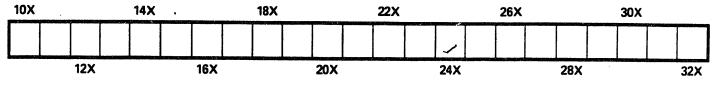
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MAGNETICAL AND METEOROLOGICAL

OBSERVATIONS

АT

LAKE ATHABASCA AND FORT SIMPSON,

AND AT

FORT CONFIDENCE.

MAGNETICAL AND METEOROLOGICAL

OBSERVATIONS

AT

LAKE ATHABASCA AND FORT SIMPSON,

BY CAPTAIN J. H. LEFROY,

ROYAL ARTILLERY;

AND AT

FORT CONFIDENCE,

IN GREAT BEAR LAKE,

By SIR JOHN RICHARDSON, C.B., M.D.

PRINTED BY ORDER OF HER MAJESTY'S GOVERNMENT.

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BY

LONGMAN, BROWN, GREEN, AND LONGMANS.

1855.

LP QC825.1.66 \$22,1 257

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PLATE II.—Showing the Diurnal Variation of the Declination at Fort Confidence, Riekiavik, Lake Athabasca, Christiania, Bossekop, St. Petersburg, Catherinenbourg, Barnaoul, Nertchinsk, Sitka, Toronto, Greenwich. (To accompany Captain Younghusband's Discussion of Sir John Richardson's Observations, page 297.)

3122499

PREFACE

BY COLONEL SABINE, R.A.

THE observations of Admiral Löwenorn, in 1786, at Reikiavik in Iceland, confirmed by Lottin in 1836, and those made by myself in 1823 at Fairhaven in Spitzbergen, also confirmed by the observations of the "Commission du Nord" at Magdalena Bay in Spitzbergen, in 1839, showed that, in the high magnetic latitudes of the northern hemisphere, the horary variation of the magnetic declination is subject to wide differences in respect of the turning hours, and the direction of the movement at the same hours of local time, from the phænomena which in the middle latitudes of the same hemisphere are found to prevail generally, and, with very slight The progress which, since the modifications, in all meridians. results of the magnetic observatories established in the last few years have been known and discussed, has been made towards the physical explanation of many of the magnetic phænomena, renders it desirable that facts which at first sight, and to minds accustomed to the comparative regularity of the diurnal variation elsewhere, have somewhat the aspect of anomalies, should be more extensively investigated and better understood. The differences which they present from the ordinary march of the phænomena are far too considerable and too consistent to be ascribed to accident: they are obviously specialities; and the particular laws which govern them will no doubt ultimately be found to be consistent with, and to form, in fact, a part of, the general laws by which the diurnal variation in all parts of the globe shall be comprehended.

But the parts of the globe where such observations can be made are little frequented, and are difficult of access; and the observations cannot be effectively made without considerable sacrifices of personal convenience. The Magnetic Survey of the British Possessions in North America—undertaken by Her Majesty's Government at the recommendation of the Royal Society, and

PREFACE.

executed by Captain Lefroy, of the Royal Artillery—and the expedition in search of Sir John Franklin and his companions, under the direction of Sir John Richardson, afforded opportunities which the zeal and public spirit of those gentlemen did not suffer to pass unimproved.

The instruments with which the observations were made were supplied from the establishment under my direction at Woolwich; and on the completion of the services, the observations were trans-On application to the Treasury, a sanction was mitted to me. obtained for their publication in the present form. The observations of Captain Lefroy, both magnetical and meteorological, have been arranged and discussed by himself, as have the meteorological observations of Sir John Richardson by himself; but on learning from Sir John Richardson, soon after his return, that his professional duties at Haslar would prevent him from undertaking the examination and reduction of his magnetical observations, they were placed in the hands of Captain Younghusband, of the Royal Artillery, then my assistant at Woolwich, by whom that portion of the volume has been The proof-sheets of the whole have been read and comprepared. pared with the original manuscripts by the non-commissioned officers of the Royal Artillery permitted by the Master General of the Ordnance to be employed in my office for purposes of a similar nature.

EDWARD SABINE.

Woolwich, December 14th, 1854.

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MAGNETICAL AND METEOROLOGICAL OBSERVATIONS

AT

LAKE ATHABASCA AND FORT SIMPSON,

Territory of the Hudson's Bay Company.

INTRODUCTION

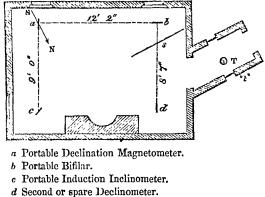
BY CAPTAIN J. H. LEFROY, Royal Artillery.

THE stations of magnetical observations established in North America in the year 1840, namely, Philadelphia, Washington, and Cambridge near Boston, in the United States; Toronto in Canada; and Sitka in Russian America; might all, with the exception of the last, be comprised in a circle of little over 200 miles radius; nor were any means at that time provided for attaining a knowledge of the absolute or relative values of the magnetical elements, or of their regular and irregular changes, in the northern parts of the British possessions; a region of peculiar interest, as comprising both the focus of maximum magnetic intensity in the northern hemisphere, and the point or pole of vertical dip. It was the principal purpose of the magnetic survey of British North America, authorized by the Government in 1841, and in part executed in the years 1843 and 1844, to supply the former deficiency; but with a view also to the latter. I was provided, in addition to other instruments, with a complete set of transportable magnetometers, of the construction of Dr. Weber, as improved by Captain Riddell; and it was arranged with the authorities of the Hudson's Bay Company, that the excursion of the first summer should terminate at Moose Factory on Hudson's Bay, where it was left optional with me to pass the whole of the ensuing winter, or to return in the course of it to Canada. The employment of these instruments in the magnetical term days, and in the observation of disturbances, was in either case the special duty of the time to be so employed. On arriving at the Red River settlement, in June 1843, I found various difficulties in the way of

INTRODUCTION.

an execution of this part of my instructions, and was led to believe that their object would be better attained by wintering at some more northern station. As Colonel Sabine, foreseeing the difficulty of precisely defining the details of a task which involved many contingencies, had kindly left me considerable discretionary latitude to be guided by circumstances, I decided on giving up the journey to Moose Factory, for that time, and selected in its place Fort Chipewyan on Lake Athabasca; not only the most northerly station which could be conveniently reached in the season, but one also whose resources would make an unexpected addition of eight persons, to the number of its occupants, a matter of no inconvenience. I reached this post with my assistant, Corporal William Henry, Royal Artillery, since Adjutant of Pensioners, on the 23d September 1843. Observations were here made every hour of the 24th from the 16th October 1843 to the 29th February following; together with very numerous extra observations on magnetic disturbances. On the 3d March 1844 I started, in company with the same assistant, and a party of four or five servants of the Company, for Fort Simpson on Mackenzie's River; we were provided with three trainaux, each drawn by three dogs, for the conveyance of the instruments and provisions; and a cariole, to which a team of four dogs was allotted, was very kindly provided by Mr. Colin Campbell for my own use, if required. The distance, which is about 350 geographical miles in a straight line, but considerably more by the course of the Slave and Mackenzie rivers, which is the route travelled, was accomplished in twenty-one days, including one day of detention at Great Slave Lake; and without other hardship or inconvenience than that occasioned by the severity of the cold, which ranged on several occasions between 30° and 40° below zero of Fahrenheit.

Fort Chipewyan is situated in latitude 58° 43' N., longitude 7^h 35' 15" W. from Greenwich, and is distant about 1,700 geographical miles from Toronto. By the exertions of Mr. Campbell,—to whose kindness, as well as to that of Mr. Lewis, the chief factor resident at Fort Simpson, and to Sir George Simpson, the Governor of the Hudson's Bay Company, I have to acknowledge the greatest obligations,—a small detached log building was erected, 18×13 feet in dimensions, especially for my use as an observatory; it was begun on the 27th September, and finished on the 13th October. No iron was used in the construction, it was furnished with an open fire place, and received light from three parchment windows, each having a small panel of glass, and so disposed as to throw light on the scales of the instruments, the arrangement of which is shown in the annexed diagram.



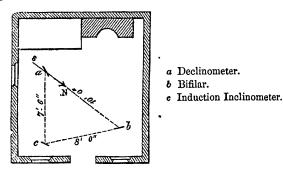
- T Portable transit instrument.
- t Thermometers.
- s Screen.

The Bifilar was screened from the direct action of the fire by a leather curtain, the Inclinometer was screened by the projection of the chimney; the whole were mounted on firm wooden pillars disconnected from the floor. The internal temperature ranged from $+61^{\circ}$ 0 on 19th October, to -1° 2 on the 22d January; we have even the mean for 24^h as high as 52°'8 on 18th October, and as low as 15°'2 on the 8th January. The extremes of cold usually occurred on Monday morning, the room not being occupied on the Sunday.

The system of relief adopted to carry out a series of hourly observations with only one assistant, was this: A observed from 8 P.M. to midnight, and on retiring aroused B, who observed from 1 to 5 A.M.; he in turn retiring, again aroused A, who resumed the observations at 6 A.M., and so on for four hours alternately. It will not be found that the omissions are numerous, the fatigue of this system, maintained for so many months, being considered. I have much pleasure here in acknowledging the assistance rendered by Mr. T. Dyke Boucher, the junior resident of the fort, upon several occasions. T have before acknowledged the zeal and spirit with which Corporal Henry devoted himself to his laborious dutics throughout the magnetic survey.

The building given up to my use at Fort Simpson as an observatory and dwelling-room, was also a detached wooden building on the north side of the principal house; which has since been removed to a point a little further back from the river. It was close to the then north-west angle of the inclosure. Care was taken to keep out of it, while occupied as a sitting-room and bed-room, all

guns, axes, and utensils of iron. The annexed diagram represents the arrangement of the instruments :---



The Declination Magnet produced an effect of -0.3 div. on the scale reading of the Bifilar, and of -1.8 div. on that of the Inclinometer. The Bifilar Magnet produced an effect of +1.7 div. on the scale reading of the Inclinometer, but no sensible effect on that of the Declinometer; the effect of the Inclinometer Magnet was +0.6 div. on the Bifilar, and of -0.5 div. on the Declinometer.

Fort Simpson is situated in latitude $61^{\circ} 51'^{\cdot}7$ N., longitude $8^{\rm h} 5' 40''$ W. from Greenwich, and is about 1,800 geographical miles distant from Toronto; its distance from the Russian Observatory at Sitka is about 460 miles, that of Fort Chipewyan from the same point being 780 miles.

I have endeavoured in the following pages to pursue the comparison of the phenomena observed, as far as the data admitted, through the registers of all the Magnetical Observatories in North America; reducing the results to a common unit, by means of the scale co-efficients given in the respective publications of the Observatories. As the observations at Toronto have been published since the completion of these reductions, it is necessary to observe that the scale co-efficient of the Bifilar at Toronto, here employed, —namely, k = `0001057 X,—was determined by an extensive series of experiments of Deflection made in 1848, in conformity with a circular of Instructions addressed at that time to Directors of Magnetical Observatories.

It has been found necessary to omit the detail of a part of the observations on Magnetical Disturbances and Term Days, for want of space.

Woolwich, July 1854

J. H. LEFROY.

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ERRATA.

The reader is requested to make the following corrections :---

Page 18. Near the foot, for fourteen-inch, read fifteen-inch.

" 19. Heading of Table X., for 14-inch, read 15-inch.

, 65. Near the foot for $\frac{\Delta R}{R}$ read $\frac{\Delta \phi}{\phi}$.

- " 75. Near the top, after evident, insert that.
- " 75. Near the foot, for substracted, read subtracted.
- , 79. Line three from foot, for does, read it does.
- " 80. Heading, insert VIII., after the word Table.
- " 106. Table L., heading, for extremes of each instrument, &c., read comparison of selected days at three stations, with reference to the degree of disturbance which prevailed.
- " 140. Above the centre, after or Fort Simpson, add with two exceptions, and bracket [October 24] and [December 8].
- " 140. Below the centre, for all coinciding, read two of them coinciding, and bracket [October 19].
- " 142. Table LXV., midnight, January No. of A., for 7, read 6; at the foot, for 51, read 50; in column of total, for 23, read 22. See below, p. 169. Again, 17^h February No. of A., for 2, read 3; in column of total, for 12, read 13.
- " 148. First line, for Table LXVII., read Table LXVI.
- " 152. Before the Table, dele together with the values of those quantities.
- " 153. Near the top, for but five instances, read but four instances; and dele November 27.
- , 167. Foot-note, for -3° , read $-37^{\circ} \cdot 8$.
- " 169. At 18^d 20h, the entry of Aurora at 20^h 45^m belongs to January 17s.
- " 178. February 29^d 0^h, after the entry, add, idem 1^h.
- " 298. Second line, for second, read first.

MAGNETICAL OBSERVATIONS

AT

LAKE ATHABASCA AND FORT SIMPSON.

ADJUSTMENTS, ABSTRACTS, AND COMMENTS.

SECTION I. DECLINATION.

e ge

MAGNETICAL OBSERVATIONS.

SECTION I.

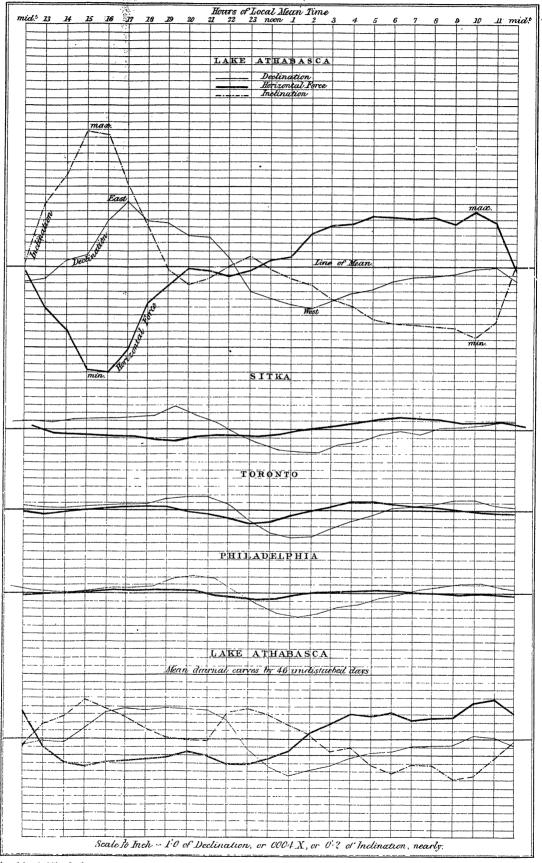
MAGNETIC DECLINATION.

Declinometer, 12th October 1843.—The adjustment of this instrument consists in levelling the base, and turning the arm which carries the Telescope in azimuth, until the central division of the scale coincides with its line of collimation. This being done, the value of the ratio $\frac{H}{F}$, for the coefficient of torsion, was found to be $\frac{1}{1452}$, whence one division of the scale = a $(1 + \frac{H}{F}) = 1'.00069$. The Magnet was 3 inches in length, and suspended by a single thread of silk. The effect of the massive copper box in which it was suspended was such, that the Magnet was generally at rest, and underwent considerable changes without vibration. Increasing numbers on the scale denote an easterly movement of the north end of the bar.

Absolute Declination.—The following observation was made with the Collimator Magnet, c. 9. October 16th 1843, to determine a zero value of the Declinometer scale. The portable Theodolite was levelled, and made to coincide approximately with the magnetic axis of the Collimator, then directed to the sun, and the transit of both limbs observed; after reading off the verniers, it was again directed to the magnetic axis of the Collimator, and a series of simultaneous readings of the scale and of the Declinometer were taken. The sun was too low at the conclusion to allow the Theodolite to be referred to it again.

B 2

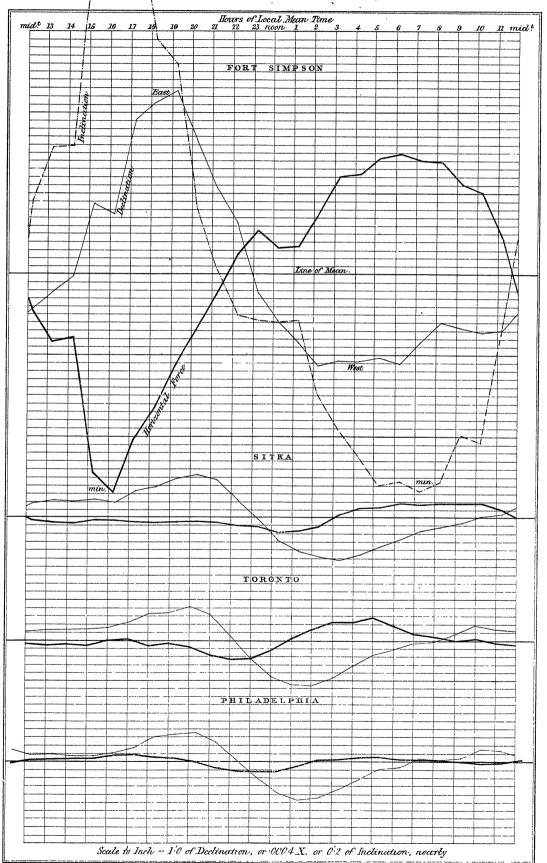
Simultaneous Mean Diurnal Variation of the Declination, Horizontal Force and Inclination, at Lake Athabasca, North America, October 1843 to Fibruary 1844 inclusive, also of the Declination and Horizontal Force for the same period at three other Stations.



Day & Con Lath to the Queen.

Simulta =| Horizontal | April and May| mai

neous Mean Divernal Variation of the Declination, Force & Inclination, at Fort Simpson on M^cKenzie's River, 1844, also of the Declination and Horizontal Force at three other American Stations for the same period.



Toronto, December 4, 185:

Mean Scale reading of the Collimator, 76'72, corresponding to 409'20 on the scale of the Declinometer. Point of scale on magnetic axis, 82''06, each division is equal to 2''51, showing a deviation of the Telescope of 13''13 to the West.

Mean reading of Verniers	249 °	° 29′	'83
Deviation of Telescope to the West -		13	13
Reading of magnetic axis	940	42	· 06
Reading of Sun's centre	249 99		83
iteaung of Sun's centre		9	
Magnetic azimuth of Sun's centre at 3 ^h 52 ^m 49	рв _		
App. T	150	33	'13
The Sun's true azimuth at 3 ^h 52 ^m 49 ^s , App. T.	122	2	•31
Variation East, corresponding to 409' 2 on	·	ة فيستعديها	
scale – – – – –	2 8	30	·82

The absolute values corresponding to the mean scale reading for each fortnight, will be found at p. 13, Table IX. The mean of the whole is 420'93, and the corresponding absolute Declination 28° 42''6.

Diurnal Variation of the Declination.

Before proceeding to examine the mean diurnal curves for the four and a half months of observation at Lake Athabasca, it will be useful to obtain a general idea of the magnitude of the changes to which the Declination is liable at this station and at Fort Simpson. The following Table has been drawn out with this view, showing the difference between the highest and lowest hourly readings, and between the highest and lowest readings, observed in each Göttingen day; the latter shows the actual range of the element, the former is requisite for comparison with other stations. The Table may be referred to, also, for the dates of disturbances.

TABLE I.

		In the hou	rly Series.	Obse	rved.	Range.		
Date.		Highest.	Lowest.	Highest.	Lowest.	Hourly.	Total.	
1843 :					,	1	·· /	
October	1	_		-				
33	2			-				
• 33	3		-	-		-		
**	4	-		<u> </u>				
**	5	-						
37	6	i						
,,,	7			-	— .			
**	8			—				
73	.9		-	=				
97	10			—				
,,	11	-				-		
**	12					-		
**	13			-		-		
1)	14					-		
"	15	101.0	405.1	507.9	0.50.4		155.5	
9 2	16	491.6			352.4	86*5		
*	17	448.3	392.3	466'0	356.2	56.0	109.8	
"	18	424.4	403.0	432.0	369.6	21.4	62.4	
"	19	436.0	382.0	436.0	382.0	54.0	54'0	
2 7	20	430.0	406.0			24.0	-	
"	21 22	426.6	403.0			23.6	-	
"	22 23	S. 422.0	411.0		-	11.0	-	
"	25 24	422 0		456.2	408.2		48.0	
,,	24 25		408.2	400 Z 523·4	396.0	27.8		
- 77	25 26	479.8				73°8	127.4	
"	20 27	434.6	388.0 408.0	437.0	388.0 404.0	46°6 42°5	49 °0 46°5	
"	21 28	425.0	391.0	458.0	1	34.0	67.0	
>>	20 29	-425 U S.	091.0	400 0	391.0	040	010	
"	30	490.0	387.5	490.0	386.0	102:5	104.0	
"	31	457.8	406.0	470.0	406.0	51.8	64.0	
"	01	101 0	400 0	4100	1 200 0	010	040	
November	r 1	423.6	412.0]		11.6		
	2	423.5	375.0	428.4	326.0	48.5	102.4	
"	3	425.0	408.6	460.2	359.4	16.4	100.8	
"	4	432.0	404.2	400 2	000 1	27.8	100 0	
**	5	S.	101 2			21 0		
37	6	464.0	410.0	464.0	404.0	54.0	60.0	
"	7	422.0	400.2	U FUF	TOTO	21.8	000	
"	8	475.4	407.8	475.4	404.0	67.6	71.4	
9 7	9	422.8	415.2	430.0	415.2	7.6	14.8	
22 1	10	423.8	408.2	429.8	408.2	15.6	21.6	
**	11	420.8	404.0	143 0	100 2	16.8		
>> #/	12		1010			100		

Daily Range of the Declination.

5

TABLE I.—continued.

-		In the ho	urly Series.	Obs	erved.	Range.		
Date.		Highest.	Lowest.	Highest.	Lowest.	Hourly.	Total.	
1843	:	1	. 11	,		-1	5.9	
Novembe	e r 13	438:0	402.6	438.0	402.6	35.4	. 35.4	
"	14	426.0	407.0	432*6	349'0	19.0	83.6	
"	15	433.2	470.2	·		23.0	-	
"	16	440.0	408.0	440'0	403.0	32.0	37.0	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	17	422.0	412.0			10.0		
3)	18	421.1	405.0			16.1		
	19	S.						
"	20	433.0	413.4	-		19*6		
35	21	422.0	411.8			10.2		
3 7	22	436.5	411.8			24.7		
"	$\frac{22}{23}$	422.0	412.5			9.5		
79	$\frac{23}{24}$	436.2	408.2	444.0	408.2	28.0	36.8	
"		420 2	408 2	422.0	408 2 412.8	28 0 7.4	9°2	
"	25		412 0	422 0	412 0	14	92	
"	26	S.	414.0					
37	27	423°0	414.0			9.0	-	
•>	28	430.0	408.0	-	-	22.4	-	
\$ 3	29	425.5	401.6			23.9		
"	30	434'0	409'0	434.0	404'0	25.0	` 30•0	
Decembe	r 1	430.8	390.0	453.2	324.0	40.8	129-2	
	$\hat{2}$	450.1	414.2	484.0	414.2	35.9	69.8	
32	3	S.		101 0				
**	4	422.0	412.8			9.2		
' 22 ,	5	427.0	405.0	439.0	394.4	22.0	45.0	
37	6	436.5	411'8	450.0	411.8	24.7	38'2	
"	7	421.5	411 8	400 0	411 0	7.6	00 4	
>>				101.0	396.0			
37	8	464.2	396'0	464.2	890 V	68·2 17·6	68'2	
23 ⁸	9	424.0	406'4			17.0		
**	10	S.	10510	-	-			
	11	427.0	405.0		-	22.0		
	12	428.4	410.4	- 1	-	28.0		
"	13	428.2	416.2	-	-	12.0	Filment	
"	14	434.0	422.6	-	-	Í1·4		
ć 😕	15	431.0	416.4			14.6	-	
,,	16	428.2	415.0			13.2		
,,	17	S.	-		-			
,,	18	429.5	413.4		-	16.1		
,,	19	451.5	416.8	452.0	416.8	34.7	35.2	
**	20	438'2	408.0	458.2	408.0	30.2	30'2	
,,	21	426'0	410.0	426'3	407.8	16.0	18.2	
,,	22	425.6	410.6			15.0	-	
"	23	422.8	414.0			8.8	-	
••	24	S.			_	_	-	
	25	Christma	is Day.					
					1			
97 39	26	429'5	416.0			13.2		

.6

TABLE I.—continued.

		In the hour	rly Series.	Obse	rved.	Rang	ge.
Date.		Highest.	Lowest.	Highest.	Lowest.	Hourly.	Total.
1843 :		1	İ			1.	,
December 2	8	477.8	400.4	477.8	400.4	77.4	77.4
	29	438.5	412.0	438.5	368.0	26.5	70.5
	30	433.4	411.8		-	21.6	
	31	S .					
1844 :							
January	1		—		, 	·	
,,	2	443.0	414.4	-		28.6	
* **	3	429.5	419.0	15010		10.5	
>>	4	460.0	384.0	470.0	384'0	76°0 88°8	86 °0 91 °6
	5	497.2	408.4	500°0 458°0	408.4	60.0	66 .0
	6 7	452.0	392.0	400 0	392.0	000	00 0
,,	8	S. 436*4	408.0	447.8	408.0	28.4	39.8
> ?	9	436.5	416.0	41/0	400 0	20.5	
37	10	443.8	405.0			38.8	· · · · ·
<i>"</i>	ii	436.0	416.0			20.0	
.,	12	450'8	417.2			33.6	
	13	434.0	420.2			13.8	
	14	· S.			·`		
	15	434.0	419°0			15°0	
	16	433'0	418.9			14.1	
	17	438.0	412.2	438.0	412.2	25.8	25.8
	18	440.0	420.0			20.0	
	19	448.0	423.0	454.0	423.0	25.0	31.0
37	20	434.0	414.8	-	- 1	19.2	'
•7	21	S.	100.0		-	38.2	
,,	$\frac{22}{23}$	$444^{\cdot}2$ $436^{\cdot}5$	406.0			16.2	
57	$\frac{23}{24}$	480.4	413.8	515.0	379.2	66.6	135.8
•/	25^{-1}	551.0	419.0	551.0	416.0	132.0	136.0
>> >>	26	443.0	414.0	001 0	110 0	29.0	100 0.
	$\overline{27}$	436.0	418.2	445.0	418.2	17.8	26.8
37	28	S.					
37	29	434.4	410.4			24.0	-
,,	30	432.0	413.0			19.0	-
>>	31	432.2	394.4	-		37.8	-
February	1	476.0	411.4	486.7	341.0	64.6	145.7
"	2	439'0	373.0	439.0	373.0	66.0	66.0
,,	3	428.0	396.0		-	32.0	
	4	S.					1
,,	5	449.6	399.1	504.4	348.0	50 5	156'4
,,	6	437.8	409.0	442.6	398'6	28.8	44.0
37	7 8	439.0	410.2	150.0	408.6	28·8 42·0	50.4
**	9	430 6	408.6	459.0	400 0	42 0	
\$? \$7	10	451.5	417.0			34.2	

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TABLE	I.—continued.
1. L	

	In the hourly Series.		Obse	erved.	Range.	
Date.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Total.
1844 :]	1	, ,	,
February 11	S.	· · · ·		-		· <u> </u>
" 12	436.0	416.0	- 1		26.0	
" 13	434.4	417.2		Noncon	17.2	•••••
" 14	431.0	410.5			20.5	
" 15	436.0	414.0	-		22.0	·
,, 16	436.0	413.8		-	22.2	-
" 17	438.2	414'6			23.6	-
" 18	S.	·				-
" 19	436.4	417'8			18.6	
,, 20	429'8	416'6			13.2	
" 21	439.6	410'0			29.6	finese
,, 22	435.2	415.5			19.7	
,, 23	430.4	412.8	434°0	412.8	17.6	21.2
" 24	435.0	422.0	440.6	417.0	13.0	23.6
" 25	S.				~	
,, 26	444.0	419.0	444.0	419.0	25.0	25.0
" 27	440.0	418.4			21.6	-
,, 28	437.7	401.0	π		36.7	
" 29	447.8	413.0			34.8	-

Fort Simpson, Machenzie's River.

April	1	498.0	420.2			77.8	<u></u>
· ,,	2	542.1	431.8	608.0	401.4	110.3	206.6
,,	: 3	550.0	438.8	572.0	424.2	111.5	147.8
,,	4	499.6	429.2)	70.4	
	5	Good	Friday.		- 1		
	6	475.0	430°0	-	-	45.0	
**	7	S .	`	*	-		
,,	8	462.8	426.0	·		36.8	
37	. 9	505.4	452.0		-	53.4	-
,,	10	506.0	450'0	548.0	450.0	56.0	98.0
37	11	480.0	456'0			24'0	
**	12	477.0	460.5			16•5	
"	13	490.8	448.0			42.8	
,,	14	S.					
39	15	558°0	442.0	584.0	442.0	116.0	142.0
**	16	509.7	430.2	600.3	390.2	76°5	210.1
**	17	583.5	433.0	880.0	433'0	150.2	447.0
"	18	493.0	468.0			25.0	
**	19	499.5	473.0			26.5	
,,	20	516.0	474.6	530.0	474.6	41.4	55.4
	1						
,,	21	S.					
,,	22	401.8	364.4		-	37'4	
,,	23	422.0	369.2	-		52.8	
,,	24	402.3	374.0	416.6	374.0	28.3	42.6

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TABLE I. - continued.

		In the hou	rly Series.	Observed.		Range.		
Date.		Highest.	Lowest.	Highest.	Lowest.	Hourly.	Total.	
1844 :	· ·					, ,	, <i>י</i>	
April	25	526.2	857.3	584.0	335'7	16819	248:3	
, ,,	26	470.0	308.4	470.0	308 4	161.6	161.6	
39	27	419.6	362.4	426'9	362.4	57.2	64'5	
,,	28	S .		·			ن شم	
22 J	29	509.0	379.2	520.0	363 2	129.8	156.8	
	30	458.0	346.9	531.2	346 9	111.1	184.3	
May	1	413.5	372.0	438'6	372.0	41.5	66'6	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	2	420°0	380.2	420.0	360.0	39.8	60°0	
	3	458.0	386.0	513.4	386.0	72.0	127.4	
,,	4	415.8.	372.0	464'3	372.0	43.8	92.3	
33	5	S .						
	6	426'0	390'8			35.2		
, j	7	424.6	374.0	430.0	373.6	50°6	56.4	
>>	8	438.0	373.6			64.4	, 	
	9	459.0	390.2			68.8	-	
,,	10	434.0	393 ° 6			40.4		
33	ì 1	435 2	380.2			55.0		
,,	12	⁻ S.	·					
,,	13	428.0	388.0	428.0	375 9	40.0	52.1	
,,	14	446.0	392.0	461.2	392.0	54'0	69 🔒	
"	15	438.8	402.0			36.8	iledi.	
,,	16	454.4	406.4	454.4	406.4	48.0	48 '0	
"	17	431.0	406'0			25.0	-	
,,	18	432.0	403 2			28.8		
,,	19	S.				-	-	
,,	20	430'0	407.4			22.6	ا رسمه ا	
,,	21	441.8	403.2			38.6		
,,	22	534.0	390.2	554.0	370.0	143.8	184.0	
"	23	465.0	384.4	541 °6 .	388.2	80.6	153.4	
•,	24	448.0	404'0	494.0	402.0	44.0	72.0	
` > >	25	Incom	plete -	462.1	410.0		52.1	

Since the date of these observations, a considerable extension has been given to our knowledge of the occasional amount of irregular or disturbed movements, by the remarkable disturbances of 1847 and 1848. In those years a range exceeding 4° was three times recorded at Toronto; but from 1840 to 1847, the greatest range of Declination attained at this station in any one disturbance, was 2° 15', and if we compare the above ranges at Lake Athabasca and Fort Simpson with those of the same season at Toronto, it will be obvious that their magnitude increases in a much higher ratio than that of the inverse proportion of the Horizontal Force at these stations, which is as 7:4 nearly. There were 116 days of observation at Lake Athabasca between 16th October 1843 and 29th February 1844, having 23d December for their middle period. There were 46 days of hourly observation at Fort Simpson, between 1st April and 25th May, having 27th April for their mean period. By classifying the ranges according to magnitude, we have the following results:—

Daily Change	Lake A	thabasca.	Fort Simpson.			
of Declination.	Hourly Observations.	Hourly and extra.	Hourly Observations.	Hourly and extra.		
Less than $10' - 15' - 10' - 15' - 20' - 25' - 25' - 25' - 25' - 35' - 35' - 35' - 35' - 40' - 40' - 45' - 45' - 50' - 55' - 55' - 60' - 55' - 55' - 60' - 55' - 65' - 70' - 70' - 75' - 75' - 80' - 90' - 100' - 110' - 120' - 100' - 110' - 110' - 120' - 2^{\circ} - 3^{\circ} - 3^{\circ} - 4^{\circ} 10'$ Above 7° -	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} 6\\ 17\\ 13\\ 20\\ 12\\ 6\\ 10\\ 2\\ 4\\ 2\\ 0\\ 3\\ 5\\ 2\\ 1\\ 2\\ 1\\ 4\\ 0\\ 7\\ 0\\ 0\\ 0 \end{array} $	$ \begin{array}{c} 0\\ 0\\ 1\\ 2\\ 5\\ 0\\ 6\\ 7\\ 2\\ 4\\ 3\\ 1\\ 1\\ 2\\ 2\\ 1\\ 0\\ 0\\ 4\\ 5\\ 0\\ 0\\ 0 \end{array} $	0 0 1 2 4 0 5 4 2 3 3 3 3 2 1 0 2 0 0 6 4 1		

TABLE II.

The greatest range in any one day during the winter at Lake Athabasca was $2^{\circ} 35'$, on the 16th October 1843; and the greatest during the spring at Fort Simpson was $7^{\circ} 27'$, on the 16th April 1844. Upon the last occasion, however, the actual difference of scale reading observed was $8^{\circ} 10'$, the westerly extreme falling on April $16^{d} 19^{h} 50^{m}$, and the easterly on April $17^{d} 1^{h} 24^{m}$; this is believed to be the greatest range hitherto recorded. During the same season the distribution at the three permanent Observatories in America was as follows :—

'	T.	AE	É	É	III.

	16th Oct. 184	3-29th Fe	b. 1844.	April-	April—May 1844.				
Acres 1	Philadelphia.	Toronto.	Sitka.	Philadelphia.	Toronto.	Sitka.			
Less than 10' - 10'	103 13 0 0 1 0	94 19 1 2 1 1	81 29 12 4 3 3	23 22 6 1 0 1	8 / 32 5 3 1 2	6 31 18 3 0 3			
	117	118	132	,53	51	61			

The means of all the daily ranges during the above periods by the regular hourly observations, that is to say, the square roots of the mean of their squares are:—(1.) For the winter, 7''77 at Philadelphia, 9''56 at Toronto, 11''64 at Sitka, and 33''8 at Lake Athabasca: (2.) For the spring, 12''32 at Philadelphia, 15''17 at Toronto, 18''40 at Sitka, and 75''6 at Fort Simpson. For the several months again, we have the means as follows:—

TABLE IV.

	Philadelphia.	Toronto.	Sitka.	L. Athabasca. Fort Simpson.
	,	1 .	, '	,
1843. October (the whole) ,, (16th to 31st November December 1844. January February March April May		$10.44 \\9.70 \\8.44 \\8.07 \\8.38 \\12.25 \\16.94 \\15.62 \\14.73$	$12.63 \\ 12.50 \\ 9.80 \\ 10.39 \\ 10.44 \\ 14.33 \\ 21.02 \\ 21.19 \\ 15.19 $	53 · 31 27 · 32 30 · 30 30 · 85 32 · 03
June - July -	- 12.14 - 12.85	$13.75 \\ 14.27$	$15.35 \\ 15.65$	_
August -	- 12 85 - 15.01 - 14.50	15.95	13 03 22.93 18.25	_

The observations were made at the same moment of time, at all the stations; the difference in the number of days arises from the Sunday being a day of observation at the Russian stations. There is no marked preponderance of number under any one daily range at Lake Athabasca between 13' and 29', and these two values include half the days of observation.

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It appears, then, that during the winter under comparison, the movement of the Declination Magnet, observed hourly, exceeded 15', in the proportion of fifteen days to each hundred at Philadelphia, seventeen days to each hundred at Toronto, and exactly the same at Sitka, but on eighty days of each hundred at Lake Athabasca. During April and May they exceeded 30' in the proportion of about two to a hundred at Philadelphia, four to a hundred at Toronto, five to a hundred at Sitka, but of eighty-five to a hundred at Fort Simpson, showing an increase in the liability to disturbance at these stations, which it appears difficult to attribute to the merely negative influence of a diminished directive power in the magnet.

The next Table contains the hourly means of all the observations during the winter period, with the exception of six days which are omitted at Lake Athabasca as incomplete, namely, October 20th, November 3d and 4th, January 2d, 9th, and 27th. Each Value at this station is, therefore, the mean of 110 observations at the same hour. Since the principal novelty of these means consists in their maxima being found at a period of the $24^{\rm h}$ which is not marked by a similar inflexion at any other station, they are, in the same Table, compared with the means for the corresponding periods at the other three American stations.

TABLE V.

Mean Diurnal Curves of Declination at all the American Stations, for the Period included between the 1st or 16th October 1843 and the 29th February 1844; together with the Difference of each hourly Value from the Mean of the whole; expressed in arc.

Local . Mean	Atha	basca.	Sit	ka.*	Tor	onto,	Philadelphia.		
Time.	Scale.	Diff.	Scale.	Diff.	Scale.	Diff.	Scale.	Diff.	
		1	·]	1		,		,	
Blidn.	419.07	-1.86	429.48	+ 0.95	126.51	+ 0' 36	547.52	+ 0.38	
13	419.39	-1.54	429.42	+0.89	126.25	+ 0' 17	547.12	+0.19	
14	421.83	+ 0. 90	430.08	+ 1.26	126.05	+ 0.01	546.98	+0.13	
15	422.54	+ 1. 61	430.06	+1.25	126.50	+ 0' 85	547.46	+0.32	
16†	426.76	+ 5.83	430.20	+1'32	126.91	+ 0.65	547.66	+ 0' 54	
17	429'20	+ 8' 25	430'54	+1'51	127.09	+ 0'78	548.00	+ 0. 59	
18	426.81	+ 5.84	430'74	+1.63	127.30	+ 0' 93	548.82	+0.98	
19	426.49	+ 5 56	431.08	+2.81	128.14	+ 1.54	550.98	+ 1.95	
20	424.83	+ 3' 90	430.90	+ 1.71	128.74	+ 1.97	551.38	+ 2.13	
21	424'69	+ 3.76	429.50	+0.93	128.71	+ 1.95	550'82	+1.88	
22	422.26	+ 1.33	426.82	-0.52	126.98	+0.20	547.30	+ 0. 28	
23	417.95	-2.98	424 92	-1.60	124.32	-1'22	543.82	-1'30	

* In every instance in which the observations at Sitka are referred to, the mean for the month of November 1843, as given in the Annuaire Magnetique, &c., has been corrected by adding 23'2 div. to each scale reading of Declination from 1^d 0^b to 14^d 10^b Gott, being the difference between the means for the 24^b before and after the last-named hour. This difference is permanent, and appears due to some accidental cause, although no explanation of it is given.

† 0^h Göttingen mean time at Lake Athabasca.

Local	Athabasca.		Sit	ka.*	Tor	onto.	Philad	Philadelphia.		
Mean Time.	Scale.	Diff.	Scale.	Diff.	Scale.	Diff.	· Scale.	Diff.		
1 . 1 . 1-			· [·		1		1 .		
Noon	417.00	-3.93	423.14	-2.29	122.27	-2"70	540'92	-2.65		
- 1	416.04	-4.89	422.82	-2.77	121.39	-3.33	540.14	-2.97		
2	415.72	- 5.21	422.52	-2.93	121.83	-3.05	541 02	-2. 57		
S	416 74	-4.19	424.10	-1.95	123:00	-2.12	542.50	-1.90		
4,	417.70	-3'23	425 22	-1.44	124.17	-1.35	543.90	-1.27		
5	418.05	-2'88	426.28	-0.68	125.23	-0.26	545.42	-0. 57		
6	419, 15	-1.80	427.44	-0.50	126.32	+ 0. 22	546.62	-0.03		
7	419'61	-1'32	426.64	-0.62	126.79	+ 0. 52	547.58	+ 0.40		
8 .	.419:75	-1.18	428.44	+ 0. 29	127.34	+ 0. 96	548.56	+0.84		
- 9	420°01 :	-0'92	428 52	+ 0.39	127.87	+1.34	549.10	+1.10		
10	420.70	-0'23	428.86	+ 0 58	127.88	+1.32	548.94	+1.05		
11	420'90	-0'03	429.44	+0'90	126.87	+0.65	548.14	+0.62		
	420' 97		427.81	l '	126.01		546.69	1		

TABLE V.—continued.

The observations were taken 5^m before the hours named at Lake Athabasca, 28^m after the hours named at Sitka, 3^m after at Toronto, and 19^m after at Philadelphia.

It appears that the mean diurnal changes of Declination at Lake Athabasca follow the same law as at all the other stations, so far as relates to the principal minimum or westerly extreme of the 24^h, which occurs at 2 P.M.; from this hour the Declination continues to increase until 11 PM.; it shows a westerly tendency at midnight and 1 A.M., after which it increases again, at first slowly, but between 3^{h} and 4^{h} A.M. with rapidity, until it attains its maximum or easterly extreme between 4^{h} and 7^{h} A.M., after which it begins a westerly course, conducting to the minimum at 2 P.M. This occurrence of a strongly marked maximum at the earlier hours of the morning has not been observed at any other station.*

It has been shown by Colonel Sabine, from the observations at Toronto, that no continuance of observation will give a strictly

* A second Declinometer, having a Magnet of only two inches in length, was observed from the 16th December to the 29th February. The means by 58 complete days of observation in this period are given below:

Г.Т.	Midnt.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	M.T.
e -	228.89 , -1.46	228·53 , -1·82	232.09 , +1.74	233 · 28 +2 · 93	236 46 +6 11	239·29 , +8·94	235·93 , +5·58	235·77 , +5·42	234.67 , +4.32	234·98 / +4·63	231·05 , +0·70	226·77 -3·58	
	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mean.
e -	226.07	224.57 +5.78	223·63 , -6·72	225·59 -4·78	226·81	227·28	228·32 , +2·03	229·40	229.68 -0.67	229·39 -0·96	229·24 / -1·11	230·80 +0·45	230-35
		A CONTRACTOR OF A	باباذ والثلا بيويسيا يشت	والمراجعة والمتعادية والمتعاد						The Division of the sector	and the second	State of Concession, Name	

TABLE VI.

Ä

normal curve, or one wholly free from the effects of disturbance, since the disturbing causes are not entirely irregular in their action, but have a preponderating influence in one direction. It will be shown below that this remark applies equally at the stations under consideration, consequently the foregoing mean cannot be regarded as a true representation of the normal curve at Lake Athabasca. This can only be obtained by some selection of undisturbed days, and the next Table has been formed as an approximation to it. Ŧŧ contains the mean by all those days on which no extra observations were made, assuming that circumstance to be a proof of the absence of any decided disturbance. They amount to 46, and the mean of the same 46 days at Toronto, which have been formed into a similar abstract, furnishes a direct comparison of the mean diurnal movement, uninfluenced by disturbance, or nearly so, at these two stations.

Local	L. Ath	abasc a.	Toro	nto.	Local	L. Atl	abasca.	Toro	onto.
Mean Time.	Scale.	Diff.	Scale.	Diff.	Mean Time.	Scale.	Diff.	Scale.	Diff:
		1		1			1		1
Midn.	420' 85	-0.91	416.36	+ 0.06	Noon	418.68	-3.08	412.87	-2.46
15	421'68	-0.08	416'34	+0'04	1	417.21	-4.55	411.97	-3.11
14	421.37	-0'89	416.27	-0.01	2	417.81	-3.92	412.24	-2.92
15	422.92	+1'16	416.77	+ 0' 35	3	418.44	-3.35	413.65	-1.90
16	424.91	+ 3.15	417.55	+ 0' 92	4	419.39	-2.37	414.85	-1.03
17	425.57	+ 3.81	417.81	+1.10	5	419.90	-1.86	415.89	-0'28
18	425.31	+ 3* 55	417.48	+ 0' 87	6	420'30	-1.46	416'58	+0'22
19	425 57	+ 3.81	418.05	+1'28	7	428.88	-0.88	416.82	+0.39
20	425.36	+ 3' 60	418.72	+1.76	8	420.93	-0'83	417.38	+0.29
21	425.40	+ 3*64	418.60	+ 1' 67	9	420.98	-0'78	417.60	+0.92
22	424'04	+2.32	417.11	+0.60	10	422.25	+0.49	418.06	+1'28
2 3	420.65	-1.11	414'85	-1.03	11	421.91	+0.12	417.11	+0.60
						421.76		416'29	

TABLE VII.

It appears that a partial rejection of the more disturbed days at Lake Athabasca has the effect of throwing back the hour of greatest westerly deviation to 1 P.M., but occasions very little change, and none of a systematic character, in the mid-day or afternoon branches of the curve. The principal effect is shown in the reduction of the daily variation between midnight and 10 A.M. The maximum at 5 A.M. disappears, and in its place we have a nearly uniform value prevailing from $5^{\rm h}$ to $9^{\rm h}$ A.M. constituting the easterly extreme of the $24^{\rm h}$, but materially less in amount than the corresponding value before the rejection, thus proving the unusual maximum at 11 P.M. is thrown back to 10 P.M., but the succeeding minimum is scarcely affected. The mean curve given by the corresponding 46 days at Toronto differs so little from that of the whole period, that when drawn on a scale of 10' to one inch they can scarcely be distinguished.

Proceeding now to the observations at Fort Simpson, we find the same peculiarity in a more marked degree, as may be expected from the greater magnitude of the daily ranges observed at this station. The incomplete days here are not omitted, as they form rather too large a proportion of the whole to be passed over. There were 46 days of observation, of which number twelve are imperfect. The omissions occur as follows, at

0^{h}	Gött. o	r 15 ^h	of Table VIII.	5
1.	,,	16	"	6
2	,,	17	"	2
3	"	1	"	1
	•	-		

consequently, the two first alone can be materially affected, and at twenty of the twenty-four hours the means are strictly comparable. In one of the cases at each of the above-named hours an observation taken *late* has been employed.

TABLE VIII.

Mean Diurnal Curves of Declination at all the American Stations for April and May 1844, together with the Difference of each hourly Value from the Mean of the whole; expressed in arc.

Local Mean	Fort S	impson.	Sit	ka.	Tor	onto.	Philad	lelphia.
Time.	Scale.	Diff.	Scale.	Diff.	Scale.	Diff.	Scale.	Diff.
M: J	005101	,	400100	1	100115	1		
Midn.	385'31	- 5.24	432.80	+1.91	126.17	+1'13	552.95	+0.91
13	387.98	- 2.60	433.15	+2'10	126.34	+1'26	553.10	+0.98
14	394.54	+ 3.96	433.05	+2'04	126.40	+1.30	552.70	+0.79
15*	399.05	+ 8'47	433.35	+2.22	126.67	+1.49	552.93	+0'88
16 17	402 64	+12.06	432.80	+1.91	126.89	+1'65	553.35	+1'09
		+19.89	435.25	+ 3' 27	127.67	+2.21	555.10	+1'88
18	410.90	+20.32	436.40	+ 3' 91	129.19	+3'31	557.50	+2'97
19	412.49	+21.91	438.15	+ 4 88	129'70	+ 3'68	558.45	+ 3' 40
20	408'98	+ 18 40	439.35	+ 5 55	130.40	+ 4' 18	558.50	+3'42
21	401'86	+11.58	437.95	+ 4.77	129.21	+ 3' 33	556.00	+ 2' 29
22	395 22	+ 4.64	433.45	+2.27	125.45	+0'61	551.30	+0.16
23	388'72	- 1.86	429.05	-0.17	121.60	-2'16	546.65	-1.95
Noon	385.02	- 5.56	424.15	-2.83	118.45	-4'44	542.55	-3'81
, 1	382'31	- 8.27	421'45	-4'38	117.05	-5.45	540.35	-4' 57
2	380.03	-10.55	418.85	- 5.83	116'88	- 5 57	541.25	-4'40
3	380.01	-10.22	418.50	-6.05	118.14	-4'66	542.70	-3'29
4 5	380.20	- 9'88	419.30	- 5.57	120.07	-3'27	546.05	-2'22
5	379.35	-11.53	420.80	-4'74	122'16	-1.76	548.85	-0'95
6	379.61	-10.97	424.55	-2'66	123.19	-1.03	549'40	-0'70
7	382.63	- 7'95	426.62	-1.20	124.33	-0.13	551.70	+0'34
8	\$80.53	-10'35	427'3 0	-1.14	124.42	~0.13	551.10	+ 0'07
9	381.28	- 9'00	428.02	-0.25	125.76	+0'84	552.45	+0'68
- 10	381.13	- 9.45	429'60	+0.14	127.33	+1.97	554'15	+1'45
11	383.02	- 7.51	430.40	+0.28	126.77	+1'56	553.65	+1'23
Means -	890 ' 58		429`35		124'60		550.95	

* Ob of Göttingen mean time at Fort Simpson.

The observations at Fort Simpson were made 15^{m} after the hour named, the rest as before stated.

It will be seen that a remarkable difference exists in the amount of the daily movement at Fort Simpson and Lake Athabasca, although the diurnal law is nearly the same. It is difficult to attribute this altogether to change of locality, which in this case involves but a slight change of magnetical position*; we are therefore led to connect it with the advance of the season. On referring to the Table, it will be seen that the westerly extreme at 2 P.M., which is so well marked at Toronto and the lower stations, is here prolonged for nearly four hours, during which space the magnet does not sensibly deviate from it. After 7 P.M. it returns to the eastward, but so gradually as not to attain its mean, or zero value, before 2 A.M. instead of 8 P.M., as at Toronto. Then commences a sudden and rapid increase, leading to a maximum at 7 A.M., after which a steady and rapid westerly movement takes place, which attains its limit, as already stated, at or about 2 P.M., and amounts to the very large mean quantity of 32'. The sun was above the horizon 15^h 44^m on the middle date at this station, and 5^h 56^m on the middle date at Lake Athabasca, which correspond to 13^h 48^m and 8^h 44^m on the same dates at Toronto respectively. Notwithstanding this great difference in the length of the day in December and April, it will be observed that the magnet in its regular westerly movement from 7 A.M. to 2 P.M. cuts the line of mean at or near the same hour in both periods, as it does also on its return at night towards its easterly extreme. When referred to the westerly limit, or lowest mean value, as zero, instead of to the mean of the whole twenty-four hours, the diurnal changes at Lake Athabasca for the afternoon branch do not exceed, but, upon the whole, rather fall short of those at Toronto, and at Fort Simpson they are less than those at Toronto for ten hours following that epoch, namely from 3^h to 12^h inclusive. It is the nocturnal branch at both stations which occasions the great apparent excess of their diurnal changes above the changes at Toronto.

The persistency of the magnet at its westerly extreme, in April and May, is strongly contrasted with a similar persistency at its easterly extreme, which appears to be one of the principal characteristics of the curve at Lake Athabasca in the winter. We see by Table IV. that when free from the effect of disturbances, the easterly maximum is maintained from 5^{h} to 9^{h} A.M., which suggests the inference that the effect of the advance of the season on the

^{*} The Horizontal Force is $2^{\circ}02$ at Lake Athabasca, and $1^{\circ}95$ at Fort Simpson; the inclination is $81^{\circ}37'$. 6 and $81^{\circ}52'$. 3, the total force $13^{\circ}92$ and $13^{\circ}84$, at the same stations respectively.

daily curve is analagous to that of the sun's diurnal progress, the increased power of the sun being attended by a determination of the north end of the magnet to the west, its diminished power by a determination of the same end to the east.

Comparing together the means of the four American stations for the two periods under discussion, we find that besides the different amount of the daily changes shown, they have peculiarities of a systematic character, which is apparent more particularly in those of the spring months, but not so decidedly in either group as in those of the bifilar. Referring first to the curves for April and May, it appears that the magnet attains its daily limit to the westward at nearly the same hour at Toronto and Philadelphia, namely, 2 P.M. or thereabouts, and then commences an immediate return towards its mean position; it reaches the same limit about half-past three at Sitka, and its return is more gradual. It would appear from the general character of the curve at Fort Simpson that its turning hour is there as late as 5 or 6 P.M., and the return is effected still more slowly. The hour of attaining the easterly limit does not appear to vary much. The number of hours at which the magnet is to the eastward of its mean position is, however, considerably less at the more northern than at the southern stations, which results from the easterly tendencies during the night having the effect of raising the mean scale reading, and throwing the readings in the latter hours of the afternoon and evening relatively to the westward. The numbers for the winter group are sixteen at Philadelphia, seventeen at Toronto, fourteen at Sitka, and nine at Lake Athabasca; for the spring group, sixteen, fourteen, thirteen, and nine respectively.

The mean scale readings at both stations show an increase of Easterly Declination, which was slight in the winter months, and very rapid in the spring. Taking the means for each fortnight, and referring them to absolute values, we have the following series. The approximate means for the same periods at Sitka, are inserted for comparison.

1 scale division = 0^{\prime} 553.				Sitka.		Lake Athabasca.
		Ì				0 /
1843. Oct. 16 to Oct. 21	-	-	-	-	-	414.24=28 35.8 E.
Oct. 22 to Nov. 4	-	-	-	-	-	415.84=28 37.4
Nov. 5 to Nov. 19	-	-	-	-	-	416'61=28 38'2
Nov. 20 to Dec. 3	-	-		427.94		417'58=28 39'2
Dec. 4 to Dec. 17	-	-		423.02		419'28=28 40'9
Dec. 18 to Dec. 31	-	-		427.74		$421^{\circ}26 = 28\ 42^{\circ}9$
1844. Jan. 1 to Jan. 15	-	-		427.54		425.71 = 2847.3
Jan. 16 to Jan. 29	-	-		424'25		427.32 = 28.48.9
			n			

TABLE IX.

· · ·		Sitka.	Lake Athabasca.
1844. Jan. 30 to Feb. 12 -	_	420.69	423·32=28 44·9 E.
Feb. 13 to Feb. 28 -	-	423.47	424.63=28 46.2
Feb. 26 to Mar. 10 - Mar. 11 to Mar. 24 -	-	$426^{\circ}95$ $427^{\circ}84$	Fort Simpson.
Mar. 25 to April 7 -	-	431 • 93 429 • 44	$358.14 = 36^{\circ} 53.1 \text{ E.*}$ 385.92 = 37.26.9
April 8 to April 21 - April 22 to May 5 -	-	431.58	400'33 = 3741'3
May 6 to May 19 - May 20 to June 2 -	-	433 • 17 431 • 69	418.21=37 59.2
may 20 to 5 une 2 -	- 1	101 03	

TABLE IX.—continued.

The regular character of the progression makes it difficult to attribute the easterly movement, from October 16th to the end of January, to any accidental or instrumental cause, still more so the much more rapid movement in April and May; the latter is the more difficult to account for, as the effect of Disturbances at Fort Simpson in those months appears to have been less exclusively easterly than during the previous period at Lake Athabasca. The means at Sitka, which are derived for the present comparison from the three equidistant observations of 0^h, 8^h, and 16^h, Gött., show no similar tendency from November to January, and but a slight one from February to May. We have, however, a similar result from the observations of Sir John Franklin at Great Bear Lake in 1826, which give the mean Declination in February 38° 41' 6, and in March 38° 50' 2 E. As no observations were made by Sir J. Franklin at those hours of the night which are now shown to include, in these latitudes, the extreme easterly movements, the difference in this case is probably within the truth. The effect of Disturbances being greater in March than in February, would have increased the relative easterly value of the former month.

In all the foregoing tables, the movements of a three inch-magnet at one station have been regarded as comparable with those of a fourteen-inch magnet at the other, without consideration of the difference of their size and weight. It appears, however, from a comparison of the mean diurnal curves, deduced from observations of two magnets of these dimensions respectively at Toronto, that there is a slight and apparently specific difference between them. The diurnal variation by the small bar is greatest from 8 P.M. to 5 A.M., and least from 6 AM. to 8 P.M., with an exception at 1 P.M. only; that is to say, the Declination by the larger magnet is slightly more

* The regular division is continued at Sitka; at Fort Simpson the fortnights are taken from April 1st to 14th, and so on.

easterly during the day, and less easterly during the night, than the Declination by the smaller bar, and this peculiarity presents itself in every month, but the amount is not sufficient to affect any of the foregoing conclusions. A difference of a similar nature is observable between the mean diurnal curves by two bifilar magnets of corresponding dimensions.

TABLE X.

Comparison of the Diurnal Variation of Declination from the Register	
of a large and small Declinometer at Toronto in 1847.	

Time.	14-Inch Magnet.				3-Inch Magnet.			
Tune.	June.	July.	Aug.	Mean.	June.	July.	Aug.	Mean.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	+2.73 +5.25 +5.98 +6.16 +4.49 +1.77 -1.89 -4.87 -5.95 -5.02 -3.43 -1.88 -1.02 -0.11 +0.14 +0.14 +0.74 +1.25 -0.07 -0.26	$\begin{array}{r} -2 \cdot 01 \\ -5 \cdot 61 \\ -6 \cdot 78 \\ -5 \cdot 93 \\ -4 \cdot 76 \\ -3 \cdot 03 \\ -0 \cdot 97 \\ -0 \cdot 29 \\ -0 \cdot 74 \\ -0 \cdot 27 \\ -0 \cdot 59 \\ +1 \cdot 10 \\ +0 \cdot 82 \\ -0 \cdot 05 \\ -0 \cdot 13 \end{array}$	$\begin{array}{c} & & & \\ & +2\cdot27 \\ & +3\cdot68 \\ & +6\cdot05 \\ & +8\cdot47 \\ & +8\cdot15 \\ & +5\cdot92 \\ & +0\cdot89 \\ & -7\cdot43 \\ & -9\cdot20 \\ & -7\cdot43 \\ & -9\cdot20 \\ & -8\cdot23 \\ & -9\cdot20 \\ & -3\cdot84 \\ & -9\cdot20 \\ & -0\cdot32 \\ & -0\cdot32 \\ & +0\cdot52 \\ &$	' +1·40 +2·64 +5·78 +7·21 +7·08 +5·13 +1·49 -2·34 -5·97 -7·43 -6·28 -3·43 -0·50 -0·43 -0·15 +0·20 +0·87 +0·37 +0·38	$\begin{array}{r} -5.05 \\ -6.39 \\ -6.08 \\ -5.19 \\ -3.65 \\ -2.05 \\ -1.10 \\ -0.15 \\ +0.43 \\ +0.12 \\ +1.08 \\ +1.20 \\ +1.49 \\ +0.29 \\ -0.05 \end{array}$	$\begin{array}{r} -5.64 \\ -6.34 \\ -6.15 \\ -4.97 \\ -3.20 \\ -1.02 \\ -0.36 \\ -0.73 \\ -0.08 \\ -0.30 \\ +1.75 \\ +1.39 \\ +1.07 \end{array}$	' +2·40 +4·04 +6·08 +7·95 +7·75 +5·55 +0·68 -3·15 -7·36 -8·95 -8·95 -8·95 -6·50 -2·21 -0·33 -0·42 -0·18 +1·71 +0·75 +0·68 +0·73 +1·45 +0·88 +0·81	' +1·48 +2·89 +5·63 +6·78 +6·79 +4·83 +4·10 -2·61 -6·02 -7·23 -6·84 -5·55 -3·64 -1·76 -0·60 -0·43 +0·06 +0·51 +1·19 +1·09 +1·10 +0·61 +0·28 +0·28

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HORIZONTAL FORCE.

SECTION II.

BIFILAR MAGNETOMETER.

The instrument employed was a small transportable biflar, provided with a hollow 3 0-inch magnet, weighing 207 grains. The reading telescope was carried by an arm connected with the base of the instrument, so that the copper box and suspension apparatus turned with the telescope. The azimuth circle read by verniers to single minutes, the torsion circle to 5' 0. The suspension silk was about 9 inches long. The arc value of each division of the scale attached to the telescope was 2' 0.

Adjustment, 13th October 1843.—(1.) The reading telescope was brought to the magnetic meridian by attaching the magnet to an unifilar suspension and bringing the central division of the scale (210) to the wire. The azimuth circle read $302^{\circ} 55'$, declination 428, whence $302^{\circ} 45'$ corresponds to the scale reading 418 °0 found at the next step.

(2.) The magnet was next attached to a bifilar suspension of waxed silk, the north end pointing to the north, and the torsion circle turned until the same division was on the wire, showing the plane of detorsion to coincide with the meridian. At the first trial the force of torsion was too great, the interval of the threads was in consequence reduced; this, however, altered the position of the plane of detorsion, and it appears that in adjusting it afresh to the meridian, the telescope was inadvertently moved 34' to the west, the next reading of the horizontal circles being 302° 11' instead of 302° 45'. The plane of detorsion, therefore, instead of being in the meridian, was in such a position as to deflect the magnet 34' to the westward, or rather, correcting for a small change of declination, $33' \cdot 2$ to the westward. If (u) and (v) be the angles at which the magnetic force and the force of torsion act on the magnet, we have in every position of equilibrium $\frac{F}{G} = \frac{\sin v}{\sin u}$, and in the present case $\frac{F}{C^2} = 0.86$, and u = 33'.2, hence v = 28'.4, and the angle $u + v = 61''_{0}$, being the angle by which the plane of detorsion

HORIZONTAL FORCE.

differed from the meridian to the westward. The reading of the torsion circle was $58^{\circ} 50'$, whence the true position of the plane of detorsion was $58^{\circ} 50' + 1^{\circ} 1' \cdot 6 = 59^{\circ} 51' \cdot 6$, which is the datum employed. Declination 418 0 scale reading of bifilar 209 6 (for 210).

(3.) The telescope was now turned 90° in azimuth, from the assumed meridian, or 90° 33' 2 from the true one; the division of the scale at right angles to it was therefore 226'6 instead of 210, and the torsion circle being turned until the scale read 208, the magnet was carried 37' 2 beyond the position intended, namely, that at right angles with the magnetic meridian. The torsion circle read 0° 15' Declination 416'5.

In the equation $\frac{\mathbf{F}}{\mathbf{G}} = \frac{\sin v}{\sin u}$ we have therefore $u = 90^{\circ} 37'^2$ instead of 90°, which somewhat diminishes the sensibility of the adjustment, but is otherwise unimportant. $v = 59^{\circ} 51' \cdot 6 - 0^{\circ} 15' =$ $59^{\circ} 36' \cdot 6$, also $a = 2' \cdot 0$, whence the value of one division of the scale in parts of the Horizontal Force was

 $k \equiv a \cot a v \equiv 0003432.$

Increasing numbers denote increasing Horizontal Force.

It appears that the scale readings decreased regularly until January, showing the north end of the magnet to be carried from the meridian to the south of west; the readings increase again in February, and this circumstance, coupled with that of a contrary change in the inclinometer scale readings, makes it appear that in part, at least, the effect was due to a real increase of Inclination and decrease of Horizontal Force in the winter months, having respectively their maximum and minimum in the latter portion of the month of January. Mixed up with this periodical change there is probably also a loss of magnetic moment in the bifilar bar, and an increase of permanent magnetism in the soft iron bar of the The fortnightly mean scale readings of both instruinclinometer. ments are collected in the following table. Dr. Lloyd having shown that any three equi-distant observations give, very nearly, the true mean of the twenty-four hours, that principle has been applied in the present and all the similar tables, to obtain true mean scale readings for days on which one or more observations were omitted, by the simple proceeding of omitting, also, the corresponding readings of the imperfect triplet or triplets, and taking a mean of the remainder or perfect triplets.

TABLE XI.

Fortnightly Mean Scale Readings of the Bifilar and Inclinometer at Lake Athabasca.

Date.	Period.			Inclino-		
	1 enou.	 Observed.	Temp.	Corrected.	Angle u.	meter- corrected.
1843 " " " " 1844 " "	Oct. 15 to Oct. 22 Oct. 23 to Nov. 5 Nov. 6 to Nov. 19 Nov. 20 to Dec. 3. Dec. 4 to Dec. 17 Dec. 18 to Dec. 31 Jan. 1 to Jan. 15 Jan. 16 to Jan. 29 Jan. 30 to Feb. 12 Feb. 13 to Feb. 27	 $\begin{array}{c} 247\cdot 32\\ 232\cdot 01\\ 210\cdot 78\\ 183\cdot 93\\ 174\cdot 17\\ 171\cdot 41\\ 152\cdot 72\\ 140\cdot 67\\ 144\cdot 94\\ 174\cdot 20\\ \end{array}$	° 51'07 43'68 43'63 41'64 41'33 37'19 30'90 25'51 41'76 44'87	254·39 234·60 213·31 185·08 175·10 169·46 146·32 130·29 146·17 177·63	o 1 89 04 90 27 91 23 91 43 92 41 93 13 92 41 93 13 92 41 91 38 91 38	

The first fortnight has only half weight.

The coefficient of Temperature of the biflar magnet was ascertained after its return to Toronto, in January 1845. A series of deflections on different days gave the following results:— January 8, 1845, a = 0.0003128

ry 8,	1845, $q =$: 0'0003128
10	"	·0003009
11	,,	0001784
14	,,	·0001941
17	39	'0001818
ч .		· · · · ·

The mean of the whole is 0 0002336. The mode of proceeding was the same in each case. The temperature of the magnet was raised at once from the lowest to the highest point, being about 40° Fahr. and 90° respectively, and three sets of readings taken at each, with an interval of 5^{m} between them, the bar being previously allowed 15^m to acquire the temperature of the surrounding water; the Declination and Horizontal Force were also observed at the same time. As the two first of the above values differ materially from the rest, the experiment was repeated in 1848 under similar arrangements, except that the change of temperature at each alternation was from 40° to 60° and no higher temperature was employed, the intervals were also reduced to 4 minutes between each set, and 10 minutes between each alternation :

> March 4, q = 0.00024726 0002138 7 0002874

The mean of these is 0 0002495, not materially different from the former value. Lastly, the mean of both sets is,

q = 0.0002396

And adopting this value, we have the ratio $\frac{q}{k}$, or the change in scale divisions for a change of temperature of 1° Fahr. = 0.70. The whole of the readings in the abstracts have been reduced to the uniform temperature of 40° with an approximate coefficient $\frac{q}{k} = 0.66$, which occasions, however, an error of only 2°1 divisions at the extreme temperature recorded, a quantity so small, as compared with the extent of other changes, that it has not been thought necessary to correct the work. The more accurate coefficient has been employed below in deducing the mean diurnal curve, and in correcting the observations on term day, and disturbances.

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In Absolute Measure. - The observations of the Absolute Horizontal Force made at Lake Athabasca and Fort Simpson have been published in detail by Colonel Sabine (Contributions to Terrestial Magnetism, No. VII.), but it may be convenient to repeat the particulars here. Six deflecting magnets, varying in length from 3.6 inches to 2 0 inches, were employed at both stations; two of these, Nos. 30 and 31, of three inches in length, were considered the standard bars, and the others employed for verification. The whole of the magnets were suspended for vibration by a silk fibre attached directly to the bar, without the addition of any stirrup; bars 30 and 31 were also vibrated in a stirrup, the weight of which was 322 grains, thus giving a second and independent value of the term $m \mathbf{X}$. The amount of inertia of each suspension was found by vibrating the magnet with and without the addition of carefully turned brass rings, according to the method recommended by Dr. Lamont. The following are the mean values :---

Bar 30. Bar 31.

Log. $\pi^{2}k$ for vibration without the stirrup 1 33408 1 33952 Log. $\pi^{2}k$ for vibration in the stirrup 1 50167 1 50521

The observation at Lake Athabasca was commenced on the 13th October, shortly after completing the adjustment of the bifilar already described; the experiments of deflection with four bars were completed on that day, and with the other two on the following day. The bars were vibrated without the stirrup on the 14th, and with it on the 20th, each experiment being connected with scale readings of the bifilar. The observation was repeated in March 1844.

ΣH.
R F
ABL
H

Determination of Absolute Horizontal Intensity with Bars 30 and 31 at Lake Athabasca. Length of Suspended Magnet 2.45 inches; length of Deflecting Magnet 3.0 inches.

:	15											2.022									
	General	Mean.						2.026									2.018)		-	'	
		Means.			2.024		2.030		2.027		2.027/			2.025		2.008	<u>^_</u>	2.018		2.020	
	•1	×		2.0221	2.028	2.034]	2.026	2.0187	2.024	2.031	2.023	، بر معروب	9.095	2.025	6,000.6	2.002	2.019	2.018	1010.6	2.021	
;		æ		0.418	-	0.385	0.387	0.418	0.416	0.385			0.421	0.421	0.376	0.376	0.419	0.419	0.378		
		Corrected Time.		s 5.0514		5.2816	•	6.1381 0.418		6.4017	•		5.0328		5.3740	2 1	6.1234		6.4798		
	ON.	Temp.	6	0.88	, ,	97.0	'	34.0	•	34.0	1 1		34.5		8.18	•	29.0		29.0	•	_
•	VIBRATION	Observed Time.		s 5.0354	•	5.2409	•	6.0943	•	6.3767	•		5.0258	•	5.3643		6.1011	•	6.4381	•	
	Λ	Date.		October 14 -	*	October 14 -	"	October 20 -		October 20 -	•		March 2 -		March 2		March 2 -		March 2 -	•	_
		Corrected Angle.		22 26 8	10 6.8	20 27.7	9 24.8	22 26.8	10 6.8	20 26.7	9 24.8		22 32.1	10 15.0	20 13.6	9 12.6	22 32.1	0.51 01	20 13.6	9 12 6	-
		Temp.	•		0.88	_	36.4		0.88	36.6	36.4		41.8	43.8	45.4	45.4	41.8	43.8	45.4		
	NOI.	Observed Angle.	0	22 28.2	10 13.0	0.18 03	9 23.7	22 28 2	10 13.0	20 31.0	9, 23.7		22 34.8	10 15.8	20 14.9	6 13.5	22 34.8	10 15.8	20 14.9	9 13.5	
	DEFLECTION.	Dist.	Foot	1.0257	1.3257	1.0257	1.3257	1.0257	1.3257	1.0257	1.3257		1.0257	1.3257	1.0257	1.3257	1.0257	1.3257	1.0257	1.3257	-
	A	Bar.		30	30	31	31	30	30	31	31		30	30	31	31	30	30	31	31	
		Date.	1843:	October 13 -	۶ ۱	October 13	*	October 13 -	•	October 13 -		1844:	March I -	•	March I -		March I -		March 1 -		

HORIZONTAL FORCE.

24

The mean value by the other four bars in October was

X = 2.030

which agrees nearly with the mean deduced from the observations of Bars 30 and 31; but it has not been employed, as three of them were corrected with an assumed coefficient of temperature, and the value of the moment of inertia employed has not been so well determined as that for the standard magnets.

The value of the Absolute Horizontal Force was found to be

X = 2.040

by the standard bars in July 1844, being an increase of 0 0088X, or $\frac{1}{1+3}$ of its whole amount, over the value found in October and March, which may probably be attributed to a real increase of that element in the summer months.

Since the publication of the preceding observations by Colonel Sabine, Captain Younghusband has succeeded in obtaining a satisfactory determination of the value of the ratio $\frac{\Delta}{m}$ for Bar 30, the previous results having been obtained without any correction for the change in the induced magnetism of the bars under the different circumstances of vibration and deflection. Five experiments made at Woolwich in May 1847 gave the following results:—

$$\frac{\Delta m_{\circ}}{m_{\circ}} = 0.00042$$

$$\frac{0.00048}{0.00037}$$

$$\frac{0.00048}{0.00042}$$

$$0.00042$$

$$0.00056$$

mean of the whole, 0'00045. Assuming the magnetic moment of the bar itself at the period of these experiments to have been nearly the same as in June 1846, when the absolute intensity was determined last with it at Woolwich, we have the means of reducing this value of the correction to the value applicable at the northern station.

$$\frac{\Delta m}{m} = \frac{\Delta m_{\circ}}{m_{\circ}} \quad \frac{A_{\circ}}{A}$$

where $A_o =$ the ratio $\frac{m}{X}$ at Woolwich, and A the same at the northern station. $A_o = \frac{0.372}{3.728}$ and $A = \frac{0.419}{2.022}$ (at Lake Athabasca), whence $\frac{\Delta m}{m} = .000218$ On applying this correction to the times of vibration and the angles of deflection, by the formula given in the Supplement to Magnetical Instructions, §c., 1846, the difference in the

resulting value of X proves to be insignificant; it is less than 0 0003, and does not affect the above values, which are not carried beyond the third decimal, the effect is negative.

The foregoing value of the Horizontal Force is not referable to any one division on the bifilar scale. The readings of the instrument on the 14th and 20th October, taken in connexion with the experiments of vibration, differed considerably from the readings on the 13th, which were taken with the experiments of deflection. The mean on the 13th was 176 0 at 64° 6, on the 14th 255 5 at 57° 4, and on the 20th 254'4 at 50°'4; there is therefore a change of about 74 divisions between the 13th and 14th of October. The greatest difference between two successive daily means in the subsequent series is 27'4 div., which makes it probable that the change between the 13th and 14th October was partly instrumental, the magnet not at once taking up its position of adjustment. As the change of reading on the first day of regular observation amounted to 223'8 div., the amount of this difference did not appear at the time to be so great as to call for re-adjustment, but in calculating the observation of absolute intensity the observations on the 13th and 14th were reduced separately to the mean reading on those days respectively, and those on the 20th to the mean of the first week of regular observations, which commences on 16th October. The instrument had been dismounted before the observation of March. but the regular change evinced by the fortnightly means would have rendered the zero division of the scale in October, had it been determined, inapplicable in succeeding months.

Changes of the Horizontal Force and Inclination.—These elements, especially the last named, like the declination (p. 1.) were found to be liable to daily change far exceeding in magnitude anything commonly observed at stations in lower magnetic latitudes. The daily extremes of both are brought together in the next table. The section relating to the inclinometer may be referred to for the grounds on which the value of the scale has been assigned. The ranges of inclination here given are considered subject to an uncertainty not exceeding one tenth of their amount.

TABLE XIII.

	1	BI	FILAE	ŀ	k=:00()3412.	INCLINOMETER.						
Date Gött.	In Hourl	the y Series.	Obse	erved.	Ran Hor.	ge of Force.	In Hourl	the y Series.	Obse	erved.	Ran	prox. ige of nation.	Scale.
Day.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Coeff.
1843.		h	300.6	77.0	•0761	10500	325.9	86.9	341.6	0040	/	1	/
Oct. 16	300.6 292.6	77·6	292 6	68.0	.0602	·0763	325°9 287°7	115.8	362.8	86·9	43.1	45.9	0.1802
17	311.0	231.7	314.1	231.7	.0271	.0278	152.6	83.6	153.6	74.8	12.4	14.2	
т{ ¹⁸ 19	280.2	143.8	322.7	132.4	•0465	.0649	269.3	91.4	281.2	50.6	31.9	41.2	
(10	200 2	140 0	044 1	102 %	0400	0048						91.0	
20	274.1	225.6	~	-	•0165	[-	265 • 7	232.0	-	-	5.9		0.1747
21	277.5	260.3	-	-	·0059	-	245.1	185.0	-	-	10.2	-	
22	s.	-	-			-	S .		-				-
23	276.9	226.1	-	-	•0173	-	269.5	241.9	-	-	4.8		-
24	246.8	153.6	246.8	144.9	•0318	•0348	323 • 2	236.1	349.7	236.1	15.2	19.8	-
25	240.2	164.4	240.2	0.9	•0259	·0816	332.2	248.3	556-2	248.3	14.6	53.8	-
26	240.8	111.8	240.8	111.8	•0440	•0440	391.2	240.6	391.5	240.6	26.0	26.0	-
27	231.5	63.4	231.5	52.5	•0573	•0611	414.7	249.3	449.8	249'3	28.9	34.9	-
28	272.2	160.2		-	·0382		307.7	252.0		-	9.7		·
29	S .	-		-	-	-	S .	-	-	-		-	
30	288.5	156.4	288.5	83.6	•0451	•0699	390.2	258.9	492.7	258.9	20.9	40.8	-
31	279.7	178.3	293.9	155.1	•0346	·0480	341.0	255`6	378.0	255.6	14.9	21.3	-
Nov. 1	268.7	219.4		-	·0168		133.4	81.6	_	-	8.8	·	0.1208
2	266:3	117·9	278.3	81.2	·0506	·0673	255.3	81.1	286.5	51.7	29.7	40.1	-
8	238.9	129.9	~		·0031		222.0	99 .8	-	_	20.8		-
*4	248.6	193.0	~	-	·0190		117.1	99·8			2.9		
5	s.		~		-		s.	_	-				
· 6	267.1	156.8	267.1	156.8	·0137	·0137	223.4	102.6	$223 \cdot 4$	100.5	20.6	20.9	
7	246.9	227.1	-		·0067		125.9	101.2	-		4.5	-	-
8	249.0	138.1	249.0	122.1	·0394	·0433	217.2	70.1	232.7	70.1	25.1	27.8	
9	240.9	156.7	240.9	127.8	·0287	·0386	191.5	91.8	224.3	91.8	17.0	22.6	
10	223.6	169.8	223.6	122.7	·0183	·0844	168.2	109.2	221.5	109.2	10.1	19.1	
11	233.8	185.5			·0165	-	144.1	93.3	-	-	8.7	-	
12	s.	-	-	-	-	-	s.	-	-	-	~		
13	239.6	109.6	239.6	105.6	·0444	•0457	243.9	100.5	243.9	100.5	24.5	24.5	
14	216.1	196.2	231.4	196-2	·0068	·0120	134.5	102.9	134.5	86.0	5.4	8.4	
15	215.7	176.6	-	-	·0133	-	151.1	109.5		-	7.1		
16	237.5	195.9	237 • 5	195.9	·0142	·0142	184.1	84.2	184.1	82.2	8.2	8.8	
17	221.3	195.5	-	- 1	·0088	- 1	126.9	115.8	-	-	1.9	-	

* Imperfect day.

TABLE XIII.—continued.

		BI	FILAR	.)	k=•000	3412.		I	NCLI	NOME	TER.	<u></u>	
Date Gött.	In Hourly	the y Serics.	Obse	rved.	Ran Hor.	ge o f Force.	In Hourly	the Series.	Obse	rved.	Ran	prox. ge of nation.	Scale.
Day.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Coeff.
1843. Nov. 18	203.6	187.2	-	_	·0054	_	131.5	115.8	_		, 2·7	, 	, 0·1708
19	s.	-		-			s.	-	-		-		-
20	216.3	176.0	-	-	·0137	<u> </u>	145.6	117.0	-	-	4.9		·
21	209.6	190.3	_	-	·0066		142.7	121.9	-	-	3.2	-	-
22	203.8	178.1	_		·0088	-	147.9	126.1	_	-	3-9		-
23	200'2	183.1	_	_	·0058	-	137.6	124.1		-	2.3		-
24	192.1	105.6	192.1	105.6	.0295	·0295	235.5	118.8	235.5	118.8	19.9	19.9	-
25	197.4	182.7	-	_	·0050	_	142.0	129.4	-		2.5		-
26	s.	_		-	_	_	s.	_		-	_		-
27	193.0	181.0	-		·0041	_	151.0	133.6	-		3.6		
28	190.6	175-9	-	-	·0043	_	153.6	131.4	-	-	4.0		-
29	196.6	141.6	196.6	136.0	·0188	*• 0207	182.2	131.7	195.8	131.7	9.2	10.9	-
30	184.0	165.8	-	-	·0062	-	152.4	134.7		-	3.0	-	
Dec. 1	192.6	90.4	192.6	57.7	·0349	·0460	279.6	128.8	313.2	128.8	25.8	31.5	
2	185.0	63.8	185.0	41.7	·0414	·0490	271.7	134.1	328.9	134.1	23.5	33.3	
3	s.			-		_	s.	_		-		-	-
4	185.9	167.4	- 1	-	·0063	-	159.0	146.4	-	-	2.2	-	
5	182.7	96.6	182.7	73.9	·0294	•0371	237 . 9	143.5	287.1	143.5	16.1	24.5	
6	220.0	126.5	220·0	116.5	·0319	·0353	205 1	117.9	218.9	117.9	14.9	15.2	
7	186.6	174.6			·0041	_	161.2	146.6	-		2.2	-	
8	220.4	161.5	220.4	161.5	·0201	· 0201	194.0	117.1	194.0	117.1	13.1	13.1	-
9	205.5	151.8	-		·0183		185.5	129.2		-	9.6	-	
10	s.	-		_		_	s.	_	-	_			
11	195.4	163.0			·0110	_	185.2	132.4			9.0	-	
12	199.4	165.2	-	-	·0117		177.6	142.9	-	-	5.9	-	-
13	183.4	149.2	~-	_	·0117		191.0	156.7	_	-	5.8		-
14	171.3	143.0		-	·0096	-	188.5	165.8	-	-	3.9		-
15	178.0	152.4		_	·0087		183.6	160.9	-		3.8	-	-
16	171.6	161-1		-	·0036		181.2	166.3	-	-	2.2		-
17	s.			_			S .		-	-			-
18	179.0	161 • 2			·0061		179.3	153-1	-	_	4.2	-	
19	175.8	101.2	175.8	41.8	·0254	·0457	255.8	159.6	357.8	159.6	16:4	83.9	-
_ (20	183.1	154.8	181.8	139.9	·0096	·0144	189.1	157.7	204.2	157.7	5.4	7.9	-
т{ ₂₁	183-3	163°0	183.3	163.0	· 0060	·0060	181·0	154.2	181.0	154.2	4.6	4.6	-
22	182.3	161.7	-	-	•0070		176.7	160.4	-	-	2.8	-	-

TABLE XIII.—continued.

			BI	FILAR	. 7	k=∙000	8412.		1	NCLI	NOME	TER.		
Da Gö			the y Series.	Obse	erved.	Ran Hor.	ge of Force.		the y Series.	Obse	rved.	Ran	orox. ge of nation.	Scale.
· Da	y.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed	Highest.	Lowest.	Highest.	Lowest.	-Hourly.	Observed.	Coeff.
184			100.0		· ·							,	,	/
Dec.	23	175.7	162.6		-	•0045		175.6	162.5		-	2.5	-	0.1708
	24	S.			-	-	-	S.			_	-	-	-
	25 25		mas Da		-				mas Da	Ĩ				-
	28	187.3	77.3	187.3	52.8	•0375	•0456	299.2	156.5	328.9	158.5	24.4	29.4	-
	27	203.5	123.0	212.5	123.0	•0275	•0805	223.2	143.6	229.2	129.7	13.6	17.0	-
	28	200.4	112.6	200.4	112.6	•0299	•0299	229.5	143.7	235.7	141.2	14.7	16.1	-
	29 29	183.4	73.8	183.4	40.7	•0375	·0488	276.8	163.2	340.2	163.2	19.4	30.1	-
	30	170.4	148.5	-	-	•0075	-	182.1	158.4	-	-	4.0	-	-
	31	s.	-		-	-	-	s.	-		-	-	-	-
_ 184														
Jan.	1		-		-	-	-	-	-	-	-	-	-	-
	2	181.9	80.8		-	•0345	-	281.6	149.1	-	-	22.6	-	-
	8	160.9	144.7	-	-	•0055	-	198.4	175.0		-	4.0	-	-
	4	224.9	-37.5	239.0	-51.9	•0895	•0991	472.9	110.3	477.0	85.2	61.9	66.9	-
	5	182.7	-49.0	182.7	-49.0	•0790	•0790	380.3	152.0	380.3	152.0	39.0	39.0	-
	6	161.0	29.8	161.0	29.8	0447	•0447	328.4	164.7	328.4	164.7	27.9	27.9	
	7	s.	-		-	-	-	s.	-	-	-	-		-
	8	154.6	121.4	170.4	87.9	•0113	·0281	221.2	175.8	261.0	158.9	7.7	17.4	-
	9	157.1	125.7	-		•0107	-	222.5	159.5		-	10.8		
	10	157.1	126.9	-	-	.0103	-	238.1	179.6	-	-	10.0		
	11	153.3	112.4	-	-	•0139	-	236.9	184.6		-	8.9	-	-
	12	163.6	141.6		-	•0075	-	213.5	138.3	-		12.9		-
	, 13	154.2	138.3		-	.0054	-	208.3	187.1	-	-	3.6	-	-
	14	s.	-		-	-	-	s.	-	-		-	-	-
	15	159.2	138.2		-	.0072		215.1	193.8	-		3.6	-	-
	16	157.0	144.8		-	.0015	-	208.5	190.4	-		3.1	-	-
	17	162.0	123.5	162.0	98.9	•0131	•0215	233.5	180.2	252.6	180.2	9.1	12.3	-
	18	145.5	123.5			•0075	-	220.2	195.8	—	-	4.5	-	
	19	160.3	104.2	160'3	104.5	•0190	•0197	262.8	199.6	262.8	199.6	10.8	10.8	-
	20	150.2	110.0		-	•0138	-	216.8	196.8	-		3.4	-	
	21	S.	-		-	-	-	s.	-	-			-	-
	22	157.1	102.3		-	•0187	-	261.3	173.6	—	-	15.0	-	-
	23	138.4	120.8		-	•0060		212·5	194.6	-	-	3.1		-
	24	147.3	35.6	153.0	-37.6	•0381	•0650	381 2	195.9	401.9	130.2	31.7	46.4	-
(L25	145.1	24.2	150.3	14.7	•0411	•0463	392.9	192.0	404-4	177 • 9	34.3	38.7	-

TABLE XIII.—continued.

			BI	FILAR.	1	c=.000	8412.]	NCLI	NOME	TER.		
Da Gö		In Hourly	the Series.	Obse	rved.	Ran Hor.	ze of Force.	In Hourly	the 7 Series.	Obse	rved.	App Rang Inclin	orox. ge of ation.	Scale.
Da	ıy.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Coeff.
184	-		1	<i>.</i>			-					,		/
Jan.	26	134.4	82.3	134.4	74.0	•0178	·0206	254.3	196.5	259.0	196.2	9·9 4·4	10.2	0.1208
	27 28	135.5	111.3	-	-	·0082		219·2 S.	193.2			44.44		
	28 29	S. 145 [.] 5	119.1			· 0090		238.5	189.1			8.4		
	29 30	140 0	117.7			.0142	_	203 0	178.4		_	9.2		
	31	159.5	112.2			·0161		219.4	167.7	-	-	8.8	_	_
Feb.	1	185.5	- 3.4	185.5	- 9.7	·0645	·0666	353.8	115.1	390.4	115.1	40.7	47.0	_
	2	204.8	67.0	226.9	66.2	·0470	·0548	276.7	143.3	289.7	109.1	22.8	. 80.7	
	3	178.7	118.2	_		·0189		224.8	160.5			11.0	_	-
	4	s.	-					s.	′	_		_		-
	5	214.8	-18.0	219.3	-71.0	·0794	·0952	494 8	121.8	564.0	83.1	63.7	82.1	-
	6	164-2	67.4	164.2	67.4	·0330	•0330	285.5	171.2	285.5	154.1	19.2	22.4	
	7	183.7	122.6		-	·0208		231.9	158.9	_		12.5	-	-
	8	175.7	71.2	175.7	71.2	·0355	.0355	294.6	169.3	294.6	169.3	21.4	21.4	-
	9	172.9	131 · 3	-	-	·0142	—	193.1	124.8	-	-	11.7		-
	10	179.4	108.1			·0243	-	246.3	172.3	-	-	12.6	-	-
	11	s.	-	—			-	s.	-		-			-
	12	158.4	96.0	-	-	·0213	-	259.5	179.2	-		13.7	-	-
	13	159.3	134.5			•0085		204.7	184.9	-		3.4	-	-
	14	172.6	144.7		-	•0095	-	210.2	167.5		-	7.3	-	-
	15	183.6	126.3	-	-	•0195		224.1	188.6	-	-	6.1	-	-
	16	200.5	157.9	200.2	150.3	•0144	•0170	218.0	174.7	225.6	174.7	7.4	8.2	-
	17	204.6	164.6	-	-	•0136	-	215.7	182.3			5.2		-
	18	s.	-	-		-	-	s.			-	-	-	-
,	19	190.7	175.8			•0051	-	205.5	191.4			2.4	-	-
	20 21	197.0	172.6	_	-	•0083	-	215.3	189.2	-		4.5		-
	21 22	196.1	158.2			•0129		232.6	185.1	-	_	8.1	-	-
	22	202.2	184.4		-	·0061	-	209.5	186.2	-	-	4.0	-	-
	23 24	205·0 188·6	189.1	_	_	·0054		199·0 203·1	178·1 191·2		-	1·9 2·0		-
	24 25	188'6 S.	1/0 1		_	0040		203°1 S.	101 2			20		
	20 26	8. 202.9	106.3	202.9	94.8	· 0330	·0368	8. 277 · 9	175.8	296.3	175.8	17.4	20.6	
	20 27	202.9	163.6	202 8	0410	·0184	0000	217 9	175 8	200 0		7.8	200	
	27 28	<i>411</i>						304.0	144.8			27.2		
	20 29	_			_	_	_	346.1	170.9	_	_	29.9	_	_
·								520 1				200	L	

\$

TABLE XIII.—continued.

		BI	FILAR	. 7	:= • 000;	8412.]	NCLI	NOME	TER.	ŗ	
Date Gött.	In Hourl	the y Series.	Obse	rved.	Ran Hor.	re of Force.	In Hourly	the Series.	Obse	rved.	Ran Inclir	ge of ation.	Scale.
Day.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed	Coeff.
1044	1	1									1		1
1844. April 1	266.2	112.4	_		·0490		394'1	61.2			, 43.0	1,	, 0·1293
2		79.3	284.7	<79.0	.0335	.065	467.7	58.0	>743'2	58.0	58.0	88.6	0 1200
3		115.9	278.6	66.7	.0518	·0674	368.2	83.4	484.5	83.4	36.8	51.9	-
4		124.7	_	_	.0560		368.1	69.7	_	_	38.6	_	_
5		Friday.	-		-	_		Friday.	-		_		-
e		228.8	304.2	228.8	·0220	·0240	167.1	63.0	167.1	51.5	13.5	15.0	
7	s.	-	-	-	-		S.		-	_	_	_	-
8	262.8	241.0	-	-	·0069		194.7	129.3	-	-	8.2		
ç	296.4	187.8	296.4	168.8	·0345	·0406	264.0	124.0	291.8	124.0	18.1	21.7	-
10	251.7	18.0	251.7	>0.0	 >'0744	>.080	272.2	96.8	467.1	96.8	22.7	47.8	-
11	244.8	188.9	-	-	·0177	-	189.8	112.2	-		10.0		_
12	238.2	210.4	_	-	·0088	_	143.4	118.8	-		3.5	-	-
18	287.6	214.3		-	·0233		135.1	102.6		-	4.2	-	
14	s.		-	-	-	-	S .	-	-	-	-	-	-
10	291 . 9	127.4	291.9	91.5	•0522	•0637	383 · 3	100.7	453.8	100.7	36.2	44.5	-
. 16	377 . 6	137.8	378.1	9.9	•0763	•1170	355 • 2	-11.0	631 . 0	-29.5	47.3	85.3	-
17	343 9	-60.8	843.9	-20.0	1284	>.123	837 • 9	20.9	837 • 9	20.9	105.6	105 • 6	-
18	283.4	255.1	-		•0077		153-1	104.0	-	-	6.3		
19	272.5	161.5	272.5	127.5	.0031	•0410	319.0	124.6	868.7	124.6	25 • 2	31.9	-
20	271.5	191.1	-	-	•0227		255.8	121.2	-	-	17.4		-
21	1		-	-		-	S.	-	-	-	-	-	-
22		221.1	-	-	·0159	-	194.6	114.3	-	-	10.4	-	-
28	1	178.3	-	-	·0294	-	304.8	127.3	-	-	22.9	-	-
$T \begin{cases} 24 \\ 24 \\ 24 \end{cases}$	1	264.9	316.2	171.3	.0111	•0408	173.6	109.4	332.4	87.3	8.3	31.7	-
(20		86.6	316.9	60.8	·0651	•0725	526.6	88.2	586.0	87.1	56.2	64.7	-
26		26.8	297.1	-46.7	.0764	•0973	645.9	108.2	781.5	108.2	69.2	100.0	-
27 28	1	137.8	309.2	133.2	•0486	•0499	377 • 4	85.2	415.2	85.2	37.8	42.8	-
	1						s.	-	-	-	-	-	-
28 3(137.0	285.1	114.3	0419	'0484	423.3	126.1	455.5	126.1	38'4	42.5	
ઝા	326.4	80.0	335.0	40.0	•0697	.0832	489.1	80.2	562.7	80.2	52.8	59.7	-
May 1	289.0	219.2	-	-	•0197	-	256'9	129.4			16'8	-	
2	336-4	207.8	336.4	207.8	·0362	·0362	Imper	fect.	-	-			-
9	271.2	43.0	271.2	39.0	·0645	•0656	614 • 1	204.0	627 • 1	204.0	63.6	96.2	0.1549
4	286.7	215.1	-	-	·0203	-	263.0	184.0	-	-	11.2	-	-

TABLE XIII.—continued.

	BIFILAR.				:=:000	3412.]	NCLI	NOME	TER.		
Date Gött.		the 7 Series.	Obse	Ho		Range of Hor. Force.		the Series.	Obse	rved.	Rang Inclin	ge of ation.	Scale.
Day.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Highest.	Lowest.	Highest.	Lowest.	Hourly.	Observed.	Coeff.
1844.	~										,	,	,
May *5	S .	_	258.5	149.7	-	•0308	s.		385.2	202.1		28.6	-
6	280.7	229.6		-	•0144		282.4	117.0			25.6		-
7	800.3	167 • 9	300.3	167.9	•0373	•0373	407 2	165.4	407.2	165.4	87.5	87.5	-
8	306.7	176.1	306.7	176.1	•0368	•0368	400.8	160.2	400.8	160.2	37.3	37.3	-
9	276.1	162.1	-	-	•0322	-	422.6	221.4	-	-	31.2	-	-
10	285.7	192.9		-	•0262	-	281.6	228.2	-	-	8.3	-	-
11	274.1	238.4			•0101		291.8	222.1		-	10.8		-
12	s.	-				~	s.		-	—	-	·	-
13	325·6	242.1	325-6	242.1	•0236	•0236	282.6	134.0	286-2	134'0	23.0	23.6	-
14	325 • 7	223 • 4	225 • 7	214.3	•0289	•0316	311.0	138.4	338.0	138.4	26.8	30.9	-
15	291.8	236 • 9	-		•0156	-	270.0	198.0			11.0	-	
16	267.5	212 • 1	267 • 5	212.1	•0157	•0157	324.8	221.1	324.8	221.1	16.1	16'1	-
17	263.9	241.9			·0062	-	258.7	227 • 4		-	4.8	-	
18	283.3	242.4	-	_	·0115		259.6	218.0		-	6.4	-	-
19	s.				—		s.	—				-	
20	273.3	238.7		_	·0098		286.7	236.0	-	_	7.9	-	-
21	288.0	224.0		_	·0181	_	306.2	216.7		_	13.9		_
22	308.9	112.8	344.3	28.3	·0555	·0904	519.2	161.6	692.3	121.9	55.4	88.3	-
23	272.7	98.9	272.7	98.9	·0492	.0520	519.1	243.8	545.9	243.8	42.7	46.8	-
т{24	285.3	160.3	285.3	140.5	·0354	·0410	440.0	211.0	468.8	184.4	35.5	44.1	
т{ 25	-	-	-	214.9	Impe		-	-				-	-

* Extra observations were taken from 5^d 21^h to 5^d 25^h.

It appears from the foregoing table, that the greatest change of Horizontal Force observed in any Göttingen day in the winter, was '0991X, on the 4th January 1844, the change of Inclination observed being 1° 6' 9, according to the approximate scale value employed. The greatest change of Horizontal Force observed in any Göttingen day of the two spring months was not less than 0 '173 X, on the 17th April, or one sixth of the whole amount of that element, and was accompanied by a change of inclination of 1° 45' 7; the movements of both instruments upon this occasion went beyond the limits of their scales, and could only be valued approximately, by holding up some object and afterwards measuring its distance from the zero of the scale. The mean inclination at Lake Athabasca was

81° 37''7, and at Fort Simpson 81° 52''0; a change of $\pm 1'$ of these elements would therefore produce a change of \mp 001996 X at the former, and of \mp '002037 X at the latter station; in round numbers $\pm 1''0$ of inclination corresponds to ∓ 002 of horizontal force at both stations; classifying the daily ranges upon this scale, we have the following results:

Range	Lake At	habasca.	Fort S	impson.	Range	Lake At	habasca.	Fort Si	mpson.
of Horižontal Force.	rižontal his si s		of Inclination Approximate.	Hourly Observa- tions.	Including Dis- turbances.	Hourly Observa- tions.	Including Dis- turbances.		
	Days.	Days.	Days.	Days.	T	Days.	Days.	Days.	Days.
Less than .010 X	40	38	6	5	Less than 5'	37	37	3	, 3
.010 to .020X	33	30	10	9	5′ to 10′	27	23	7	6
·020 - ·030 X	12	11	6	5	10' - 15'	18	15	G	6
·030 - ·040 X	13	11	6*	4*	15' - 20'	8	7	4	8
·040 - ·050X	8	11	4	7	20' - 25'	9	10	3	8
.020060X	2	1	6	4	25' - 30'	9†	6	3	1
·060 - ·070X	2	6	4	5	30' • 35'	3	6	1	4
·070 - ·080X	3	4	3	1	35′ - 40′	1	2	8	8
·080 - ·090 X	1	0	0	2	40′ • 45′	2	8	2	5
·090 • ·100X	0	2	0	2	45' - 50'	0	4	1	2
More than '100	0	0	1	2	Above 50' -	2	8	7	9
	114	114	46	46		116	116	45	45 :

TABLE XIV.

* A day is here included which is wanting in the Inclinometer series, namely, May 2. † Two days are included which are wanting in the Bifilar series, namely, Feb. 23 and 29, 1844.

It may be remarked in reference to this table, that were the total force to undergo no changes, we should expect to find an exact coincidence between the number of days giving certain ranges of the horizontal force, and their equivalents in terms of the inclination. unless there existed an error in one of the co-efficients; the great changes of the former element being always positive, and those of the horizontal force negative, we have an indication, in the excess under the higher ranges of inclination, which is apparent above, that the tendency in disturbances is to an increase of total force.

The mean range of horizontal force during the winter months at Lake Athabasca, that is to say, the square root of the mean of the squares of the differences between the highest and lowest scale reading, included in the hourly observations of each day, is '0286 X, and that of the inclination 17' 0 (minutes). The corresponding means for the two spring months at Fort Simpson are '0421 X, and

47' 5 of inclination. The other American stations give the following values for the mean range of horizontal force found in the same way, and for the same periods. For the winter months, 16th October 1843, to 29th February 1844, Philadelphia '00149 X, Toronto '00240 X, and 3' 25 of inclination*, Sitka '00377 X. For the two spring months, April and May 1844, Philadelphia '00157 X, Toronto '00357 X, Sitka '00429 X. For the several months again, we have the mean ranges in the following table, which, like that of the declination, I have extended to include twelve months at the permanent stations.

	Phila	lelphia.		Toroi	nto.		Si	tka.			habasc mpson	
Month.	Scale		Bi	ilar.	Incli	nom.	Scale.		Bif	lar.	Íncli	nom.
	Scale Divs.	$\frac{\Delta X}{X}$	Scale.	$\frac{\Delta X}{X}$	Scale.	Δθ	Divs.	ΔX X	Scale.	$\frac{\Delta X}{X}$	Scale.	Δθ
1843.												
October -	45.7	·00183	-	— ,	1-		35.4	.00428	-		-	
sïst }	36.9	·00148	22.9	·00242	5.02	4 ['] ·23	<u>31</u> ·3	·00388	118.3	'0402	127.0	22 ['] ·5
November -	30.5	·00121	21.7	·00229	3.46	2.92	28.0	·00347	62.2	·0213	75.2	12.8
December -	32.6	·00130	20.2	·00217	3.25	2.75	26.4	·00327	63·1	·0215	78.1	12.2
1844.			1.38									
January .	32.7	·00131	22.7	·00240	3.22	3.01	29.9	·00383	84.8	•0289	112.3	19.2
February -	34.1	·00136	26.3	.00278	-		3.8	.00472	89.8	•0306	105.0	17 . 9
March -	43.8	<u>:</u> 00175	31.2	·00333	-	_	46.3	·00592		-		-
April	38.9	00156	35 • 4	·00268		-	38.9	·00498	166.8	•0507	305 • 2	39.4
May	39.9	00159	32.6	·00344			30.5	·00386	113.1	·0324	189.2	29.3
June	31.7	00127	28.5	·00301		-	24.8	·00317	-		-	-
July	28.1	·00112	34.4	·00363	-		29.0	·00359	-	-	_	
August • •	43.8	·00175	39.6	·00418	-	-	31.5	.00386	-	-	-	-
September -	49.7	·00159	36.4	·00385			42.0	·00520	-		_	

TABLE XV.

The scale co-efficients used above were 1 division = -00040 X at Philadelphia, (magnetic and met. observations at Girard College, p. 1819), = 0001236 at Sitka for the observations of 1843, and 000128 for those of 1844, = 000105 for those at Toronto; the observations at the two former stations were not reduced to a uniform temperature, but from the irregularity in the hours of occurrence of the greatest and least values, the effects of inequalities of

* By observations with an instrument of one bar from 16th October 1843 to 10th February 1844, 1 division -0' 820.

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temperature must be in a great measure neutralized in the final result for each month.

Diurnal Variation of the Horizontal Force.—The following Tables contain the mean of the scale readings of the Biflar as observed, and the same reduced to the uniform temperature of 40°. As the observatory was artificially warmed, the mean daily range of internal temperature is small, although the occasional fluctuations were very considerable; the uncorrected curve differs in consequence comparatively little from the corrected one.

TABLE XVI.

Monthly means of the Bifilar readings, uncorrected for temperature, and with omission of incomplete days, namely, October 20th, November 4th, January 2d and 9th, February 28th and 29th.

Civil time	-	h. m. 15 55	h. m. 16 55	h. m. 17 55	h. m. 18 55	h. m. 19 55	h. m. 20 55	h. m. 21 55	h. m. 22 55	Noon.	h. m. 0 55	h. m. 1 55	h. m. 2 55	
Gött. time	-	0	1	2	3	4	Б	6	7	8	9	10' '	11	
1843. October –	-	203.52	205.01	228.63	242.06	247'14	245*89	250.56	250.71	248.07	247.77	256-84	255*96	,
November	-	196*44	199.06	201.96	204-20	203'14	205-99	202.89	203.02	202.99	204-19	204'88	206*84	
December	-	164.53	166.08	167.85	165.66	172'86	174.86	172.20	170'44	172'19	172.90	176.94	177.58	
1844. January -	-	133*34	135*53	142.10	145'34	147.70	147.57	145.77	145*82	1 46'8 0	144'85	145*77	148'24	
February -	-	140.36	147'70	155.69	157.62	156'64	153.50	155.77	157.57	160.80	159.22	164.57	165'43	
Mean -	-	164'53	167'60	174.63	177'85	179'64	179.74	179'24	179.27	180°24	179'88	183'29	184*55	
			1				1	i 1	1					
Civil time -	-	h. m. 3 55	h. m. 4 55	h. m. 5 55	h. m. 6 55	h. m. 7 55	h. m. 8 55	h. m. 9 55	h. m. 10 55	Mid.	h. m. 12 55	h. m. 18 55	h.m. 14 55	
Civil time - Gött. time	-			h. m. 5 55 14						Mid. 20	h. m. 12 55 21			Mean.
	-	8 55	4 55	5 55	6 55 15	7 55	8 55	9 55	10 55	20	12 55	13 55 	14 65 	
Gött. time 1843.	-	8 55 Mid.	4 55	5 55 	6 55 15 253*45	7 55	8 55 17 251.38	9 55 18 252.82	10 55 	20 217`41	12 55 21 	13 55 22 219`89	14 65 	241'00
Gött, time 1843. October -	-	3 55 Mid. 254*04	4 55 13 255°19 209°00	5 55 14 253.23	6 55 15 253°45 210°32	7 55 16 249.84 210.78	8 55 17 251·38 208·43	9 55 18 252*82 208*66	10 55 19 237 · 92 207 · 49	20 217`41 208`46	12 55 21 233·20 195·42	18 55 22 219.89 196.56	14 55 23 226·31 192·02	241'00 208'98
Gött. time 1843. October – November		8 55 Mid. 254*04 207*86 177*78	4 55 13 255°19 209°00 178°46	5 55 14 253°23 209°90 177°94	6 55 15 253`45 210`32 176`76	7 55 16 249.84 210.78 177.50	8 55 17 251'38 208'43 177'96	9 55 18 252°82 208°06 177°51	10 55 19 237 · 92 207 · 49 178 · 49	20 217`41 208`46	12 55 21 233 · 20 195 · 42 168 · 97	18 55 22 219·89 196·56 157·17	14 55 23 226·31 192·02 157·21	241'00 208'98 172'29
Gött. time 1343. October – November December 1844.		8 55 Mid. 254*04 207*86 177*78	4 55 13 255°19 200°00 178°46 149°73	5 55 14 253 · 23 209 · 90 177 · 94 149 · 86	6 55 15 253`45 210`32 176`76 131`47	7 55 16 249.84 210.78 177.50 152.88	8 55 17 251·38 208·43 177·96 150·04	9 55 18 252.82 208.66 177.51 153.58	10 55 19 237 · 92 207 · 49 178 · 49 154 · 70	20 217*41 203*46 174*73	12 55 21 233 20 195 42 168 97 137 82	18 55 22 219·89 196·56 157·17 140·60	14 55 23 226'31 192'02 157'21 124'07	241'00 203'98 172'29 145'81

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TABLE XVII.

					-		•	•						
Civil time	-	h. m. 15 55	h. m. 16 55	h. m. 17 55	h. m. 18 55	h. m. 19 55	h. m. 20 55	h. m. 21 55	h. m. 22 55	Noon	h. m. 0 55	h. m. 1 55	h. m. 2 55	
Gött. time	•	0	1	2	3	4	5	6	7	8	9	10	11	· · · · · · · · · · · · · · · · · · ·
1843. October	-	° 43∙92	° 44∙83	o 441.67	° 44.55	o 41.77	。 44`30	° 44.06	o 44.25	。 45 • 75	° 48`63	。 49`50	° 47∙01	
November		43.31	42.82	43.62	43.74	43.20	42.52	42.61	43.00	43.24	43.75	43.89	43·91	
December	•	40*32	39.9 6	39.72	89 •98	59 *9 8	39 ·80	39 •20	40.72	41.69	41 62	41.14	40.90	
1844.														
January	•	28.42	27.85	27 . 25	28.10	28.32	28.02	27.45	28.47	29.67	31.38	30.82	30.81	
February	-	42.02	42.10	42.07	42.33	41 .80	41 • 39	40.87	42.13	43.30	44.36	44.62	45.10	
Mean •	•	39.20	38.93	38.96	39.28	39.13	38.60	38.34	39.58	40.31	41.27	41.24	41.00	
											1			
Civil time	-	h. m. 3 55	h. m. 4 55	h. m. 5 55	h. m. 6 55	h. m. 7 55	h. m. 8 55	h. m. 9 55	h. m. 10 55	Mid.	h. m. 12 55	h. m. 13 55	h. m. 14 55	Mean.
Civil time Gött. time			4 55							Mid. 20				Mean.
		3 55	4 55	5 55 14 0	6 55	7 55 16 0	8 55 17 °	9 55	10 55	20	12 55 21 °	13 55	14 55 23 °	 o
Gött. time 1843.		3 55 Mid. • 46.12	4 55 13 • 45.43	5 55 14 0	6 55 15 45·49	7 55 16 • 45`46	8 55 17 °	9 55 18 46·39	10 55 19 	20	12 55 21 • 44.82	13 55 22 °	14 55 23 44.88	 o
Gött. time 1843. October	 - -	3 55 Mid. • 46·12 43·66	4 55 13 ° 45.43 43.66	5 55 14 • 45 · 26 43 · 46	6 55 15 45·49 42·62	7 55 16 • 45 • 46 42 • 26	8 55 17 45·43	9 55 18 46·39 43·28	10 55 19 46·43 43·68	20 • 46.81 43.74	21 0 44.82 43.21	13 55 22 44·34 43·48	14 55 23 44.88	45·50
Gött. time 1843. October November	-	3 55 Mid. 46·12 43·66 41·19	4 55 13 • • • • • • • • • • • • •	5 55 14 • 45·26 43·46 40·43	6 55 15 45·49 42·62 39·82	7 55 16 • 45 • 46 42 • 26 39 • 77	8 55 17 45 · 43 42 · 35 40 · 50	9 55 18 46·39 43·28 41·08	10 55 19 46.43 43.68 40.34	20 46.81 43.74 39.68	21 21 44.82 43.21 39.17	13 55 22 44·34 43·48 39·71	14 55 23 44.33 43.11 40.20	° 45°50 43°27 40°32
Gött. time 1843. October November December	-	3 55 Mid. 46·12 43·66 41·19	4 55 13 • • • • • • • • • • • • •	5 55 14 • 45·26 43·46 40·43	6 55 15 45·49 42·62	7 55 16 • 45 • 46 42 • 26 39 • 77	8 55 17 45 · 43 42 · 35 40 · 50	9 55 18 46·39 43·28 41·08	10 55 19 46.43 43.68 40.34	20 46.81 43.74 39.68	21 21 44.82 43.21 39.17	13 55 22 44·34 43·48 39·71	14 55 23 44.33 43.11 40.20	° 45°50 43°27 40°32
Gött. time 1843. October November December 1844.	-	3 55 Mid. 46·12 43·66 41·19 30·91	4 55 13 	5 55 14 • 45·26 43·46 40·43 31·05	6 55 15 45·49 42·62 39·82	7 55 16 • 45·46 42·26 39·77 29·73	8 55 17 45 · 43 42 · 35 40 · 50 29 · 06	9 55 18 46·39 43·28 41·08 28·95	10 55 19 46.43 43.68 40.34 29.39	20 46.81 43.74 39.68 29.72	21 21 44.82 43.21 39.17 27.62	13 55 22 44·34 43·48 39·71 28·13	14 55 23 44.33 43.11 40.20 28.56	° 45°50 43°27 40°32 29°23

Mean temperature of the Bifilar magnet.

The general mean for each hour in the above Tables has been obtained by dividing the sum of all the observations by the total number, which is 110.

In the next Table, the difference from 40° of each mean temperature in Table XVII has been multiplied by the co-efficient $\frac{q}{k} = 0.702$, anp applied to the values in Table XVI.

TABLE XVIII.

Med	ın Bi	filar :	readi	ngs r	educ	ed to	a'ui	niforn	n ten	ipera	ture (of 40	•
Civil time	h.m. 15 55	h.m. 16 55	h. m. 17 55	h. m. 18 55	h. m. 19 55	h. m. 20 55	h. m. 21 55	h. m. 22 55	Noon.	h. m. 0 55	h. m. 1 55	h. m. 2 55	
Gött. time	0	1	2	3	4	5	6	7	8	9	10	11	;
1843. October -	206100	208'08	231.94	245.20	250*51	248.44	253'44	253*78	252.15	253.00	263.28	260°94	
November	108.79	201.06	204*58	206.94	205*47	207*68	204.74	205'15	205.50	206.85	207*63	209.61	
December	164.74	166 .03	167.65	165*65	172.85	173-80	171.26	170'95	173.80	174.05	177'75	178*26	
1844. January -	124.02	126'90	133*05	130.89	139*41	139.09	136'86	137*63	139.47	138'73	139.29	141•72	
February –	141.79	149'10	157'16	159.27	158.02	154.40	156'39	159.08	163'14	162.31	167.85	169.05	
Means -	163'97	100.84	173.90	176.83	179.03	178.76	178.08	178.77	180*46	180.77	184'16	185°25	
Civil time	h. m. 3 55	h.m. 455	h. m. 5 53	h.m. 855	h. m. 7 55	h. m. 8 55	h.m. 955	h. m. 10 55	Mid.	h. m. 12 55	h. m. 13 55	h. m. 14 55	Mean.
Gött. time	Mid.	13	14	15	16	17	18	19	20	21	22	23	
1843. Oetober -	258'38	259'04	256*88	257 . 35	253.72	255.23	257.88	242.48	222.20	236*62	222.97	220*38	244*90
November	210*46	211°6 0	212 ⁺ 46	212.28	212.38	210.10	210.97	210-10	206.11	197.10	19918	194.23	206*30
December	178.63	179.21	178.25	176.63	177*34	178-32	178.28	178.73	174.50	168*38	156.97	157.07	172.52
1844. January –	142*81	143° 50	143*51	144*69	145.20	142'28	145'74	1	137.82		132'18	115.95	137°66
February –	170.89	172°3 6	173.50	173'68	172.85	173.46	175*65	176-07	171.42	162.61	157.77	155-83	163'70
Mean -	185*78	186.77	186*73	186.43	186*46	185*74	187'41	185*95	178.08	178*30	169*07	104*87	179'33

It is remarkable, that the above means have a decided feature in common, which is not found in the corresponding ones at Toronto, or at any other American station,-they all exhibit a minimum of Horizontal Force at or near 3 A.M. By omitting all days on which extra observations for Disturbance were taken, as in Table VII., the lowest value of the 24^h is still at 3 A.M., but the amount of the daily change is most materially reduced, proving this feature to be, in great measure, due to the effect of disturbances, which has already been shown to be the case with the extreme of Declination at the same The following Table exhibits, side by side, the mean diurnal hour. curve of Horizontal Force at all the American stations, for the period included in the observations under discussion, to which is added the mean by the 46 days selected as free from disturbance.

TABLE XIX.

Comparison of the mean diurnal curve of Horizontal Force at all the American stations for the period included between October 1843 and February 1844.

	Phila	delphía.	Tor	ontc.	Si	tka.		Lake At	habasca.	
Local mean		ΔX		۵X		ΔΧ	T whole	he period.	For selecte	ty-six ed days.
time.	Scale.	AX X	Scale.	$\frac{\Delta X}{X}$	Scale.	$\frac{\Delta \mathbf{X}}{\mathbf{X}}$	Scale.	$\frac{\Delta X}{X}$	Scale.	$\frac{\Delta X}{X}$
Mid.	161.74	000071	- 493·15	000096	509.08	+ .000194	178.68		173.90	+ 00124
1 A.M.	163.72	+.000008	493.22	000178	506.24	000159	173.30	00206	169.21	00038
2	163.98	+.000019	493.61	000066	506.06	000188	169.07	•00350	167.03	00116
3	165.32	+ 000072	494.02	000023	505.44	- • 000259	164.87	- • 00513	166.33	00137
4	167 • 42	+ •000156	495'10	+ • 000091	504.74		163.97	00522	166.90	- '00117
5	167.79	+ '000171	496.11	+ .000191	505.02	000312	166.84	00424	167.07	00112
6	168.12	+ .000184	496.66	+ .000258	503.98	000443	173.90	00183	167.43	00099
7	167.08	+.000134	496'23	+.000212	503.52	000500	176.85	00083	167.67	00091
8	163 . 22	000011	494.02	000023	504.66	- • 000357	179.03	00010	168.41	00066
9	161 • 24	000100	492.22	- '000213	504.62	000362	178.76	00019	167.94	00082
10	158.56	000207	490.39	000407	505.26	000282	178.08	00042	166.51	00181
11	156.94	000272	488.78	000577	504.90	000327	178.77	00019	166'69	00124
Noon.	158.00	·000229	489.11	- '000542	505.52	• 000249	180.46	+.00039	167.85	- '00095
1 P.M.	161.32	000096	491.04	000338	507.06	000058	180.77	+.00049	168.59	00060
2	164.60	+ .000035	494.30	+.000006	507.80	+.000037	184.16	+.00165	171.37	+ .00035
3	166.70	+ .000119	496.53	+ .000242	508.92	.000177	185.25	+.00202	172.31	+.00067
4	167.40	+.000147	498.03	+.000401	510.60	+.000387	185.73	+.00218	173.88	+ .00122
5	167.42	+ '000148	498.12	+ .000410	511.14	+.000455	186.77	+ .00254	173.73	+.00116
6	165.22	+.000060	497 . 12	+.000304	512.28	+ .000587	186.73	+.00252	173.96	+.00123
7	163.92	+.000008	496.16	+.000203	511.84	+ .000543	186.43	+ .00242	173.00	+.00091
8	163.80	+.000003	495.84	+ .000179	511.10	+.000450	186.46	+ 00243	173.34	+.00102
9	163.32	000016	495 .00	+.000080	510.18	+.000335	185.74	+.00219	173.45	+.00106
10	162.06	000067	493.80	000046	510.14	+ .000330	187.41	+.00276	175.49	+.00176
11	161.72	000080	493.28	- '000101	510.12	+ .000327	185.95	+.00226	176.13	+ '00197
	163.73	-	494 • 24	-	507.51	-	179.33	-	170.34	-

The observations were taken 19^m after the hour named at Philadelphia, 3^m after at Toronto, 28^m after at Sitka, and 5^m after at Lake Athabasca.

Fort Simpson.—The Bifilar magnetometer at Fort Simpson received an accidental shock on the 10th April, which rendered it nccessary to

readjust it^{*}, this was done on the 13th, a correction being applied to the intermediate readings. We have therefore two series, the first of only eleven days, of which one is incomplete, the second of thirtyfive days, nine of which, however, want one observation or more. A separate mean for each will be found in the abstract. The whole forty-six days have also been combined in a general mean, without omission of any one, for the reasons already stated in reference to the Declination Observations, page 15.

TABLE XX.

Mean scale reading and temperature of the Bifilar Magnet at Fort Simpson in April and May 1844, to which are added the mean for the same two months at all the American stations, and the difference of each reading from the mean of the whole, in terms of the Horizontal Force. The scale readings at Philadelphia arc the complement to 1100 of the actual readings.

		Fort	Simpso)n.		નું	Phila	delphia.	Tor	ronto.	Si	tka.
four.	nean	Obser	ved.	ed. to 60°.	A 75	Local mean time.				A T	1	
Gött. Hour.	Local mean time.	Scale.	Temp.	Means red. to Temp. 60°.	$\frac{\Delta X}{X}$	Local 1	Scale.	$\frac{\Delta X}{X}$	Scale.	$\frac{\Delta \mathbf{X}}{\mathbf{X}}$	Scale.	$\frac{\Delta X}{X}$
21 22 23 Noon 1 2 8 4 5 6 7 8 9 10 11	h. m. 12 15 13 15 14 15 15 15 16 15 17 15 18 15 19 15 20 15 21 15 22 15 23 15 0 15 1 15 2 15 2 15	232 11 227 25 228 26 205 47 202 20 211 70 217 23 224 56 230 04 238 54 244 67 247 70 244 99 244 82 250 13	 64.7 64.5 64.0 64.3 63.8 63.3 63.2 63.0 62.8 60.5 61.7 62.5 62.8 63.2 63.6 	230 · 83 231 · 48 208 · 94 205 · 27 214 · 36 219 · 77 226 · 98 232 · 30 238 · 95 246 · 05		12 13 14 15 16 17 18 19 20 21 22 23 Noon 1 2	107.65 108.90 110.55 112.60 112.80 110.45	+ 00004 + 0008 + 00018 + 00019 + 00028 + 00028 + 00019 - 00003 - 00033 - 00044 - 00045 - 00045 - 00045 + 00005 + 00005	504.04 503.87 503.92 506.02 506.02 506.44 503.67 504.08 502.87 499.06 407.05 498.30 501.27 506.52 511.22		515 · 20 514 · 20 513 · 70 515 · 30 515 · 15 514 · 45 514 · 45 514 · 45 514 · 45 514 · 45 514 · 45 514 · 45 512 · 50 512 · 10 510 · 55 511 · 40 512 · 90	
11 Mid. 13 14	3 15 4 15 5 15	256·33 256·54 258·89	63 · 2 63 · 8 64 · 3	258.92	+ .00482 + .00500 + .00580	2 3 4 5	100.95 109.90 110.20	+.00005 +.00017 +.00018	514·53 514·55 516·19	$+ \cdot 00091$ $+ \cdot 00091$ $+ \cdot 00108$	516.85 520.45 521.70	+ 00045 + 00005 + 00051 + 00057
14 15 16 17	6 15 7 15 8 15	259.30 258.02 257.65	64·4 64·5 64·6	262.84	+ .00596 + .00561 + .00552	6 7 8	107.35 106.30	+ .00007 + .00002 + .00003	(+ .00065 + .00032 + .00009	522:00 521:75 522:20	+ 00057 + 00073 + 00068 + 00074
17 18 19 20	9 15 10 15 11 15	253 · 68 252 · 12 243 · 94	65.0 65.1 65.3	257.66 256.21 248.21	+ 00332 + 00445 + 00401 + 00170	9 10 11	105.65 106.85 106.05	- ·00000 + ·00005	505 82 505 71 506 70 505 04	00002 +.00008 00009	522 · 35 522 · 35 522 · 35 519 · 50	+ 00074 + 00076 + 00076 + 00076
	-			242.37	-		105.69		505.93		516.43	

See remark at Table XIX, as to the difference of the actual observation from the hours given.

* The details of the adjustments will be found in a future section,

Mean diurnal curve of Horizontal Force.--The mean diurnal curve of the Horizontal Force, as given by observation, and influenced by disturbances, appears to consist at Lake Athabasca of a single progression, having its minimum at 4 A.M. and its maximum at 10 P.M., and agreeing in neither respect with the diurnal changes of this element at Toronto. The latter have at the same season two maxima, namely, at 3 P.M. and 6 A.M., and two minima, at 11 A.M. and 1 A.M. respectively!

Upon closer examination, it is evident that a second progression is superadded to the first at Lake Athabasca, which produces a subordinate maximum at 8 A.M., and a minimum at 10 A.M. Lastly. by omitting days most influenced by disturbance, and confining our attention to the mean given by 46 days, which were in a great measure free from it, we obtain evidence of the two diurnal maxima and two minima, as at Toronto, but accompanied by a third and more considerable maximum at 11 P.M., of which there is no trace at the The first of these maxima occurs at 8 A.M., and latter station. appears to correspond to that which occurs two hours earlier at Toronto; the second occurs at 4 or 5 P.M., and corresponds to the principal daily maximum at Toronto; the third is caused by the Horizontal Force retaining its high value after the hour just named at Athabasca, and even exhibiting an increase of it at 10 and 11 P.M. immediately before its great diurnal decline, whereas at Toronto it uniformly and steadily declines from 5 P.M. to 1 A.M.

Comparing together the values at the American stations as a group, from Table XIX., as laid down, plate 2, we find that the mean diurnal curve of the horizontal component at the two most southern stations, Philadelphia and Toronto, which are about 300 miles distant from each other, are similar in their hours of maxima and minima, but differ considerably in the value of their ordinates for the same hours, those at Toronto being much the larger, especially about the time of the morning minimum at 11 A.M., and of the principal maximum at 5 P.M.; they both present an increasing force at the hours at which it is decreasing to its lowest value at Lake At Sitka, which geographically is not far distant from Athabasca. the last-named station, while magnetically it belongs to the same group as the former, we have a curve of intermediate character; the great decrease of the Horizontal Force from 11 P.M. to 4 A.M., which occurs at Lake Athabasca, and is there followed by an equally rapid return towards mean values until 8 A.M., is, it is true, wanting, but we have a continuous slightly decreasing value, from 11 P.M. to 7 A.M., being the same period in which it is increasing at Toronto and Philadelphia. The curves in fact exhibit a striking progression of character, both in respect to the minimum and maximum of force;

we see the latter increasing rapidly in amount, and tending more and more towards an advanced period of the afternoon, as we proceed to the north, each culminating point falling above and in advance of that of the curve belonging to the stations to the southward from the lowest, which is that of Philadelphia, to the greatest, which belongs to Lake Athabasca. Again, we find the maximum at 6 A.M., which at Philadelphia exceeds that at 5 P.M. in amount, at Toronto is considerably less than the latter; at Sitka it cannot be distinguished with certainty upon the observations of one winter; and at Lake Athabasca we find in its place the very low values already pointed out, or if the small relative maximum of 8 A.M. be identified with it, it exists only as an inconsiderable undulation upon a much larger movement, determined probably by other causes.

At Fort Simpson the mean curve does not differ in general character from that at Athabasca, but is enormously increased in amplitude; the extreme deviations, both positive and negative, are doubled in amount, and there are other proofs of the influence of the advance of the season, the subordinate maximum just referred to being reduced to a still smaller relative amount, and shown three hours later; we find also no trace of the increase of the element preceding its great nocturnal decline, which was remarked in every one of the winter months; it declines slightly from 6 P.M. to 10 P.M., and then the great movement commences. At this station, as at Lake Athabasca, the mean curve by the induction inclinometer follows all the inflexions of that of the Horizontal Force, and gives a satisfactory confirmation of the accuracy with which they are represented.

A comparison of all the American stations for the two spring months, confirms the previous remark as to the systematic character of their differences, but shows also the curious fact that the *relative* change from winter to spring was less at Sitka than at either of the other stations, which is also apparent in the declination.

Induction Inclinemeter.—The instrument employed for measurement of the changes of Inclination was the Unifilar, with which the absolute determinations of the Horizontal Force were made. The arm opposite to the one which carried the reading telescope and scale was provided with a socket, at the distance of 5 inches from the suspended magnet, for the reception of a single soft iron bar of 12 inches in length. The length of the suspended magnet was 2°5 inches; the are value of the scale was 1'°0.

This instrument was one of the first of the kind that were made, and the first employed in any of the colonial observatories. I believe, also, that the present observations with it are the first that have been published at large, and as the Induction Inclinometer is less known than any other of the magnetical instruments referred to in this account, and has been less generally employed than its merits appear to deserve^{*}, it will be proper to state at some length the grounds for that degree of confidence in the results which has led to their being included in the present volume.

The principle of the instrument may be stated from the explanations of Dr. Lloyd, as follows + :- If a soft iron bar, perfectly devoid of magnetic polarity, be held in a vertical position, it immediately becomes a temporary magnet under the inducing action of the earth's magnetic force, the lower extremity becoming a north pole, and the upper a south pole; accordingly, if a freely suspended magnet, whose dimensions are small in comparison with those of the bar, be situated near, and in a plane passing through one of these poles, it will be deflected from the magnetic meridian. The deflecting force is the induced force of the bar, which is a function of the vertical component (Y) of the earth's magnetic force and of the temperature, but depends also upon the quantity and distribution of the magnetism in the bar, and its distance from the suspended magnet. In practice it may also contain a term depended upon the *permanent* magnetism of the bar, which is seldom wholly evanescent. The tendency of this force is to turn the magnet; it is resisted by the horizontal component (X) of the same force; under the opposing influence of these two forces the bar assumes a position of equilibrium at a certain angle (u) from the magnetic meridian. This position serves to determine the ratio which subsists between them, and from the changes which it undergoes, may be, in like manner, inferred the changes of this ratio, and therefore those of the magnetic inclination.

The moment of free magnetism of the suspended magnet being denoted by m, let mU be the moment of the force exerted on it by the iron bar, U being, as already stated, a function of the vertical component and of the temperature; then, since mX sin u is the

[†] Proceedings of the Royal Irish Academy, 1842 and 1850; also Letter to Colonel Sabine, dated 12th October 1848, printed and circulated for the information of the Directors of the British Colonial Observatories.

^{*} The advantages of the Instrument are these: Its construction is not attended with any of the mechanical difficulties which have led to the failure of the Balance Magnetometers. The changes of inclination being given directly, the deduction of those of the total force is much facilitated. It can be employed with increased advantage where the Balance Magnetometer, which is its only substitute, becomes nearly useless from its limited range of scale, and its unsteadiness in disturbances. It is easily adjusted, and not liable to get out of adjustment. It is observed with the same facility as a Declinometer, and its coefficient can be verified as often as we please without interrupting the series of observations; this last circumstance was not known at the period of the present observations, which was prior to the suggestion by Dr. Lamont of the method of deflection, to be referred to presently.

moment of the opposing force of the horizontal component X excited at the angle u, the equation of equilibrium is

$$\mathbf{U} = \mathbf{X} \, \sin \, u$$

now let the two components of the earth's force undergo any small changes ΔX and ΔY , and let $V\Delta Y$ be the change of U, then Δu , denoting the corresponding change of the angle u, in parts of radius $V\Delta Y = X \cos u \Delta u + \Delta X \sin u$

whence, dividing by the equation $Y = X \tan \theta$, in which θ denotes the magnetic inclination,

V
$$\tan \theta \frac{\Delta X}{X} = \cos u \Delta u + \sin u \frac{\Delta X}{X}$$

or if $p = V^{-1} \cot \theta$ we have

$$\frac{\Delta \mathbf{Y}}{\mathbf{Y}} = p \left(\cos u \Delta u + \sin u \; \frac{\Delta \mathbf{X}}{\mathbf{X}} \right)$$

assuming that the induced magnetism of the iron bar is proportional to the inducing force, the co-efficient p may be found by inverting the bar and observing the angle of deflection in the direct and inverted positions; denoting these angles by u and u', it is shown that

$$p = \frac{2}{\sin u + \sin u'}$$

whence

$$\frac{\Delta \mathbf{Y}}{\mathbf{Y}} = \frac{\cos u}{\sin \mathbf{S} \cos \mathbf{D}} \Delta u + \frac{\sin u}{\sin \mathbf{S} \cos \mathbf{D}} \quad \frac{\Delta \mathbf{X}}{\mathbf{X}}.$$

where $S = \frac{1}{2} (u + u')$ and $D = \frac{1}{2} (u - u'.)$ also since

$$\Delta \theta = \sin \theta \cos \theta \left\{ \frac{\Delta Y}{Y} - \frac{\Delta X}{X} \right\}$$

by substitution

$$\Delta \theta = \frac{\sin 2 \theta \cos u}{2 \sin S \cos D} \left\{ \Delta u + \frac{\cos S \sin D}{\cos u \sin 1'} \cdot \frac{\Delta X}{X} \right\}$$

The angle u in this formula being the deviation of the suspended magnet from the position which it would assume under the action of the earth alone, its changes Δu are the differences between the observed changes of position, measured from a fixed line, and the corresponding changes of declination. The effect of temperature upon the iron bar may be corrected by substituting ($\Delta u + a \Delta t$) for Δu , Δt being the actual change of temperature, and a the change of angle in parts of radius, corresponding to a change of 1°. Dr. Lloyd states, that the effect of an increase of temperature upon a soft iron bar, in all his experiments, has been an *increase* of its induced magnetism, being the reverse of its effect upon the permanent magnetism of an artificial magnet. The same effect was observed in the case of the present instrument, and in that of the observatory instrument with two bars at Toronto, but the amount was very small in both, as was also found by him.

Since the date of the observations under discussion, Dr. Lamont has shown that the assumption, that the induced magnetism of the bar is proportional to the inducing force, is not strictly in accordance with the fact, and has proposed a method of determining the scale co-efficient of the instrument, "which is independent of all hypothesis, and necessarily includes all the circumstances upon which the quantity sought depends." The principle of his method consists in altering the induced force artificially, by a small but known amount, and observing the change of angle produced thereby, and this is effected by placing a magnet at a considerable distance* above or below the suspended magnet, their centres being in the same vertical line, and observing the scale readings with this magnet, first vertical, in which position it exerts no direct action upon the suspended magnet, but only on the iron bar, and next horizontal, and at right angles to the suspended magnet, in which position it should exercise no action on the iron bar, but only on the suspended magnet. It will be shown below that at the distances of deflection which it is necessary to employ in practice, the assumption that in its horizontal position the magnet exercises no effect on the induced magnetism of the iron bar is not quite in accordance with the fact, but the effect produced can be eliminated very nearly, by reversals. Now if n be the angle of deflection with the magnet vertical, n' with the magnet horizontal, a the distance of the magnets from centre to centre, e the length of a line connecting the centre of the fixed magnet with the centre of the iron bar, and ϕ the angle which that line forms with the vertical, it is shown by Dr. Lloyd, that

$$\frac{n}{n'} = \frac{a^3}{c^3} (1 + \cos^2\theta) \mathbf{V}$$

By substituting the value of V thus found, in the formula above,

 $\frac{\Delta \mathbf{Y}}{\mathbf{Y}} = \mathbf{V}^{-1} \cot a \theta \left(\cos u \Delta u + \sin u \frac{\Delta \mathbf{X}}{\mathbf{X}} \right)$

a new and more accurate expression is obtained for the changes of the Vertical Force; also since

$$\Delta \theta = \sin \theta \cos \theta \left(\frac{\Delta Y}{Y} - \frac{\Delta X}{X} \right)$$

By substituting the last expression for $\frac{\Delta \mathbf{I}}{\mathbf{V}}$, we have

$$\Delta \theta = \mathbf{V}^{-1} \cos^2 \theta \cos u \Delta u + \mathbf{f} \cdot \frac{\Delta \mathbf{X}}{\mathbf{X}}$$

* Seven or eight times the length of the deflocting magnet is the distance recommended, but it does not appear to be sufficient.

where $f = V^{-1} \cos^2 \theta \sin u - \sin \theta \cos \theta^*$; or if we put $\sin \phi = V^{-1} \cos \theta \cos u$,

then $f = 2 \cos \theta \cdot \cos \frac{1}{2} (\phi + \theta) \sin \frac{1}{2} (\phi - \theta)$

The instrument made use of at Lake Athabasca has been subsequently sent to the East Indies, and I have had no opportunity of putting in practice both these methods of determining the scale co-efficient with it, for the purpose of ascertaining in what manner the value obtained by the original method must be modified, to agree with that resulting from the experiments of deflection. Both methods have been tried, however, with this view, with two different instruments at Toronto, and with other instruments elsewhere; the results appear to warrant the conclusion, that the ratio between the values thus obtained is not only constant for the same instrument, but so nearly the same for all instruments of similar construction, and furnished with iron bars of similar quality, that we may obtain a pretty good approximation to the true scale value, when, as in the present case, it cannot be directly determined, by multiplying the value given by the formula of the instructions by the mean ratio deduced from all the experiments.

The following Table contains the particulars of a series of experiments of deflection made with an Induction Inclinometer with one iron bar, at Toronto; this instrument is precisely similar to the one used in the northern observations, except that the magnet suspended is 3 °O instead of 2 °G inches in length; it was made and sent to America at the same time.

* The foregoing explanation is, in substance, derived entirely from the Papers of Dr. Lloyd referred to in a previous note, and is given as much as possible in his own words.

TABLE XXI.

Experiments to determine the scale co-efficient of a one-bar Inclinometer by the method of deflections, under various adjustments.* In this instrument b=4.96 inches.

• . 3 • . 3	Date.		Acting End of Iron Bar		istances Inches.		$\cos^2 \phi$	Defle	ction.	De- duced Scale	Co- efficient	Ratio.
-			a	a	0	h		2 n	2 n'	Value.	Adjust- ment.	
I. 11. 111.	1851. June 6 " June 9 " June 11	-	South Pole - " - North Pole - " -	30.50 33.75 26.62 30.87 26.80	25.16 28.36 32.06 36.30 39.20	5.83 5.83 5.09 5.09 5.09	·961 ·969 ·974 ·981 ·976	11·58 7·61 6·78 4·81 6·44	59.08 42.82 80.81 52.57 80.62	, 1.097 1.152 0.829 0.822 0.878	, 0.851 0.854 0.838	1·290 1·353 0·970 0·962 1·046
IV.	June 12	-	South Pole -	30.22	25.40	5.63	•965	10.40	59.05	1.192	0.842	1.411
v .	June 13	• 1	South Pole -	33 • 29	28.34	5.30	·969	7.98	45.35	1.126	0.849	1.326
, VI.	June 13	•	South Pole -	33 · 29	28.34	5.30	•969	8.35	46.37	1.094	0.843	1.296
VII.		•	North Pole -	33 . 29	38.91	5.39	·984	4.33	42.71	0.756	0.843	0.896
	"	-	" -	30.32	86.09	5.39	•981	5.27	55.34	0.769	-	0.910
VIII.	June 16	-	South Pole -	33.03	27.64	5.30	•969	7 • 93	46.15	1.151	0.847	1.359
	"	-	»» •	29.36	23.97	5, 39	•959	12.44	66*26	1.112	-	1.312
IX.	.,	•	North Pole -	33.03	38.42	5.39	·984	4.43	42.66	0.730	0'847	0.862
	"	•	»» ,	29.36	34.75	5.39	•980	5.83	60.84	0.816	-	0*963

In the foregoing experiments, the deflecting magnet employed was the one used in the determinations of Absolute Horizontal Force, its length 3 66 inches. It will be observed that all the co-efficients obtained when the acting end of the bar was a south pole, or the bar was upwards, are greater than those given by the formula of the instructions, and all those obtained when the acting end was a north pole, or the bar downwards, with one exception, are less. It was proved, by reversing the deflecting magnet in the vertical position when the iron bar was away, that it has no effect on the suspended magnet in

* The particulars of the previous adjustments are as follows: n = number of reversals of the iron bar to obtain mean values of S and D; $\theta = 75^{\circ}$ 19'.

				n	u	s	D	
I. 111. 111. 11. 11. 11. 11. V. VI. VI. VII. VI	June 5 June 9 June 11 June 12 June 13 June 13 June 13 June 16			8 877×5×7	<pre></pre>	° ′ 16 2·2 16 0·7 16 18·0 16 7·1 16 12·0 16 12·0 16 8·7	$\begin{array}{c} \circ & \prime \\ 0 & 30.9 \\ 0 & 3.1 \\ 0 & 12.0 \\ 0 & 14.8 \\ 0 & 6.1 \\ 0 & 6.1 \\ 0 & 6.0 \\ 0 & 2.3 \end{array}$	Acting end of bar changed.
IX.	June 16	•	•	×	16 8.2	16 8.7	0 2.3	

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this position; but it would appear that the difference in question may result, in part at least, from an effect on the induced magnetism of the iron bar when the magnet is horizontal, which renders the angle n' greater in each case when the acting end is a south pole, for the same value of a, than when it is a north pole. According to the theory, the angle of deflection when the magnet is horizontal should be the same for the same distance, whatever the position of the iron bar, which is supposed not to be affected by it.

As it appeared desirable to establish this point, and it might be suggested that the effect was in consequence of not taking a sufficient distance of deflection, although in some of the foregoing experiments it was between nine and ten times the length of the magnet, a second series was made, with a deflector of 7.5 inches, which allowed a considerably greater distance to be used. The particulars are contained in the next Table.

TABLE XXII.

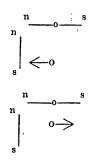
E	Experiments	of dej	flection	continue	d, def	lector	of 7	5 i	nches.	*	
.1.	1		1	. 1					1 0	1	

,	Date.	Acting End of Iron Bar		istances Inches.	3 .	$\cos^2 \phi$	Defle	ction.	aucea	Co- efficient by	Ratio.
-		a	a	e	h		2 n	2 n'	Scale Value.	Adjust- ment.	
x.	1851. June 23 -	North Pole-	55.09	60.67	5.38	0.993	5.68	55'17	, 0.898	0.829	1.084
, XI	,, - June 24 -	,, - South Pole -	58.83 55.09	64·43 49·95	5·38 5·39	0.994	5·50 9·43	43·43 59·43	0.935	" 0.818	1·129 1·258
	" -	,, -	58.83	53.66	5.39	0.991	9 43 7 · 04	47.84	1.089	, 0 010 , 0 010	1.332
XII.	June 25 • " •	North Pole -	55.09 58.83	60.67 64.43	5·33 5·33	0.992	5·96 5·08	56.07 44.76	0.856	0.805	1.064 1.016
XIII.	" -	South Pole -	55.09	49.95	5.38	0.880	10.21	58.04	0.942	0.821	1.147
	" -	,, -	58.83	53.66	5.38	0.991	8.03	46'45	0.996	"	1.213

It appears that, notwithstanding the increased distance of deflection, we have the same result as before. The ratio which the experimental scale value bears to the theoretical one evidently depends upon the nature of the acting pole, or rather upon the position of the iron bar above or below the suspended magnet at the time of the experiment; it is about one tenth greater for adjustments in the former position than for those in the latter. In both positions the value given by deflection is the greatest of the two.

* The following are the particulars of the adjustments in Table XXII. n = number of times the iron bar was reversed, to obtain the values of S and D.

			n	u	s	D	
X. XI. XII. XIII.	June 23 June 24 June 24 June 25	- - -	 7 3 5 5		$\begin{array}{c} \circ & \prime \\ 16 & 36 \cdot 0 \\ 16 & 34 \cdot 4 \\ 16 & 47 \cdot 6 \\ 16 & 47 \cdot 6 \\ 16 & 47 \cdot 6 \end{array}$	° / 1 19 1 21 1 56.6 1 56.6	Collet shifted to other end of bar,



The upper end of the iron bar being always a north pole, the effect of presenting towards it the north and south poles of the deflecting magnet alternately, during its horizontal reversal is always the same as regards its induced magnetism; when, however, the bar is *above*, or the acting end a south pole, this effect concurs with the tendency of the magnet in the same position to deflect the suspended magnet, and the angle of deflection is increased proportionably; when the iron bar is

reversed, or the upper end is the acting pole, the contrary is the case, the angle of deflection is diminished; the effect being less, however in the ratio of $\frac{e^3}{e'^3}$ to unity, (e' the value of e when greater than α or the iron bar below.)

Taking the *difference* between observed value of the angle n', in two adjustments, at which the position of the iron bar was different but the distance of deflection the same, to be the sum of the effects produced in each case by the action of the deflector in its horizontal positions upon the induced magnetism of the iron bar, it appears, in the case of the experiments numbered VIII. and IX., to have * amounted to $(46^{\circ}15-42^{\circ}66)=3^{\circ}49$ scale divisions, when the distance was 33 °0 inches; and to $(66^{\circ}26 - 60^{\circ}84) = 5^{\circ}42$ div. when it was only 29 3 inches. Let the effect in the two positions of the iron bar be η and η' , where $\eta' = \left(\frac{e}{e'}\right)^{3}\eta$, then in this case the two values of η are 2.55 and 4.05 div., therefore those of η' are 0'94 and 1'37 div.; that is to say, the double angles of deflection, when the magnet was horizontal and the iron bar above, were increased by the two former amounts, at the greater and less distances of deflection respectively, and by the two latter when the iron bar was below; in each case in consequence of the effect upon its induced The corrected values of n' are therefore 43.6 and 62.2 magnetism. divisions respectively, which slightly reduces the difference between the resulting co-efficients, but to so small an extent as to prove that it is not caused by the effect in question alone, and that we must look elsewhere for a solution of the difficulty, probably to the introduction of other terms into the expressions involving the distances e and a; but without pursuing this subject any further here, I have concluded that the only way of approximating to the true value of the ratio required is to take the mean between the values found for the same distances under two adjustments, one in which the iron bar is below, the other in which it is above.

The experiments with the 3,6 deflector supply the following couples:---

Date.	a	e	Ratio of Co-efficients.	Mean.
June 6 9 12 13 13 13 13 16 16 16 16	30°50 30°57 30°55 33°29 33°29 33°29 33°03 33°09 29°36 29°36	25°16 36°30 25°40 36°09 28°34 38°91 27°64 38°42 28°97 34°75	$1^{\circ}290 \\ 0^{\circ}962 \\ 1^{\circ}411 \\ 0^{\circ}910 \\ 1^{\circ}311 \\ 0^{\circ}896 \\ 1^{\circ}359 \\ 0^{\circ}862 \\ 1^{\circ}312 \\ 0^{\circ}963 \\ \end{array}$	<pre> } 1.126 } 1.160 } 1.103 } 1.110 } 1.137</pre>
Mean -		\	-	1.127

TABLE XXIII.

next the experiments with the 7.5 inch deflector supply the following couples :----

TABLE XXIV.

Date.	u	е	Ratio of Co-efficients.	Mean.
June 24 23 24 25 25 25 25 Mean -	55'09 55'09 58'83 58'83 55'09 55'09 55'09 58'83 58'83 58'83	49'95 60'67 53'66 64'43 49'95 60'67 53'66 64'43 	1' 258 1' 084 1' 332 1' 129 1' 147 1' 064 1' 213 1' 106	<pre> } 1.171 } 1.230 } 1.105 } 1.159 1.166</pre>

It would follow, from the whole series, that the scale co-efficient determined for this instrument in the ordinary way will be brought to accordance nearly with the true value, by augmenting it in the ratio 1 146. I have employed, however, the last series alone, the distances of deflection having been more favourable, and the general result less likely to be influenced by any terms involving that quantity beyond what are employed. We have, again, a series of experiments with another instrument, one of those provided with two iron bars. In this case one bar being always above and the other below the suspended magnet, the effect of the deflecting magnet in its horizontal position is neutralized in great measure, being of a contrary sign in the two bars respectively. The following are the particulars: —

TABLE XXV.

Experiments to determine the Scale co-efficient of a Two-bar Inclinometer, by the method of Deflections, under various adjustments. Length of deflecting magnet 7°5 inches; value of b, or distance of iron bars from suspended magnet, 5°0 inches.

Date 1848-9.		Distances, Inches.		Defle	ction.	Deduced Scale	Co- efficient	Ratio.
		a .	h	n	n'	Value.	by Adjustment.	
October	3	71.80	4.15	6'48	38'74	ó [.] 500	0. 357	1'344
,,	13	71.80	4.15	5.90	35'15	0.492		1'329
,,	13	71.80	4.15	5.72	35.29	0.251		1'398
,,	31	71.80	4.15	6.03	35.48	0'493		1'322
,,	9	65.74	4.15	7.52	46'75	0.251	-	1'400
,,	12	65.74	4'12	8.63	50.08	0.487	·	1'306
,,	13	65.74	4.15	8.28	46'31	0'469	-	1'260
November	1	65.74	4.15	8.18	46.44	0'468		1'258
April	3	71.91	4.14	6.08	34.21	0'467	0.373	$1^{+}251$
- ,,	3	65.87	4.14	7.89	44.77	0'499	-	1'338
**	9	71.91	4.14	6.02	33'78	0'494	0.372	1'327
"	9	71.91	4.14	5.75	33.72	0.466	-	1 253
**	9	65.86	4.14	7.34	43.97	0.200		1'346
,,	9	65'86	4.14	7.49	44.27	0.489	_	1.312
]	

From the deflections at the nearer distance, we find a mean value of 1.332, and from those at the greater distance, a mean value of 1.318, for the ratio in which we must augment the value of the scale co-efficient found in the ordinary way for this instrument, to make it agree with the value deduced from experiment.

Lastly, Dr. Lloyd has found for his instrument a value of about 1'3 for the same ratio.

I conceive that whole evidence warrants the conclusion that the scale co-efficient found by the formula of the magnetical instructions is invariably less than the true value as determined by experiment; that the ratio in which it must be augmented is constant for the same instrument; and that it is nearly the same for all instruments furnished with bars of similar quality. I propose to adopt 1.22 provisionally, for the instrument used at Lake Athabasca, which I consider leaves the changes of inclination under an uncertainty of about one tenth their apparent value; a quantity which, however considerable, does not perhaps greatly exceed the uncertainty of all the observations of the changes of this element thus far; it does not affect their value for many relative purposes, and will not alter the character of any periodical law deducible from the observations.

The great amount of the daily changes of inclination indicated by the scale readings has been shown in Table XIII., in connexion with the corresponding changes of Horizontal Force. Satisfactory proof of the *reality* of these changes, and of the practical value of

the instrument, may be given by a comparison of the effect of sudden magnetical shocks, which sometimes occurred, of a very marked character upon the Inclinometer and Bifilar. The following instances have been selected with this view from the observations of Disturbances. The instruments were generally read in succession, with an interval of one minute between them. I have therefore interpolated a value of the Bifilar for the minute of observation of the Inclinometer; the last columns contain the change in scale readings and in terms of the Inclination and Horizontal Force, between each successive observation, usually a space of three minutes. It will be observed, that however great and sudden the changes of Horizontal Force shown by the Bifilar, the Induction Inclinometer never fails to exhibit a corresponding change of scale reading; indeed these changes so much exceed in general what would be inferred from the change of Horizontal Force alone, as to leave an excess sufficiently large to prove that in these cases, making full allowance for probable uncertainty of the scale value of the Inclinometer, the shocks must have been accompanied by large changes of Total Force.

			Bifilar.		I	nclinometer.	
		Readings.	Differences.	$\frac{\Delta X}{X}$	Readings.	Differences.	Δθ
1	D. H. M. Nov. 2 17 10 11 15 16 20 25 30 35 2 17 40	229'3 221'8 ^s 191'6 197'7 ^a 221'4 175'4 ^b 213'4 ^b 206'0 ^b 196'0 ^b	-24.1 + 23.7 - 46.0 + 38.0 - 7.4 - 10.0	- 0083 + 0081 - 0157 + 0130 - 0025 - 0034	113.8 126.3 51.7 182.5 132.7 144.4 174.8	$ \begin{array}{c} - \\ + 12.5 \\ - 74.6 \\ + 130.8 \\ - 49.8 \\ + 11.7 \\ + 30.4 \end{array} $	$ \begin{array}{c} $
2	April 16 18 57 59 19 1 2 6 7 11	208.9 239.8 ^a 271.7 267.0 ^a 248.1 248.0 ^a 247.6	+27'2 -19'0		201 [.] 3 62 [.] 5 172 [.] 6		-17.9 + 14.2
3	April 16 20 41 42 46 47 51 52 56	$203.7 \\ 181.7^{a} \\ 93.9 \\ 97.6^{a} \\ 112.7 \\ 113.6^{a} \\ 117.2 $	$-\frac{-84^{\circ}1}{+16^{\circ}0}$	-·0238 +·0045	258.8 479.3 404.5	+ 220 · 5 - 74 · 8	+ 28.5

TABLE XXVI.

^a Readings interpolated.

^b Readings taken simultaneously with those of the Inclinometer.

Е 2

		11	Bifilar.		Inclinometer.					
		Readings.	Differences	$\frac{\Delta X}{X}$	Readings.	Differences	. Δθ			
4	D. H. M. April 16 23 16 17 20 22 23 23 25 26 23 28	146'8 101'2 9'9 21'2 43'8 56'4 71'5 80'4 108'4			345.0 631.0 529.3 499.7	$ \begin{array}{c} - \\ + 286'0 \\ - 101'7 \\ - 29'6 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ -$	/ + 37`0 3`1 3`8			
5	April 17 0 45 46 49 51 52 55 56 58 59 17 1 2 3 5 5	$176^{\circ}3$ $185^{\circ}3^{a}$ $203^{\circ}3$ $215^{\circ}6^{a}$ $240^{\circ}1$ $163^{\circ}0^{a}$ $-0^{\circ}8$ $0^{\circ}0^{a}$ $3^{\circ}2$ $-18^{\circ}1^{a}$ $-60^{\circ}7$ $-50^{\circ}0^{a}$ $-30^{\circ}7$	$ \frac{-}{+30^{\circ}3} \\ -52^{\circ}6 \\ -163^{\circ}0 \\ -18^{\circ}1 \\ -31^{\circ}9 \\ -31^{\circ}9 $	$ \begin{array}{c} - \\ - \\ - \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0$	317·9 271·5 427·6 620·9 807·8 837·9		$ \begin{array}{c} -6.00 \\ +20.18 \\ +24.99 \\ +24.17 \\ +3.89 \\ -7.7 \\ $			
6	April 17 2 19 20 21 22 25 26 28 29 31 32 34 35 37 38 40	$179'7 \\ 172'2^{a} \\ 157'2 \\ 149'5^{a} \\ 131'1 \\ 105'4^{a} \\ 54'1 \\ 51'4^{a} \\ 46'0 \\ 67'7^{a} \\ 111'0 \\ 130'8^{a} \\ 170'3 \\ 163'5^{a} \\ 150'9 \\ 150'9 \\ 100'72 \\ 100'73 \\ 10$	$-22^{\circ}7$ $-44^{\circ}1$ $-54^{\circ}0$ $+16^{\circ}3$ $+63^{\circ}1$ $+32^{\circ}7$ $-$	$ \begin{array}{c} - & \cdot & 0064 \\ - & \cdot & 0125 \\ - & \cdot & 0152 \\ + & \cdot & 0045 \\ + & \cdot & 0178 \\ + & \cdot & 0092 \\ - & - & - \\ \end{array} $	$ \begin{array}{r} 311.6\\ 373.6\\ 370.3\\ 541.3\\ 540.9\\ 459.3\\ 309.6\\ -\\ \end{array} $	$\begin{array}{c} & - \\ - \\ + 62^{\circ} 0 \\ - 3^{\circ} 3 \\ + 170^{\circ} 0 \\ - 0^{\circ} 4 \\ - 81^{\circ} 6 \\ - 149^{\circ} 7 \\ - \end{array}$	$ \begin{array}{c} - \\ - \\ + 8.01 \\ - 0.43 \\ + 21.98 \\ - 0.05 \\ - 10.55 \\ - 19.36 \\ \end{array} $			
7	April 25 20 1 2 4 5 7 8 10 11 13 14 16	$\begin{array}{c} 239 \cdot 5 \\ 171 \cdot 6^{a} \\ 65 \cdot 9 \\ 64 \cdot 2^{a} \\ 60 \cdot 8 \\ 78 \cdot 4^{a} \\ 113 \cdot 7 \\ 125 \cdot 5 \\ 140 \cdot 2^{a} \\ 169 \cdot 6 \end{array}$		$ \begin{array}{c} - & \cdot & 0303 \\ - & \cdot & 0040 \\ + & \cdot & 0111 \\ + & \cdot & 0064 \\ - & - & - \\ \end{array} $	346·3 545·6 515·3 386·2 356·7	$ \begin{array}{c} - \\ + 199'3 \\ - 30'3 \\ - 129'1 \\ - 29'5 \\ - \\ \end{array} $	+25.77 -3.90 -16.59 -3.81			

TABLE XXVI.—continued.

^a Readings interpolated.
^b Readings taken simultaneously with those of the Inclinometer.

			Bifilar.		Inclinometer.				
		Readings.	Differences.	$\frac{\Delta X}{X}$	Readings.	Differences.	Δθ		
8	D. н. м. April 30 21 22	105.9					· _		
0	23	115.9ª			475'8	_	_		
	25	136.0			-		-		
	26	104'0 ^a	-14'9	- 0042	346'6	+ 70' 8	+9.12		
	28	40.0			-				
	29	69. 9ª	-34.1	0096	525'1	+178'5	+ 23.03		
	31	129.7				-	—		
	32	129 [•] 4 ^a	+ 60.2	+ 0171	455.5	-69.6	-8.98		
	34	128.9				-			
	35	129 9 ⁿ	+0.2	+ '0001	343.3	-112.5	-14.47		
	37	131.8		1 -					
	38	123'7 ^a	~6'2	-:0017	382'3	+ 39.0	+5'04		
	40	107.6	/				-		
	41	95°0ª	-28'7	0081	457.1	+74'8	+9.65		
	30 21 43	69.8		-	- 1	-			
	1	1	1	<u> </u>	l	1	<u> </u>		

TABLE XXVI.—continued.

^a Readings interpolated.

^b Readings taken simultaneously with those of the Inclinometer.

I conclude, from the foregoing examples of the action of the instrument in extreme cases, as well as from the close correspondence in the mean diurnal curves of inclination, as derived from the observations, with that of Horizontal Force, which will be pointed out below, that the testimony of the observations themselves is in favour of the opinion that the series, with some uncertainty as to the absolute values assigned, furnishes, as far as it goes, a true representation, and the only one we can at present refer to, of the regular and irregular changes of the Inclination in high magnetic latitudes.

Adjustments.

First Adjustment, 14th October 1843.—On conclusion of the experiments of deflection for determination of the absolute Horizontal Force, the instrument was placed on its pedestal, the base levelled, and the telescope adjusted to the meridian. The scale read 420°0, the corresponding reading of the Declinometer being 404°4, Bifilar 282°0, mean reading of Vernier's 199° 56′ 30″. The soft iron bar was now inserted in the socket, the upper or north pole deflecting, and was moved in the collet until the angle of deflection appeared to be a maximum; mean of Vernier's 252° 20′ 10″; when the same division of the scale was on the wire, Declination 406°6. The bar was next reversed, the lower end or south pole deflecting, and the telescope turned in azimuth until the central division was again on the wire; the Vernier's now read 158° 20′ 30″, Declination 406°8. We have then

	,	
$u = 41^{\circ} 36'$	S=46° 59′ 8	$\theta = 81^{\circ} 37''6$
$u' = 52^{\circ} 23'^{\circ} 6$	$D = 5^{\circ} 23''8$	a = 1.0007

whence the co-efficient for differences of scale reading, when corrected for changes of Declination, Temperature, and Horizontal Force, is

$$a\mathbf{P} = a \frac{\sin 2 \theta \cos u}{2 \sin S \cos D} = 0^{\prime \cdot} 148$$

according to the formula then in use. This value I have augmented in the ratio 1 22, for the reasons already stated in the actual reductions.

Increasing numbers indicated a return of the north end of the magnet towards the north, or a decrease of Inclination; the actual readings have therefore been inverted in the abstracts, by taking the complement of each to 500; and increasing numbers represent increase of Inclination throughout.

It would appear, from the difference between the angles u and u'above, that the iron bar must have possessed a considerable degree of permanent magnetism, or else that the suspended magnet was not on a level with the centre of the collet; it is possible, as there is no record to the contrary, and attention was not directed to this circumstance in the instructions then in use, that there may have been a difference on this account in the position of the acting pole, and, consequently, the amount of its action in the two positions of the iron bar, which would partly account for the difference in question; but the existence of permanent magnetism was afterwards shown by experiments at Fort Simpson. The bar was there employed as a deflector in the horizontal position, its centre at 15.7 inches from that of the suspended magnet, and it was found that there was a regular difference of 29''8 in the reading, according as one end or the other was presented; this difference gives an angle of deflection of 14'.9, one end acting as a north, the other as a south pole. The angle of deflection produced by a three-inch magnet, the centre at very nearly the same distance, was 612''0; the relative forces, being expressed nearly by the tangents of these angles, were as 1 to 41.5. I was not aware at that time of the facility with which an iron bar can be deprived of its permanent magnetism, by dipping it, according to Dr. Lamont's suggestion, several times alternately into hot and cold water; but to ascertain whether this circumstance is likely to have had any sensible influence on the results, the experiments of deflection Nos. X. to XIII., at Toronto, above, were purposely made when the bar had contracted a still greater amount of permanent magnetism by being inadvertently placed too near a magnet, but they do not show any difference from those in which the bar was almost entirely free from it, except a slight increase in the value of given changes, which may be due to ciner causes.

It became necessary to raise the suspended magnet on the 19th October, owing to the difficulty of reading the scale; the effect of

thus altering its position with reference to the acting pole of the iron bar was shown by a decrease in the scale readings, indicating an increase in the angle u of about 1° 53′. As the instrument was not otherwise disturbed, and the position of the bar was not altered, this quantity has been added to the angle u in the above formula until the end of the month, making the scale co-efficient

$a P = 0' \cdot 1747$

Second adjustment, 31st October 1843.—The soft iron bar being removed, the telescope was adjusted to the meridian, Vernier's reading 198° 28′ 20″, Declination reading 414 °O. The bar was then inserted in its socket, reversed, the telescope being turned in azimuth until the same division of the scale was on the wire, Vernier reading 248° 50′ 30″, Declination 413°O. The bar was lastly inserted, and the telescope again turned in azimuth until the same scale reading was obtained. Vernier reading 150° 0′ 5″, Declination 410°O. We have now

 $\begin{array}{cccccccc} u = 44^{\circ} & 28' \cdot 2 & S = 47^{\circ} & 25' \cdot 2 & \theta = 81^{\circ} & 37' \cdot 6 \\ u' = 50^{\circ} & 22' \cdot 2 & D = 2^{\circ} 57' \cdot 0 & a = 1 \cdot 0007 \end{array}$

whence

$$a \mathbf{P} = a \frac{\sin 2\theta \cos u}{\sin S \cos \mathbf{D}} = 0^{\prime \cdot} 140$$

And this quantity multiplied by the ratio 1'22 as before, gives for the approximate value of the scale, the co-efficient

· 1′ 1705

The situation of the instrument made it convenient to have the iron bar in both adjustments in the position in which the permanent magnetism and the induced magnetism were opposed.

CORRECTIONS.

Declination Changes.—Each reading has been reduced to the zero of 400 on the Declination scale, by subtracting from it the difference of the corresponding Declination reading from that number. In term days and magnetic disturbances, and whenever observations were made at short intervals, the correction applied was the mean between the Declination reading immediately preceding and following the Inclinometer observation; this was rendered absolutely necessary in many cases, by the rapidity of the changes of the Declination, which not infrequently caused the correction to vary more than a degree from one reading to the next, where the interval between them was only three minutes.

Bifilar Correction.—The correction due to the observed changes in the Inclinometer scale reading, for variations of the horizontal component of the earth force, involves the same quantity (V), of which the determination is the object of the experiments of deflection, and cannot be accurately assigned in the present case; being, however,

always very small, compared with the changes of the Inclination itself, the error involved by the application of the original formula can seldom be sensible. That formula is

$$B = \frac{\cos S \sin D}{\cos u \sin 1'} \frac{k}{a}$$

where h is the co-efficient of the Bifilar, a the value of one division of the scale of the Inclinometer in terms of radius, and the correction to each observed reading is B.n, n being the difference in scale divisions between the corresponding Bifilar reading and the standard reading, for the first adjustment B=0.100, and for the second B=0.057. These corrections have been applied to all the readings; the standard division adopted was the mean of the Bifilar readings for the same day in the month of October, and in the other months the mean of all the observations of each month respectively, to the nearest convenient unit, namely, the division 200 in November, 170 in December, 140 in January, and 160 in February.

The following Table contains the correction in scale divisions of the inclinometer for each value of n from 1 to 100 divisions of the Bifilar, under the adjustment of October 31; also the value of $\frac{\Delta X}{X}$ for the same values of n, for convenience in comparisons of the

 \mathbf{X}^{-} for the same values of n, for convenience in comparisons of the Bifilar readings.

TABLE XXVII.

Values of changes of the Bifilar scale reading in parts of the Horizontal Force, also of the Bifilar correction to the Inclinometer. Adjustment of October 31.

n Bif. Div.	<u>Δ χ</u> <u>χ</u>	B Incl. Div.	n Bif. Div.	Δ <u>X</u> <u>X</u>	B Incl. Div.	n Bif. Div.	<u> </u>	B Incl. Div.	n Bif. Div.	<u>Δ X</u> <u>X</u>	B lncl. Div.
$\begin{array}{c} 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 14\\ 15\\ 16\\ 17\\ 18\\ 20\\ 22\\ 22\\ 22\\ 22\\ 22\\ 22\\ 22\\ 22\\ 22$	$\begin{array}{c} 000341\\ 000682\\ 001024\\ 001365\\ 001026\\ 002730\\ 002388\\ 002730\\ 003412\\ 0003412\\ 0003753\\ 004094\\ 004436\\ 004436\\ 004436\\ 004436\\ 004436\\ 006540\\ 006540\\ 0066142\\ 007506\\ 006824\\ 007506\\ 007548\\ 0007506\\ 007548\\ 008189\\ 008530\\ \end{array}$	$\begin{array}{c} 0.06\\ 0.11\\ 0.17\\ 0.23\\ 0.34\\ 0.40\\ 0.51\\ 0.57\\ 0.63\\ 0.69\\ 0.74\\ 0.80\\ 0.86\\ 0.92\\ 0.97\\ 1.03\\ 1.09\\ 1.14\\ 1.20\\ 1.32\\ 1.37\\ 1.43\\ \end{array}$	$\begin{array}{c} 26\\ 27\\ 28\\ 29\\ 30\\ 31\\ 32\\ 33\\ 34\\ 35\\ 37\\ 38\\ 30\\ 40\\ 41\\ 42\\ 43\\ 445\\ 46\\ 7\\ 48\\ 49\\ 50\\ \end{array}$	$\begin{array}{c} \text{-}008871\\ \text{-}009212\\ \text{-}009654\\ \text{-}009855\\ \text{-}010236\\ \text{-}010236\\ \text{-}010236\\ \text{-}010236\\ \text{-}010236\\ \text{-}010236\\ \text{-}010236\\ \text{-}011200\\ \text{-}011200\\ \text{-}011242\\ \text{-}012283\\ \text{-}012624\\ \text{-}012624\\ \text{-}012624\\ \text{-}013307\\ \text{-}013648\\ \text{-}013849\\ \text{-}013849\\ \text{-}013849\\ \text{-}014330\\ \text{-}014330\\ \text{-}014330\\ \text{-}016355\\ \text{-}016378\\ \text{-}016378\\ \text{-}016378\\ \text{-}016378\\ \text{-}016719\\ \text{-}017060\\ \end{array}$	$\begin{array}{c} 1\cdot 49\\ 1\cdot 54\\ 1\cdot 60\\ 1\cdot 66\\ 1\cdot 72\\ 1\cdot 77\\ 1\cdot 83\\ 1\cdot 94\\ 2\cdot 06\\ 2\cdot 12\\ 2\cdot 17\\ 2\cdot 29\\ 2\cdot 35\\ 2\cdot 29\\ 2\cdot 35\\ 2\cdot 46\\ 2\cdot 52\\ 2\cdot 57\\ 2\cdot 63\\ 2\cdot 57\\ 2\cdot 63\\ 2\cdot 57\\ 2\cdot 63\\ 2\cdot 57\\ 2\cdot 63\\ 2\cdot 57\\ 2\cdot 80\\ 2\cdot 86\\ 2\cdot$	$\begin{array}{c} 51\\ 55\\ 55\\ 55\\ 55\\ 55\\ 55\\ 55\\ 55\\ 55\\$	$\begin{array}{c} \circ 017401\\ \circ 017742\\ \circ 018084\\ \circ 018084\\ \circ 018766\\ \circ 019107\\ \circ 019448\\ \circ 019790\\ \circ 020131\\ \circ 020472\\ \circ 020813\\ \circ 021154\\ \circ 021406\\ \circ 021837\\ \circ 022178\\ \circ 0222178\\ \circ 0222510\\ \circ 0223262\\ \circ 023262\\ \circ 023264\\ \circ 024286\\ \circ 024566\\ \circ 024566\\ \circ 024566\\ \circ 024566\\ \circ 024566\\ \circ 024566\\ \circ 0245590\\ \circ 025590\\ \end{array}$	$\begin{array}{c} 2\cdot 92\\ 3\cdot 03\\ 3\cdot 09\\ 3\cdot 19\\ 3\cdot 20\\ 3\cdot 26\\ 3\cdot 38\\ 3\cdot 43\\ 3\cdot 55\\ 3\cdot 66\\ 3\cdot 55\\ 3\cdot 66\\ 3\cdot 72\\ 3\cdot 78\\ 3\cdot 89\\ 3\cdot 89\\ 3\cdot 89\\ 3\cdot 89\\ 3\cdot 95\\ 4\cdot 06\\ 4\cdot 18\\ 4\cdot 23\\ 4\cdot 29\\ \end{array}$	767 778 801 823 84 856 889 912 9345 967 99 99 99 99 99	$\begin{array}{c} 025931\\ 026072\\ 026014\\ 026055\\ 027936\\ 027637\\ 027078\\ 022820\\ 022820\\ 0229002\\ 0229002\\ 0229084\\ 030026\\ 030967\\ 030026\\ 030367\\ 030049\\ 031390\\ 031732\\ 032414\\ 032755\\ 033096\\ 033488\\ 033475\end{array}$	$\begin{array}{c} 4\cdot 35\\ 4\cdot 40\\ 4\cdot 462\\ 4\cdot 58\\ 4\cdot 639\\ 4\cdot 639\\ 4\cdot 862\\ 4\cdot 98\\ 5\cdot 03\\ 5\cdot 03\\ 5\cdot 15\\ 5\cdot 26\\ 5\cdot 32\\ 5\cdot 32\\ 5\cdot 32\\ 5\cdot 32\\ 5\cdot 32\\ 5\cdot 5\cdot 32\\ 5\cdot 5\cdot 5\\ 5\cdot 66\\ 5\cdot 66\end{array}$

Temperature Correction.—Experiments were made at Toronto in December 1844, after the return of the instrument from the northwest, to determine the effect of changes of temperature upon the induced magnetism of the soft iron bar. A copper vessel was fixed upon the arm of the instrument itself, surrounding the bar, and provided with a stop-cock for changing the water, a regular adjustment was completed, and the experiments were then made by filling the vessel with water at different temperatures, while the bar was in place. The temperature was carried at once from the lowest to the highest point, the average extremes being 50° and 95° respectively, and the bar allowed 15 minutes to take up the change. Eacn value of the corresponding scale readings employed in the calculation was the mean by three independent observations, with five minutes interval between them. The value of q is found by the formula

$$q = \frac{\Delta u}{\Delta t^{\circ}} \frac{\cos u}{\sin S \cos D}$$

These values and the other particulars of the experiment are given in the following Table.

TABLE XXVIII.

Experiments to determine the Effect of Changes of Temperature upon the induced Magnetism of the soft iron Bar.

Date.	Adjustn	nent of Inclir	iometer.	Number of Changes.	$\begin{cases} \text{Mean} \\ \stackrel{\circ}{t_i} - \stackrel{\circ}{t} \end{cases}$	$ \substack{ \text{Mean} \\ \Delta u } $	q
	<i>u</i> ,	<i>s</i> ,	D,				
1844:	o <i>i ii</i>	o / //	o / //		0	,	
December 23 -	25 43 50	23 59 52	1 43 50	8	46'1	11'22	0.2395
,, 24 -	$24 \ 22 \ 20$	23 35 35	$0 \ 45 \ 45$	5	43'9	6'12	0'3178
" 24 -	,,	"	,,	5	46'5	6'44	0.3124
" 26 -	,,	,,	"	5	41'2	6'61	0.3620
" 26 -	"	,,	,,	6	41'1	6'45	0.3224
" 27 –	,,	"	,,	6	47'0	14.55	0.7042
" 28 -	"	,,	,,	6	46'9	8'63	0.4183
" 28 -	,,	"	,,	6	46'5	6.82	0.3363
Mean -			Second Second				0.3232

The observation on the 27th has been rejected.

The correction to the scale readings of the Inclinometer for given changes of temperature is found by the formula—

$$\mathbf{R} = \frac{\sin S \cos D}{\cos u} \cdot \frac{q}{a}$$

The values found are R=0.368 for the first adjustment, and R=0.390 for the second. This correction has not been applied to the individual readings. The following table contains the value of $R \Delta t^{\circ}$ for each value of $\Delta^{\circ} t$ from 1° to 39°, to be subtracted from

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the scale readings (as inverted) when the observed temperature is higher than the standard temperature, and the contrary when it is lower.

TABLE XXIX.

					-		
Δt	R Δt	لمَ t	$\mathbb{R} \Delta t$	Δt	R \scrime t	∆_t	R Δt
о 0 1 2 3 4 5 6 7	Div. 0'00 0'39 0'78 1'17 1'56 1'95 2'34 2'73	。 10 11 12 13 14 15 16 17	Div. 3'90 4'29 4'68 5'07 5'46 5'85 6'24 6'63	。 20 21 22 23 24 25 ' '26 27	Div. 7'80 8'19 8'58 8'97 9'36 9'75 10'14 10'50	。 30 31 32 33 34 35 36 37	Div. 11.71 12.09 12.48 12.87 13.26 13.65 14.04 14.43
8 9	3'12 3'51	18 19	7°02 7°41	28 29	10'92 11'31	38 39	14'82 15'21
							1

Corrections to reduce the Inclinometer scale readings under the Second Adjustment to a standard temperature.

The adjustment last described remained undisturbed until December $21^d 2^h$ Göttingen, when the arm of the instrument was accidentally struck and moved, occasioning a change of 123 scale divisions in the reading; such a movement does not sensibly affect the adjustment, and that quantity has been subtracted from all subsequent readings to correct the series.

Changes of the Inclination.—The approximate amount of the daily range of this element, indicated by the difference between the highest and lowest scale readings, has been already given in Table X111. in connexion with that of the Horizontal Force.

Diurnal variation of the Inclination.—The following Table contains the mean scale readings of the Inclinometer for each month, corrected for changes of the Declination and Horizontal Force, in the manner described above.

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		Noven	iber 4,	Janua	ry 2–9	, which	h are in	ncomple	ete.	
Civil time		h. m. 15 55	h. m. 16 55	h.m. 17 55	h. m. 18 55	h. m. 19 55	h. m. 20 55	h. m. 21 55	h. m. 22 55	
Gött. time	-	. 0	1	2	3	4	5	6	7	
October November December January February Mean -		264.54 134.71 172.39 216.27 230.58 197.34	257 · 92 130 · 76 170 · 59 213 · 92 210 · 40 190 · 19	234.36 125.94 167.17 210.49 200.20 182.70	221 '11 125 '70 168 '50 200 '57 196 '86 177 '80	$\begin{array}{r} 217 \cdot 28 \\ 126 \cdot 43 \\ 161 \cdot 39 \\ 195 \cdot 92 \\ 196 \cdot 94 \\ \hline 175 \cdot 68 \end{array}$	218.05 123.46 160.00 197.50 202.50 176.21	210.97 126.13 163.97 203.76 202.67 177.92	215.79 125.15 166.39 202.25 201.81 178.43	
Civil time	-	Noon —5 ^m	h. m. 0 55	h. m. 1 55	h. m. 2 55	h. m. 3 55	h. m. 4 55	h. m. 5 55	h. m. 6 55	
Gött. time	-	8	9	10	11	12	13	14	15	
October November December January February		217.86 125.42 166.36 202.57 199.58	$\begin{array}{r} 218 \cdot 43 \\ 126 \cdot 84 \\ 164 \cdot 16 \\ 200 \cdot 69 \\ 196 \cdot 84 \end{array}$	219·20 125·71 162·25 201·47 194·31	215.78 123.72 162.25 198.82 192.08	$\begin{array}{r} 215 \cdot 37 \\ 121 \cdot 88 \\ 161 \cdot 01 \\ 195 \cdot 16 \\ 191 \cdot 63 \end{array}$	212.78 120.03 160.26 195.23 189.16	$\begin{array}{r} 213 \cdot 28 \\ 119 \cdot 64 \\ 159 \cdot 89 \\ 193 \cdot 68 \\ 186 \cdot 86 \end{array}$	$213.34 \\ 119.22 \\ 160.51 \\ 192.60 \\ 185.24$	
Mean -	•	178.26	177.20	176.22	174.14	173.01	171.25	170.36	169.98	
Civil time	-	h. m. 7 55	h. m. 8 55	lı. m. 9 55	h. m. 10 55	Midn. —5 ^m	h. m. 12 55	h. m. 13 55	h. m. 14 55	
Gött. time	•	16	17	18	19	20	21	22	23	Mean.
October November December January February		$212.93 \\ 120.33 \\ 158.25 \\ 191.89 \\ 187.74$	$211 \cdot 89 \\120 \cdot 60 \\158 \cdot 65 \\194 \cdot 48 \\183 \cdot 50$	$211.41 \\ 117.40 \\ 157.91 \\ 192.85 \\ 185.60$	$\begin{array}{r} 222^{\circ}84 \\ 120^{\circ}21 \\ 158^{\circ}38 \\ 193^{\circ}06 \\ 184^{\circ}48 \end{array}$	$\begin{array}{r} 242 \cdot 82 \\ 126 \cdot 39 \\ 163 \cdot 03 \\ 200 \cdot 16 \\ 190 \cdot 32 \end{array}$	$\begin{array}{r} 231 \cdot 18 \\ 135 \cdot 67 \\ 170 \cdot 71 \\ 216 \cdot 40 \\ 204 \cdot 93 \end{array}$	$\begin{array}{r} 248.71 \\ 137.80 \\ 182.90 \\ 209.01 \\ 205.52 \end{array}$	251.07 138.99 184.46 230.05 208.73	$\begin{array}{r} 224.95 \\ 125.74 \\ 165.06 \\ 202.03 \\ 197.02 \end{array}$
Mean -	-	169.78	169.23	168.62	170.63	178.88	187.42	191.35	197.80	178.36

TABLE XXX.Monthly Means of corrected Inclinometer readings, omitting October 20,November 4, January 2-9, which are incomplete.

The general mean is taken, as in the other Tables, by dividing the sum of all the observations under each hour by the total number, which is 112; and the co-efficient for this curve, which includes observations under the separate adjustment of October, with those of the subsequent months, is

 $a P = 0.1405 \times 1.22 = 0.1714$

A mean having been taken however for the complete days from November to February inclusive, prior to the application of the Bifilar correction, I subjoin it at the foot of the page*; but as the

*	TABLE	XXXI.

Mean by 98 complete days under the Second Adjustment uncorrected for changes of Horizontal Force.

0	1	2	3	4	Б	6	7	8	9	10	11	Gott. time.
188'78	181.75	174'79	172.23	169.94	170.20	172.68	173.41	172.82	171.48	170'14	168'18	
12	13	14	15	16	17	18	19	20	21	22	23	Mean.
166.63	165.15	164.12	163.66	163'40	161'86	162'34	163.28	170.22	181.25	181.02	190'26	171.67

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month of October was marked by considerable disturbances, which have probably affected the mean curve of Horizontal Force, it is here included with the other months. In the next Table the small correction necessary to reduce the means to a uniform temperature of 40° has been applied to the general mean; and under each corrected value is given its difference from the mean of the whole in scale divisions of the instrument, together with the approximate value of this difference in terms of the inclination.

TABLE XXXII.

Civil Time -	h. m. 15 55	h. m. 16 55	h. m. 17 55	h. m. 18 55	h. m. 19 55	h. m. 20 55	h. m. 21 55	h. m. 22 55	
Gött. Time -	Noon.	1	2	3	4	5	6	7	
Scale Differences - Δθ	$ \begin{array}{r} 197 \cdot 65 \\ +19 \cdot 22 \\ +3 \cdot 29 \end{array} $	$ \begin{array}{r} 190.62 \\ +12.19 \\ +2.08 \end{array} $	183.09 +5.06 +0.97	$ \begin{array}{r} 178.07 \\ -0.36 \\ -\acute{0.06} \end{array} $	$ \begin{array}{r} 176.03 \\ -2.40 \\ -0.41 \\ \end{array} $	176·76 -1·67 -0·29	$ \begin{array}{r} 178 \cdot 58 \\ +0 \cdot 15 \\ +0 \cdot 03 \\ \end{array} $	$ \begin{array}{c} +2 \\ +3 \\ +0 \\ $	1
Civil Time •	Noon -5	h.m. 0 55	h. m. 1 55	h. m. 2 55	h. m. 3 55	h. m. 4 55	h. m. 5 55	h. m. 6 55	
Gött. Time	8	9	10	11	Mid.	13	14	15	
Scalo Differences - $\Delta \theta$	$ \begin{array}{r} 178 \cdot 15 \\ -0 \cdot 28 \\ -0 \cdot 05 \\ \end{array} $	176.69 1.74 -0.30	175.75 -2.68 -0.46	$ \begin{array}{r} 173 \cdot 75 \\ -4 \cdot 68 \\ -0 \cdot 80 \end{array} $	172.70 -5.73 -0.98	170.98 -7.45 -1.27	170·17 -8·26 -1·41	169 [.] 98 -8 [.] 45 -1 [.] 44	
Civil Time	h. m. 7 55	h. m. 8 55	h. m. 9 55	h. m. 10 55	Mid. -3	h. m. 12 55	h. m. 13 55	h. m. 14 55	
Gött. Time	16	17	18	19	20	21	22	23	Mean.
Scale Differences - Δθ	169.86 -3.57 -1.47	$ \begin{array}{r} 169.61 \\ -8.82 \\ -1.51 \end{array} $	$ \begin{array}{r} 168.51 \\ -9.89 \\ -1.69 \end{array} $	170.55 -7.88 -1.35	178.80 + 0.37 + 0.06	187.77 +9:34 +1:60	$ \begin{array}{r} 191.47 \\ +13.04 \\ +2.23 \end{array} $	$+198^{+1}$ $+198^{+1}$ $+198^{+1}$ $+38^{+1}$ $+38^{+1}$	178.43

Corrected Mean Diurnal Curve of the Inclination by 112 days of observation at Lake Athabasca.

We see by the foregoing Table that the hour of 3 A.M. is that at which the Inclination deviates most from its mean value, a result precisely similar to what we have found for the other elements; and there is the same reason for attributing the magnitude of the deviation to the effect of disturbance at that hour. If we select the same undisturbed days as before, and take their mean, the result is a signal diminution in the amount of the diurnal change at that period of the 24^{h} .

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TABLE XXXIII.

Mean Diurnal Curve of Inclination by 45 Days * selected as free from Disturbance, corrected for Variation of Horizontal Force, and reduced to a uniform Temperature; together with the Differencc of each mean from the mean of the whole in Scale Divisions and in terms of the Inclination.

Civil Time -	h. m. 15 55	h. m. 16 55	h. m. 17 55	h. m. 18 55	h. m. 19 55	h. m. 20 55	h. m. 21 55	h. m. 22 55	
Gött. Time -	Noon	1	2	3	4	5	6	7	
Scale	180.52	179.15	177.47	176 . 29	175.79	175.64	180.02	179.94	
Difference - $\Delta \theta$	+4·50 +ó·77	+3·13 +0·54	+1·45 +0́·25	+0.27 +0.05	-0.23 -0.04	-0·38 -0·06	+4·00 +0·68	+3·92 +ó·67	
Civil Time -	Noon	h. m. 0 55	h.m. 155	h. m. 2 55	h. m. 3 55	h. m. 4 55	h. m. 5 55	h. m. 6 55	
Gott. Time -	8	9	10	11.	Midn.	13	14	15	
Scale -	179.49	177 . 76	176.61	174.07	174.71	172.36	171.08	172.45	
Difference - $\Delta \theta$	+3·47 +0 [.] 59	+1.74 +0.30	+0·59 +0·10	-1.95 -0.33	-1.31 -0.22	-3.66 -0.63	-4·94 -0 ^{·84}	-3.57 -0.61	
Civil Time -	h. m. 7 55	h. m. 8 55	h. m. 9 55	h. m. 10 55	Midn.	h. m. 12 55	h. m. 13 55	h. m. 14 55	Mean.
Gött. Time	16	17	18	19	20	21	22	23	mean,
Scale - Difference -	172·19	170.46	170.83	173.33	174.99	178.05	179.38	181.62	176.02
$\Delta \theta$	-3.83 -0.62	-0.92	-0.89	-2.69 -0.46	-1.03 -0.18	+2.03 +0.36	+3·36 +0.57	+5.60 +0.96	

For comparison of the mean diurnal curve of Inclination at Lake Athabasca with that of the same element at Toronto, the only other American station at which it was observed directly, in 1843-4, I subjoin a Table, containing, first, the mean scale readings of a one-bar Inclinometer, observed from the 15th October 1843 to the 10th February 1844; and, secondly, the mean for the same five months, October to February inclusive, of the scale readings of a two-bar Inclinometer for the years 1845, 1846, 1847.

The scale co-efficient given by adjustment for the one-bar instrument was (a P)=0'723, which it appears by the experiments contained in Tables XXII.-XXIV., must be augmented in the ratio 1'166 to agree with the value given by experiments of deflection, the instrument there used being the same, giving for the approximate co-efficient 0'820. The other mean is related to various adjustments,

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^{*} One day less than for the other elements, the 14th February being excluded on account of the omission of an observation.

[†] I take the experiments with 7.5 inch deflector alone as the best series.

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and proportioning the co-efficient according to the number of days under each, the value applicable to it is (a P) = 0'. 3686. This must be augmented in the ratio 1.32, according to the experiments contained in Table XXV., to give the true scale value for this instrument, which is also the one to which those results refer, giving aP = 0'.486.

TABLE XXXIV.

Mean Diurnal Curve of Inclination at Toronto for 101 days, October to February 1843, by a one-bar Inclinometer; also, Mean Curve for the same period for three years, by a two-bar Inclinometer.

Civil	Gött.		bar Inclinor to Februar			-bar Inclino to February,		
Time.	Time.	Carle	Daily fl	uctuation.	G1	Daily fluctuation.		
		Scale.	Scale.	Δθ	Scale.	Scale.	Δθ	
h	h			,			,	
16	22	157.02	-0.21	-0·17	54.37	1.22		
17	23	156.92	-0.31	-0.22	53.81	-1.81	-0'88	
18	Noon	156.81	-0.42	-0.34	53.76	-1.86	0.90	
19	1	156.88	-0.35	-0.29	53.99	1.63	-0'79	
20	2	157.23	+0.00	+0.00	54.65	-0.92	-0'47	
$\frac{21}{22}$	3	157.40	+0.17 +0.40	+0.14	55.91	+0.29	-0.14	
22 23	4 5	157.63	1	+0.33	57.43	+1.81	+ 0.88	
Noon	6	158.12	+0.89	+0.73	58.63	+3.01	+1.46	
	7	158.13	+0.90	+0.74	59.04	+3.42	+1.66	
1 2	8	157.61	+0.38	+0.31	58.53	+2.91	+1'42	
23	8 9	$157 \cdot 22$ $157 \cdot 00$	-0.01 -0.23	-0.01	57.54	+1.92	+ 0. 93	
3 4	9 10	157.00	-0.23 -0.37	-0.19	56.58	+0.96	+ 0.47	
	10	156.85	-0.37 -0.38	-0.30 -0.31	55.38	-0.54	-0.15	
5 6	Midn.	155.85	-0.38 -0.23	-0.31 -0.19	54.98	0.64	-0.31	
7	1	157.00 157.12	-0.13	-0.19 -0.10	55·07 55·11	-0.35	0'17	
8	2	$157 \cdot 12$ 157 · 11	-0.12 -0.12	-0.10	55.00	-0.51 -0.62	-0.25 -0.30	
9	3	157.30	+0.07	+0.06	54.93	-0.69	-0.30 -0.33	
10	4	157.23	+0.00	+0.00	55.03	-0.59		
11	5	$157 \cdot 25$ $157 \cdot 28$	+0.00 +0.05	+0.00 +0.04	55.03	-0.39	-0.29	
Midn.	6	$157 \cdot 28$ $157 \cdot 27$	+0.03 +0.04	+0.04 +0.03	55.23	-0.39 -0.43	-0.13	
1	7	$157 \cdot 27$ $157 \cdot 21$	-0.05	-0.02	55.19	-0.43 -0.62	-0.21 -0.30	
2	8	157.16	-0.02 -0.02	-0.02	54.91	-0.62 -0.71	-0.30	
3	9	157.10	-0.18	-0.00	54.91	-0.89	-0'34 -0'41	

It will be remarked, that while the above means give similar diurnal curves, there is a difference of a large proportional amount between the values of the ordinates for the corresponding hours under them; a similar difference being observable between the corresponding mean curves of Horizontal Force, it would appear that the range of both elements was really less for the winter under discussion than its average amount. Taking the difference between the highest and lowest mean scale reading of the Bifilar, and the mean of the whole for each month in the above periods respectively,

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it appears that the mean of the former, from October 1843 to February 1844, at Toronto, was +5.77 scale divisions, and of the latter -6.12 scale divisions; the corresponding quantities for the period included in the second part of the table are +7.78 and -10.52 scale divisions respectively. The adjustment of this instrument was the same for both periods, but the difference shown is not nearly enough to account for the whole effect. The adjustment of the one-bar Inclinometer was made with every care. I am nevertheless disposed to believe that the co-efficient deduced is too small. I present the result, however, because the instrument was similar to the one used in the north, and the *diurnal law* deduced is independent of the absolute amount of the change.

The mean diurnal curve of Inclination at Lake Athabasca presents two principal maxima and two minima; the first of these occurs at 3 A.M., and corresponds to the minimum of Horizontal Force; the second maximum occurs at 11 A.M., and corresponds to the small relative minimum of the latter element, which has been pointed out as having the effect of creating an undulation in the ascending branch of its daily curve. The principal minimum occurs at 10 P.M., and agrees nearly with the daily maximum of Horizontal Force; the smaller minimum, which is at 8 A.M., agrees in like manner with a subordinate maximum of this element at the same hour. Proceeding in the same way as before, to eliminate, partially, the effect of disturbances, by assembling all those days on which no extra observations were taken, we find that the mid-day maximum becomes more prominent, and the maximum at 3 A.M. considerably less so. The hours of maximum and minimum are but little altered, but a slight increase of inclination is shown at 8 P.M., immediately preceding the lowest value of the day, and answering to a contrary inflexion in the mean curve of Horizontal Force at the same hour. It appears, therefore, that in the minor as well as in the more prominent features of the curves, each maximum of the Horizontal Force corresponds to a minimum of Inclination, and each minimum of the former to a maximum of the latter; and we have, from the independent changes of these two elements, observed, by methods which have nothing in common, a strong mutual support and confirmation.

The mean diurnal curve of Inclination at Toronto, for the period under discussion, consists principally of a single progression, having its maximum at 11 A.M., about one hour after the daily minimum of Horizontal Force. This characteristic is the same, whether we take the mean by 101 days, corresponding to the period of observation at the northern station, or the general mean for the same months. There are indications of a second maximum at 10 P.M. The principal minimum occurs at 5 A.M. There is not the slightest trace of an inflexion corresponding to the daily maximum at 3 A.M., which constitutes the principal feature of the northern curve.

Fort Simpson.—The details of the adjustment of the Inclinometer at Fort Simpson will be given in a future section. The observations at this station are divided into two series; the first of 26 days, five of which are rendered imperfect by the omission of one or more observations; the second of 19 days, three of which are in the same condition. The omissions only affect the means at 0h. and 1h., and the whole 45 days have been combined for a general mean, without excluding the imperfect days, for the reasons assigned in reference to the Declinometer at the same station (p. 11.)

TABLE XXXV.

Mean scale reading of Inclinometer at Fort Simpson, corrected for changes of Declination and Horizontal Force, for the months of April and May 1844. To which is added the Mean for the same two months at Toronto, by observations of four years, 1845– 1848.

Scale co-efficients :---

1 April to 1 May 2 May to 24 May The general mean Also for Toronto

 $aP_{,=0}^{\circ} 106 \times 1^{\circ}22 = 0^{\prime} 1293$ $aP_{,,=0}^{\circ} 127 \times 1^{\circ}22 = 0^{\prime} 1549$ $aP = 0^{\circ} 115 \times 1^{\circ}22 = 0^{\prime} 1402$

Toronto $a P = 0.354 \times 1.32 = 0.4673$

				Fort S	imps	on.						Toron	ito.	
		P	artial	Means.		(Fenera	l Means	•	e		Fo	our year	s.
en hou	me.	Apr	il.	Ma	у.	Read	ings.		urnal iation.	tim	ime,		Diu Varia	
Göttingen hour.	Mean time.	Sca	Temp.	Scale.	Temp.	Scale.	Temp.	Scale.	Δθ	Göttingen time.	Mean time.	Mean.	Scale.	Δθ
noon 1 2 3 4 5 6 7 8 9 10 17 18 10 17 18 10 17 19 20 21 23 23	$\begin{array}{c} 15 & 15 \\ 16 & 15 \\ 17 & 15 \\ 19 & 16 \\ 20 & 15 \\ 21 & 15 \\ 22 & 15 \\ 22 & 15 \\ 23 & 15 \\ 23 & 15 \\ 2 & 15 \\ 3 & 15 \\ 4 & 15 \\ 7 & 15 \\ 7 & 15 \\ 10 & 15 \\ 12 & 15 \\ 13 & 15 \\ 14 & 15 \\ 14 & 15 \\ 14 & 15 \\ \end{array}$	$\begin{array}{c} 2.40\cdot 61\\ 2.52\cdot 18\\ 2.52\cdot 18\\ 2.52\cdot 18\\ 190\cdot 87\\ 191\cdot 47\\ 175\cdot 69\\ 1.42\cdot 27\\ 1.33\cdot 05\\ 1.42\cdot 27\\ 1.33\cdot 25\\ 1.23\cdot 25\\ 1.23\cdot 25\\ 1.23\cdot 25\\ 1.23\cdot 25\\ 1.23\cdot 25\\ 1.21\cdot 51\\ 121\cdot 97\\ 1.20\cdot 60\\ 1.22\cdot 04\\ 1.25\cdot 64\\ 1.51\cdot 43\\ 1.81\cdot 84\\ 1.83\cdot 80\\ 1.80\cdot 55\\ 1.60\cdot 55\\ 1.60\cdot 55\\ \end{array}$	$\begin{array}{c} 53.6\\ 58.0\\ 57.5\\ 57.1\\ 50.5\\ 57.0\\ 55.3\\ 55.0\\ 55.3\\ 55.0\\ 55.3\\ 55.0\\ 55.3\\ 55.0\\ 55.3\\ 55.0\\ 55.3\\ 55.0\\$	$\begin{array}{c} 280 \cdot 41\\ 294 \cdot 15\\ 306 \cdot 84\\ 292 \cdot 13\\ 291 \cdot 47\\ 259 \cdot 23\\ 248 \cdot 23\\ 241 \cdot 54\\ 216 \cdot 41\\ 236 \cdot 48\\ 225 \cdot 52\\ 2230 \cdot 48\\ 225 \cdot 52\\ 229 \cdot 58\\ 227 \cdot 46\\ 225 \cdot 41\\ 255 \cdot 41\\ 255 \cdot 41\\ 255 \cdot 41\\ 272 \cdot 91\\ 255 \cdot 41\\ 272 \cdot 91\\ 277 \cdot 06\\ 255 \cdot 41\\ 8\end{array}$	$\begin{smallmatrix} & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ $	$\begin{array}{c} 257^{\circ}11\\ 272^{\circ}11\\ 255^{\circ}99\\ 233^{\circ}60\\ 210^{\circ}96\\ 193^{\circ}24\\ 193^{\circ}24\\ 187^{\circ}65\\ 186^{\circ}72\\ 188^{\circ}67\\ 178^{\circ}97\\ 174^{\circ}13\\ 165^{\circ}95\\ 169^{\circ}44\\ 165^{\circ}55^{\circ}3\\ 164^{\circ}17\\ 165^{\circ}73\\ 173^{\circ}58\\ 171^{\circ}96\\ 190^{\circ}98\\ 221^{\circ}42\\ 212^{\circ}93\\ 221^{\circ}42\\ 224^{\circ}22\\ 224^{\circ}22\\ 224^{\circ}22\\ 200^{\circ}20\\ \end{array}$	$\begin{smallmatrix} 622 & 6 \\ 622 & 6 \\ 61 & 2 \\ 60 & 9 \\ 9 & $	$\begin{array}{c} +56.9\\ +71.9\\ +55.8\\ +38.7\\ +38.7\\ +33.4\\ +10.2\\ -7.0\\ -12.5\\ -21.2\\ -26.1\\ -34.8\\ -34.8\\ -34.6\\ -34.5\\ -28.2\\ -28$	$\begin{array}{r} +7.98\\ +7.98\\ +10.07\\ +7.81\\ +5.42\\ +4.68\\ +1.51\\ +0.03\\ -0.98\\ -1.766\\ -1.766\\ -1.89\\ -1.789\\ -3.68\\ -3.80\\ -4.87\\ -4.83\\ -3.95\\ -5.00\\ -4.83\\ -3.95\\ -1.29\\ -3.95\\ +1.78\\ +2.97\\ +3.36\end{array}$	21 22 23 noon 1 2 3 4 5 6 7 7 8 9 10 11 13 14 15 16 17 18 19 20	15 16 17 18 19 20 21 22 23 noon 1 22 3 3 4 5 5 6 6 7 8 9 10 11 midut 13 14	$\begin{array}{c} 45 \cdot 49 \\ 45 \cdot 23 \\ 45 \cdot 01 \\ 44 \cdot 54 \\ 45 \cdot 03 \\ 46 \cdot 25 \\ 51 \cdot 19 \\ 50 \cdot 46 \\ 49 \cdot 06 \\ 49 \cdot 06 \\ 49 \cdot 06 \\ 44 \cdot 02 \\ 44 \cdot 05 \\ 44 \cdot 05 \\ 44 \cdot 06 \\ 45 \cdot 13 \\ 46 \cdot 21 \\ 46 \cdot 13 \\ 46 \cdot 21 \\ 46 \cdot 06 \\ 45 \cdot 91 \\ 45 \cdot 91 \\ 45 \cdot 88 \\ \end{array}$	$\begin{array}{c} -1.05\\ -1.21\\ -1.53\\ -2.00\\ -1.31\\ -9.29\\ +1.87\\ +4.65\\ +3.92\\ +2.52\\ -1.62\\ -0.77\\ -1.62\\ -1.68\\ -0.77\\ -1.62\\ -1.68\\ -0.48\\ -0.48\\ -0.48\\ -0.63\\ -0.66\\ -0.66\\ \end{array}$	$\begin{array}{c} -0.49\\ -0.50\\ -0.71\\ -0.93\\ -0.61\\ +0.88\\ +2.07\\ +1.83\\ +1.83\\ +1.83\\ -0.365\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.52\\ -0.89\\ -0.89\\ -0.83\\ -0.81\\ -$

The mean diurnal curve of inclination at Fort Simpson deducible from the observations of April and May presents only one wellmarked maximum and one minimum, the former at 4 A.M., the latter at 7 P.M.; there is an indication of a very slight maximum at 1 P.M., which coincides with a contrary inflexion in the mean curve of Horizontal Force, but both curves approach more nearly to a single progression than in the winter months. Viewed generally, the mean diurnal curve of inclination at this station, as at Lake Athabasca, is the exact converse of that of the Horizontal Force; the morning maximum of the latter element shown in the winter months is here reduced in amount, proportionably, as much as the mid-day maximum of the former, both features have nearly disappeared. There is no corresponding difference shown at Toronto in the mean curves of the same elements for the same periods respectively; and without grounding too much on observations embracing so short a period, I regard the corroboration afforded by the two elements to one another as giving good grounds for the conclusion that in high latitudes the advance of the season, and the rapid increase in the length of the day, produces changes in the character of the daily course of the magnetic elements which is not experienced in lower ones.

As the Inclinometer was not observed at Toronto in April and May 1844, I have taken the mean for these two months for four years, as a normal curve for that station. It does not differ in any characteristic from that of the five months previously described. It consists of a dcuble progression, having two minima of nearly equal amount, at 6 A.M. and 5 P.M. respectively, and two maxima, of which the first, at 11 A.M., is so strongly marked as to be the great feature of the whole curve, and the second, at 9 P.M., is so small in amount, as to fall on the negative side of the mean line. The curves of this element, therefore, at the two stations have scarcely anything in common.

Total Force.—Owing to the uncertainty in the precise values of the scale co-efficient of the Inclinometer, the inferences we can derive from the observations as to the changes of the Total Force, which depend very much upon those of the inclination, are necessarily somewhat vague; having found, however, by trial, that the *law* of the diurnal changes deducible is not altered by any moderate change in the scale value of the Inclinometer or of the Bifilar readings, but only the *amount*, I think it worth while to present the result.

The changes of Total Force are found by the formula

$$\frac{\Delta R}{R} = \frac{\Delta X}{X} + \tan \theta \Delta \theta$$

in which the quantities $\frac{\Delta X}{X}$ and $\Delta \theta$, are taken from Tables XX., XXXIII., and XXXIV.

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TABLE XXXVI.

Approximate Mean Diurnal Curve of total Magnetic Force at Lake Athabasca from 110 days of observation, to which are added the corresponding Values from the 46 days selected as free from disturbance.

Mean time •	16	. 17	18	19	20	. 21	22	23
Gött. time	0	1	2	3	4	5	6	7,
Whole period Selected days	+ ·00128 + ·00035	-·00013 -·00005	+ ·00009 ·00050	· 00095 · 00081	*00091 *00074		-·00036 +·00003	-·00009 +·00008
Mean time -	Noon	1	2	8	4	5	6	7
Gött. time -	8	9	10	11	Midn.	18	14	15
Whole period Selected days	+ ·00029 + ·00021	-·00010 -·00001	+ '00074 + '00054	+ ·00044 + ·00002	+ ·00025 + ·00079	+ .00003		
Mean time -	8	9	10	11	Midn.	13	14	15
3 ött. time -	16	17	18	19	20	21	22	23
Whole period Selected days				•00041 +•00106	-·00010 +·00086	+ ·00110 + ·00033	+ ·00090 + ·00004	+ .00121

The prevalence of positive and negative signs alternately, in both the mean curves contained in this Table, indicates clearly that the total Magnetic Force at Lake Athabasca in the winter months has two maxima and two minima daily; and on laying down the above quantities upon a sufficiently large scale, the hours of the latter are seen to be 8 A.M. and 8 P.M. nearly, while of the former, one maximum falls by both curves at or near 2 P.M., and the other at or near 3 A.M. if we include the disturbed days, and at or near midnight if we exclude them. There is very little difference in character or amount between the curves given by the whole period and by the selected days respectively in any other than the particular just alluded to. By both curves the Total Force is greater at the maximum in the night than at the one in the day, and less at the minimum, which occurs four hours before noon, than at the one eight or nine hours after noon. The difference between the highest and lowest mean value, or the mean diurnal range of total force, appears to be about '002. R by both curves. To examine the influence of an error in the co-efficients upon this curve it was assumed that the value of

TOTAL FORCE.

the scale divisions of either instrument might be one tenth greater or the same quantity less than the value actually employed; this supposition allows of eight combinations, and, having computed and laid down the values upon every one of them, it appears that in each case we have the two daily maxima and minima at nearly the same hours; the differences are chiefly in the amount of the changes and the relative prominence of the two maxima.

TABLE XXXVII.

Approximate Mean Diurnal Curve of total Magnetic Force at Fort Simpson from 46 days of observation in April and May 1844.

		-							
Mean time	-	15 15	16 15	17 15	18 15	19 15	20 15	21 15	22 15
Gött. time	•	0	1	2	3	4	5	6	-
	-	+ 0065	+ • 0097	+ • 0077	+ • 0045	+ • 0050	+ •0001	• 0009	0009
Mean time	-	23 15	0 15	1 15	2 15	3 15	4 15	5 15	6 15
Gött. time	-	8	9	10	11	12	13	14	15
ACC ARGE CONTROL OF CON		0014	0024	0012	-*0029	- • 0027	0029	- '0041	0038
Mean time		7 15	8 15	9 15	10 15	11 15	12 15	13 15	14 15
Gött. time	-	16	17	18	19	20	21	22	23
		- '0046	0043	0031	0040	0009	+.0012	+ 0027	+ .0032

The above curve presents but one maximum and one minimum, the former at 4^{h} A.M., the latter at 7^{h} or 8^{h} P.M.; the mid-day maximum has disappeared, but the amount of the daily fluctuation is increased fourfold. This change of character in the mean diurnal fluctuation of the total force does not appear to attend the progress of the seasons at Toronto, but would necessarily be inferred from the altered character of the mean curves of all the elements at Fort Simpson; it is evident that the causes preceding the minor fluctuations at Lake Athabasca are here overruled by the more powerful influences to which the principal fluctuation is due, and we see in the case of each of the three elements observed an approach to one great diurnal movement, owing its character almost entirely to the

TOTAL FORCE.

extraordinary constancy and regularity which appears, in these regions, to belong to a class of influences elsewhere denominated *irregular*.

TABLE XXXVIII.

Approximate Mean Diurnal Curve of Total Force at Toronto, from combination of the changes of Horizontal and Inclination Force given by Tables XXXIV. and XXXV.

Mean time •	-	16	17	18	19	20	21	22	23
Göttingen time	•	22	23	Noon	1	2	3	4	5
October—February April—May -	-	- · 00028 - · 00063	- · 00025 - · 00073	- · 00042 - · 00126	- · 00076 - · 00087	- ·00102 - ·00048	- ·00109 ·00025	- · 00093 ·00127	- ·00073 ·00159
Mean time •		Noon	1	2	3	4	5	6	7
Göttingen time	•	6	7	8	9	10	11	Midn.	13
October—February April—May •	- -	·00043 ·00153	•00127 •00137	·00184 ·00090	·00181 ·00051	·00143 ·00008	·00093 ·00011	·00017 - ·00023	- ·00014 - ·00026
Mean time -	•	8	9	10	11	Midn.	13	14	15
Göttingen time	•	14	15	16	17	18	19	20	21
October—February April—May -	•	- · 00001 - · 00013	·00020 -·00020	- · 00038 - · 00016	-·00046 -·00031	- · 00042 - · 00053	- · 00039 - · 00055	-·00030 -·00055	- ·00035 - ·00081

In this Table the observed mean diurnal values of the Horizontal Force for the seasons compared have been combined with the normal curves of inclination given by the observations of three years. They agree in showing that the mean diurnal curve of Total Force at Toronto has one principal maximum, which in the winter seems to occur about 2 P.M. and in the spring about mid-day; the lowest value occurs in the forenoon in the winter at 9 A.M., and in the spring two or three hours earlier. The indications of a secondary maximum and minimum are undecided; in neither case is there any appearance of a maximum of Total Force answering to the nocturnal one in the north. The curve computed from the changes of inclination shown by the one-bar instrument gives also a single maximum at noon, but of a small amount.

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ABSOLUTE DETERMINATIONS AND

ADJUSTMENTS OF THE MAGNETICAL INSTRUMENTS

AT FORT SIMPSON.

Declination.-The Declinometer was adjusted on the 30th March The Magnet was suspended by a single fibre of silk, of which 1844. the force of torsion was quite insignificant; the mean change of scale, reading produced by turning the torsion circle 90° was 4'1 div. whence $\frac{\bar{H}}{\bar{F}} = \frac{1}{1769}$. The base was levelled, and the fixed wire of the telescope made to cut the central division of the scale, when the instrument was ready for observation. It became evident, however, after a time, that the length of the scale, which was between 12° and 13° of a circle, was insufficient to allow the full range required in some of the great disturbances at this station, if it was to be bisected in the mean position of the Magnet; advantage was therefore taken of a state of entire quiescence of the Magnet, on the 21st April, to move the arm and telescope 1° 40' to the westward, adding 100 divisions to the range of the scale on the east side of Zero, and diminishing the readings to the same amount; 100 has been subtracted from all readings prior to that date, in order to connect them with the subsequent series.

Absolute Declination.—An observation was made on the 30th March with the azimuth compass. Two sets of azimuths of the sun were observed A.M. and two sets P.M., giving the following values, which are reduced to the mean for $24^{\rm h}$ by a correction from Table VIII.

At 7^{h} 58^m 1 A.M. var. east 37° 35''7 at 9^{h} 12^m 7 A.M. , 38° 32''8 at 3^{h} 46^m 2 P.M. , 37° 39''0 at 4^{h} 55^m 8 P.M. , 38° 12''7 37° 55''8 38° 0''0

The following observation with a Collimator Magnet was made on the 8th May 1844.

The Theodolite was levelled and directed to the Collimator, mean scale reading 77 84, Declination 416 0, mean of verniers $359^{\circ} 59' 30''$, deviation from the magnetic axis 3'43 div. = 8' 30'' to the west. It was then directed to the sun, and the transit of both

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limbs observed, mean reading of Vernier's 86° 17' 30" for the sun's centre, at 9^{h} 0^{m} 17^s apparent time. We have, then, the sun's apparent

Magnetic azimuth -	-		-	-	86°	18'	0″
Deviation of telescope		-		-	0°	8′	30″
1						_	
Sun's magnetic azimuth	-		-	-	86°	9′	30″

Absolute Declination - $37^{\circ} 56' 58''$ east, corresponding to 416 0 on the Declination scale. The mean scale reading on the 8th was 399 9, corresponding, therefore, to $37^{\circ} 40'' 9$ east Declination. There is a regular and progressive increase of Declination shown by the scale readings in April and May, as already remarked *ante* p. 17, Table IX. The following means were there given :—

Differences.

April, from 1st to 14th, Mean Declination 358'14

		154h 40 074h		285.00 27.78
••	"	15th to 27th,	99 1	³⁸⁵ 92 ⁻ } 14.41
"	,,	28th to 11th May	"	$ \begin{array}{c} 385 \cdot 92 \\ 385 \cdot 92 \\ 400 \cdot 33 \\ 418 \cdot 21 \end{array} $ $ \begin{array}{c} 27 \cdot 78 \\ 14 \cdot 41 \\ 17 \cdot 88 \\ 17 \cdot 88 \end{array} $
May,	,,	12th to 24th	"	418.21

The mean for April will be $374^{\circ}59 = 37^{\circ} 16'^{\circ}6$ east, and the mean for May $410^{\circ}01 = 37^{\circ} 53'^{\circ}0$ east. The mean of the whole, which corresponds to April $27^{\circ}5$, will be $390^{\circ}76 = 37^{\circ} 31'^{\circ}7$.

The results of the Declination observations have been discussed in connexion with the corresponding series at Lake Athabasca, *ante* p. 15, et seq.

BIFILAR.

First Adjustment, 30th March 1844.

1. The telescope was placed in the meridian, by suspending the magnet with unifilar suspension; reading of the azimuth circle 118° 12'.

2. The telescope was next suspended by the same double suspension as was used at Athabasca, and the interval of the threads adjusted by trial to give an angle of about 60°. Scale reading 210.

3. To bring the plane of detorsion of the double suspension into the meridian, the magnet was suspended, and the torsion circle turned until a position was found by trials, in which the scale readings were nearly the same, whether the magnet hung with its marked end to the north, or, by turning the arm 180°, it was reversed and hung with the marked end to the south. The final readings were

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AT FORT SIMPSON.

	Telescope :	Torsion Circle :	Scale :	Bar:
	$118^\circ 12'$	265° 30'	278.0	N. end to N.
5	298° 12′	265° 30'	300.0	N. end to S.

265° 30' was therefore taken as the position of the index of the torsion circle which made the plane of detorsion in the meridian.

4. The arm was then turned 90° to 208° 12', and the torsion circle turned until the scale read 277 ° 0, torsion circle 326° 50'.

We have then $v = (326^{\circ} 50' - 265^{\circ} 30' =) 61^{\circ} 20'$ when K = a cotan v = -000318. Increasing numbers denote increase of Horizontal Force.*

The Bifilar received an accidental shock after the observation of April $10^d 3^h$, which produced a change of reading of + 80 div.; this quantity has been added to the readings from that hour down to the re-adjustment of the instrument on the 13th.

Second Adjustment, 13th April.

1. The telescope was placed in the meridian by suspending the magnet with unifilar suspension, reading on the torsion circle $119^{\circ} 45'$, scale 210, Declination 264 0.

2. The double suspension being applied as before, a number of trials were made to bring the plane of detorsion into the meridian. The final readings were as follows:

Telescope :	Torsion	Circle :349°	50'	Scale :207 5
299° 50′		349°	50′	202'0
Bar : N. end	to N.	Declination	ı :— 46	5.0
N. end	to S.		46	0.0

349° 50′ was therefore taken as the position of the index, which made the plane of detorsion in the meridian. The arm was turned 90° to 209° 50′, and the torsion circle turned until the scale read 204°0, when the reading of the torsion circle was 53° 50′, Declination 464°0, whence $a \cot n v = -000283$. Increasing numbers denote increase of force, as before.

The length of the scale of the Bifilar was found insufficient at this station, and a continuation on card was attached to it, on the side of decreasing force; but even this was insufficient on some occasions, when the observed range exceeded both the natural scale and its continuation.

HORIZONTAL FORCE.

In absolute measure.—The determination at Fort Simpson was similar in all respects to that at Lake Athabasca, except that three distances of deflection were employed instead of two. The details were as follows:—

* Decrease of Horizontal Force as actually observed, but the numbers having been inverted, Increase of Force in the register.

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TABLE XXXIX.

ABSOLUTE DETERMINATIONS AND ADJUSTMENTS

1.949

1,943

1.936

0.360

 $5^{\circ}5993$

58.8

5.5845

June 12

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9 8

10 m

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1.0257 1.0257

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June 12 " 12

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General Mean. ų, ų 1:951 Determination of the absolute Horizontal Intensity with Bars 30 and 31, at Fort Simpson, Mackenzie's River. Mean. (896.1 1.941 1.954 (196.1 1.936 1.946 996.1 1.952896.1 046.1 196.1 1.964 1.935 1.936 1.936 1.948 1.944 .096.1 × $\begin{array}{c} 0.372 \\ 0.372 \\ 0.372 \end{array}$ 0.412 0.412 0.411 0.417 0.417 0.416 0.368 0.367 0.368 $0.401 \\ 0.403$ æ Corrected s 5°1393 5.2323 ٩ 1 5.46916.3133 6.6867 Length of suspended Magnet, 2.45 inches. . 8 1.1 . 4 ı . 0.68 46.0 Observed Temp. 42.0 57.8 1 . 0 . , ı , . 47. σ VIBRATION. . , 1 1 1 5.4616ı . s 5.1307 6.30202 6.6707 1 5.2357 4 • 1 . . 1 , Date. June 12 က က က 3 May : May May May 2 2 : : : : : : Corrected Angle. 961 54 20 10 10 9 6 ~ 500 2 2²6 8 6 6 7 27 22 19 27 22 19 10 13 20 23 15 20 13 10 ٥ 15 10 10 Temp. 37°5 38°0 37°5 48°5 44°0 48°5 57.5 48°5 44°0 48°5 37°5 38°0 37°5 ٥ 20 14 12 13 14 24 9 12 27 89 S Observed Angle. 12 24 27 49 48 48 48 46 48 48 DEFLECTION. 20 14 13 14 9 12 58.4.0 28 1 9 30 123 10 10 0 1.1757 1.0257 1.1757 1.3257 1.1757 1.3257 1.0257 I.1757 1.3257 1.0257 1.0257 1.3257 Dist. Bar. 888 8 8 8 8 8 30 30 31 31 31 31 1844: June 12 " 12 Date. May 2 , 2 , 2 May 2 .. 2 . 2 May 2 , 2 2 2 01 01 ŝ May '

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In addition to the foregoing values by the standard bars, we have those given by the magnets employed for verification; namely,

By bar 17, May 2, 1844, 1'959 | Bar 20, June 2d, 1844, 1'972. bar 17, June 12, 1'956. | bar 23, June 2, 1'947. Including in the present instance the results by bar 17, the general mean is

which is the value employed.

Variations of the Horizontal Force.-See Tables XXIII, &c.

INDUCTION INCLINOMETER.

First Adjustment, March 30, 1844.

1. The base was levelled, and the meridian reading of the verniers found to be $297^{\circ} 30' 0''$.

2. The iron bar was inserted in its collar reversed, the lower or north end deflecting, and the telescope was turned in azimuth until the central division of the scale appeared on the wire, verniers $249^{\circ} 34' 10''$, hence $u = 47^{\circ} 55' 50''$.

3. The bar was inverted, the upper or south end deflecting, and the telescope turned as before.

Verniers, $351^{\circ} 29' 0''$, whence $u = 53^{\circ} 59' 0''$, also $S = 50^{\circ} 57' 25''$, $D = 3^{\circ} 1' 35''$, and $\theta = 81^{\circ} 52'$.

Then
$$a\mathbf{P}_{,=} a \frac{\sin 2\theta \cos u}{2 \sin S \cos \mathbf{D}} = 0^{'} \cdot 106$$

which value being multiplied as before by the co-efficient 1 22, gives for the approximate scale value under the first adjustment 0 1293.

$$B = \frac{\sin D \cos S}{\sin 1' \cos u} \cdot \frac{K}{a} = 0.0618 \text{ when } K = .000318.$$

= 0.0551 when K = .000285.
$$R = \frac{\sin S \cos D}{\cos u} \cdot \frac{q}{a} = 0.488$$

The series was broken by an accidental shock to the instrument 2d May, by which the arm carrying the telescope was moved about 5°; advantage was taken of this opportunity to make the series of observations of the Absolute Horizontal Force given at page 72, after which the instrument was re-adjusted.

Second Adjustment, May 2, 1844.

1. The meridian reading of the verniers was 181° 57' 10", Declination 400.

2. The iron bar was inserted in its collar reversed, the lower

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end deflecting, verniers 135° 59' 45", Declination 387.0, whence $u_{,}=45^{\circ}$ 57' 25 - 13' 0 = 45° 44' 25".

Then $aP_{\mu} = 0' \cdot 127 \times 1' \cdot 22 = 0' \cdot 1549$

B=0.023R=0.388

which continue applicable to the end of the series. There are 26 days in the first adjustment and 19 days in the second, giving

$$aP = 0' \cdot 115 \times 1 \cdot 22 = 0' \cdot 1402$$

for the value applicable to the diurnal curve obtained by uniting the whole.

Increasing numbers in every case denote increase of Vertical Force or Dip.

The means of the Inclinometer scale readings at this station will be found in Table XXXV.

IRREGULAR FLUCTUATIONS OF THE MAGNETIC ELEMENTS.

It has been shown in the preceding sections, by an arbitrary selection of days regarded as free from magnetic disturbance, that the portion of the mean diurnal curve of each of the elements, which owes its peculiar character most to the influence of what are usually called the *irregular* movements, is comprised between midnight and 7^{h} or 8^{h} A.M., and their effect, as far as can be inferred from the proportionate reduction in the deviation of the magnet from its mean position, made by rejecting them, is much the greatest during that part of the night. As regards the Declination, at least, this result is unexpected, being different from the conclusion to which Colonel Sabine and Dr. Lloyd have been led by their examination of the observations of Toronto and Dublin respectively, and is of so much importance that it will be necessary to investigate it more fully.

If we take the difference between the scale reading (ψ_{λ}) at each hour of observation, and the monthly mean at the same hour $(\overline{\psi_{\lambda}})$, the square root of the mean of the squares of these differences $\sqrt{\frac{\Sigma}{n}(\psi_{h}-\overline{\psi_{h}})^{2}}$ is a quantity regarded by Colonel Sabine* as the mean effect of the *irregular disturbing force* at the hour, and is called by Dr. Lloyd the mean disturbance[†], being analogous to the mean error of an observation at that hour; similarly $\sqrt{\frac{\Sigma'}{N}(\psi_{h}-\overline{\psi_{h}})^{2}}$ gives the value for a whole month, or longer period, N being the total number of observations, and Σ' the sum of all the squares. These quantities have been calculated for each of the elements at

† Transactions of Royal Irish Academy. Vol. XXII. part 1.

^{*} Preface to Observations during Magnetic Disturbances. Part 1. p. ix. 1842.

both the northern stations, and for some of them at Toronto, Philadelphia, and Sitka, with the view of giving stronger prominence to the peculiarity of the others. The work was first done, employing the observations as they stand in the abstracts, but it was evident, while the law is thus deducible, and the quantities for the several hours are relatively correct, their absolute values, when the scale readings of the instrument have undergone any considerable regular change, whether of a periodic or instrumental character, are very much exaggerated, and altogether deceptive. In these cases the scale readings at the beginning and end of the month differ from its mean $(\overline{\psi})$ by a quantity which includes, with the irregular fluctuation, the amount of the regular change in half the month. The differences between the successive fortnightly mean values in Table XI., show how considerable this change was in the Horizontal Force and Inclination at Lake Athabasca; it was equally large in the Declination at Fort Simpson; all these differences $(\psi_b - \overline{\psi_b})$ therefore were exaggerated to an amount proportioned to their interval in time from the middle period. It was thought worth while, in the case of the elements just named, to endeavour to eliminate this change, which was done by assuming that all the daily means of each month would, but for this cause, have been equal, and that the difference of each from the mean of the whole was a measure of the amount of the progressive change to be eliminated in the interval elapsed between that day and the middle day. Each daily mean therefore furnishes the equation $ne - (\psi_n - \overline{\psi}) = 0$, where e the value of the daily change required, and n the interval in days; by summing these equations in the usual manner, a mean value of the quantity e was obtained for each month, and this again, being multiplied by n, was added to, or substracted, as the case might be, from all the scale readings of each day, and the differences taken anew from the readings thus corrected. The values of e actually employed, or the approximate change of mean scale reading from day to day, were as follows :-Bifilar at Lake Athabasca, for the month of November 2'47 divisions, for the month of February 2'16 divisions; Incunometer, November 1'29 divisions, December 0'91 divisions, January 0'75; for the other months the change did not appear large enough to call for the correction. Again, for the Declination at Fort Simpson, from the 1st to the 27th April 1 537 divisions, from the 28th April to the 24th May 1 268 divisions. In the following tables the quantities given are those derived from the readings thus corrected.

TABLE XL.

Value of the Mean Disturbance of the Declination, taken without regard to sign, at the several observation hours at Lake Athabasca, to which are added the corresponding quantities for the same period at Toronto and Sitka, the whole expressed in Arc.

Local	1	1	Lake Athal	oasca 1843-4	i .		Toronto.	Sitka.
Mean Time.	Oct.	Nov.	Dec.	Jan.	Feb.	N N	N	Ň
Midnight 1 A.M. 2 y 3 y 5 y 5 y 6 y 7 y 9 y 10 y 1	7.84 9:55 7:80 6:28 18:90 14:12 18:4:12 18:4:12 18:4:12 4:12 4:12 4:29 4:29 4:24 2:53 4:32 4:32 4:32 4:32 4:32 4:32 4:24 3:332 4:32 4:32 4:24 3:332 4:32 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:24 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 4:226 3:332 3:332 4:226 3:332 3:332 4:226 3:332 3:332 4:226 3:332	4 '51 8 '61 2 '98 4 '54 9 '14 4 '54 9 '14 3 '65 5 '96 5 '96 5 '96 2 '52 2 '83 3 '14 3 '65 2 '52 2 '83 3 '14 3 '65 2 '52 2 '73 3 '15 3 '65 5 '96 5	$\begin{array}{c} 8.69\\ 7.05\\ 7.69\\ 6.59\\ 5.35\\ 8.87\\ 12.42\\ 4.82\\ 6.80\\ 7.41\\ 4.82\\ 6.85\\ 5.21\\ 4.67\\ 6.40\\ 5.17\\ 5.47\\ 3.36\\ 4.34\\ 4.34\\ 4.34\\ 4.69\\ 9.97\\ 9.97\end{array}$			8 50 9 87 8 65 7 37 10 96 15 25 a 10 96 8 48 5 45 4 56 4 56 4 56 4 56 4 56 4 56 4 56	1.72 1.73 1.60 1.52 1.675 1.282 1.892 1.683 1.684 1.614 1.335 1.661 1.653 1.661 1.653 2.216 2.235	4 '36 4 '18 3 62 2 997 2 92 2 84 2 82 2 88 3 10 2 67 5 2 20 2 195 1 81 3 '09 2 67 5 2 20 2 1 95 1 81 3 '09 2 '51 1 '3 '43 3 '32

a Irregularity produced by a single unusual observation. See remark below.

It appears that the mean disturbance of the Declination at Lake Athabasca, or the mean disturbing force, if that term is preferred, is nearly constant, and at its lowest amount from 9 A.M. to 7 P.M.; it is greatest at 5 A.M., but an inferior maximum is presented at 10 P.M., which is the hour at which the greatest value prevails at Toronto and at Dublin. We have consequently an indication of the existence of at least two classes of irregular movements, the one due to causes which apparently act universally, the other due to some cause which only comes into operation in high magnetic latitudes. The characteristics of the curve for the five months in question at Toronto, are a nearly uniform value from 8 A.M. to P.M., when it begins to diminish; it is least at 7 P.M., and then increases regularly until 10 P.M., when it is greatest; it diminishes again until midnight, but appears to vary little during the night. There are indications in each of the three curves of a small increase in the mean disturbance about noon. Referring next to the mean for the Russian station at Sitka, the nearest geographically to Lake Athabasca, we find a manifest approximation to the law which prevails at the latter station; the greatest mean disturbance is shown at midnight, but high values The lowest value is here also prevail from 10 P.M. to 2 A.M. at 5 P.M.

There are two observations included in the series at Lake Athabasca taken during disturbance, which differ so much from the means for the same hours, as to produce a considerable effect upon the final result. These occurred on January 25^{d} 1^h, and February 2^d 7^h, Göttingen; by omitting them and taking fresh means for those hours, the mean disturbance for 5 A.M. becomes 10' 63, and that for 11 A.M. becomes 5''28, which are in accordance with the values before and after them. The quantities for the individual months in these cases are then 14''56 and 6''37 respectively.

The preceding results are independent of the *direction* of the disturbance. The next Tables are formed by taking the sum of the squares of the easterly and westerly deviations separately, and dividing them by their proper number. It sometimes happens that the scale reading at an individual observation is exactly equal to the mean; in this case the difference being \pm 0, the observation is not included in the number with either divisor, but being included for the disturbance without regard to sign, Table XL., occasions that value to be apparently less than, from the values for the same hours under the special signs, it should be; but such is not really the case.

TABLE XLI.

Value of the Mean Easterly Disturbance of Declination at the same stations and for the same period.

Local			Lake .	Athabase	a 1843-4.			Tore	onto.	Sitl	ka.
Mean Time,	Oct.	Nov.	Dec.	Jan,	Feb.	$\frac{\Sigma(E)}{N}$	Excess.	$\frac{\Sigma(E)}{N}$	Excess.	$\frac{\Sigma(E)}{N}$	Ex-
	$\begin{array}{c} \cdot 4 \\ \cdot 6 \\ \cdot 2 \\ \cdot 5 \\ \cdot 6 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\ \cdot 6 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\ \cdot 1 \\ \cdot 5 \\ \cdot 2 \\$	$\begin{array}{c} & 4 \cdot 3 \\ 11 \cdot 3 \\ 2 \cdot 8 \\ 0 \\ 17 \cdot 7 \\ 8 \cdot 7 \\ 10 \cdot 7 \\ 2 \cdot 1 \\ 8 \cdot 2 \\ 3 \cdot 4 \\ 4 \cdot 2 \\ 2 \cdot 5 \\ 2 \cdot 9 \\ 5 \cdot 3 \\ 3 \cdot 4 \\ 2 \cdot 5 \\ 3 \cdot 5 \\ 5 \cdot 5 $	$\begin{array}{c} 12 \\ 14 \\ 60 \\ 8 \\ 8 \\ 8 \\ 8 \\ 8 \\ 8 \\ 8 \\ 8 \\ 8 \\ $	$\begin{array}{c} 7 & 8 \\ 7 & 8 \\ 20 & 12 \\ 0 & 3 \\ 23 & 6 \\ 0 & 3 \\ 6 & 4 \\ 0 & 3 \\ 0 & 3 \\ 0 & 5 \\ 16 & 9 \\ 10 & 3 \\ 0 & 3 \\ 0 & 5 \\ 1 \\ 4 & 3 \\ 4 \\ 3 \\ 4 \\ 3 \\ 4 \\ 7 \\ 3 \\ 5 \\ 4 \\ 4 \\ 7 \\ 3 \\ 5 \\ 4 \\ 4 \\ 7 \\ 3 \\ 5 \\ 4 \\ 3 \\ 5 \\ 4 \\ 3 \\ 5 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3$	$\begin{array}{c} 10.9\\ 5.9\\ 6.30\\ 7.02\\ 13.3\\ 11.30\\ 6.89\\ 4.7\\ 13.5\\ 11.3\\ 5.6\\ 4.5\\ 1.6\\ 1.6\\ 1.6\\ 1.6\\ 1.6\\ 1.6\\ 1.6\\ 1.6$		4 15 1 771 3 85 7 58 1 35 6 62 1 33 0 37 0 34 0 12 0 58 0 55 0 47 4 98 3 97	$\begin{array}{c} 2\cdot 16\\ 1\cdot 66\\ 1\cdot 75\\ 1\cdot 959\\ 1\cdot 559\\ 1\cdot 33\\ 1\cdot 51\\ 1\cdot 296\\ 1\cdot 51\\ 1\cdot 51\\ 1\cdot 33\\ 2\cdot 51\\ 1\cdot 33\\ 1\cdot 33\\ 2\cdot 51\\ 1\cdot 33\\	0.85 0.59 0.27 0.50 0.12 	5072 4073 318 2094 20565	í 132 0.66 1.36 0.41 0.51 0.20

a The extreme readings of Jan. 25 and Feb. 2 are here omitted; the mean disturbance is 23'21 at 1 A.M., and 5'52 at 11 A.M. if they are retained, the monthly values being then 75'1 and 7'1 respectively.

TABLE XLII.

		1		Lako	Athabasc	a 1843-4.		· · ·	Tor	onto.	Sit	ka. 1
Local	L,								<u></u>			
Time	,	Oct.	Nov.	D::0.	Jan.	Feb.	$\frac{\Sigma(W)}{N}$	Excess.	Σ(W) N	Excess.	$\frac{\Sigma(W)}{N}$	Ex- cess.
Midn.		18.2	4.9	5.2	14.9	7.5	8.95	ó·78	í·81	_; _	ś ·70	·
1 A.M.	-	14.9	5.6	10.0	12.8	9.1	10.14	0.21	1.07	-	8.97	(* <u>*</u> _)
2 "		6.2	8.2 ,	4.8	8.0	11.2	7.01		1.48		2.77	
8 "	· _	6.9	2.5	5.2	7.5	8.7	6.26		1.37		2.77	225
4 ,,		9.8	8.8	5.7	14.5	9.6	9.46	- · -	1.48		2.67	-
5 "		12.2	44	5.9	7.10	5•9	6.88 2	· •	1.70	0.02	2.74	
6,	-	2.2	4.7	8.2	6.1	5.6	6.21		2.18	0.81	2.81	0.12
7,,	-	5.6	4.0	6.8	6.2	4.8	5.40		1.82		8.19	0.72
8 "	-	9.0	8.8	4.0	4.9	4.6	4 89		2.34	1.05	8.20	0.64
9 "	_	- 2.2	2.8	5.0	4.2	6.2	4.29		2.08	0.78	2.96	0.31
10 "		5.7	2.8	6.9	5.3	4.4	5.00		1.62	0.81	8.73	1.28
11 "	-	7.7	4.8	5.9	8.2	6.22	5'28 6		1.95	0.52	8.07	0.26
Noon	-	4.8	4.6	5.4	4.2	5.4	4-84	0.22	S·01	6.72	3.01	0'66
1 р.м.	-	2.9	8.9	5.2	4.2	5.8	4.69	0.81	1.62	0.19	2.94	0:79
2 "	-	5.1	2.8	7.5	6.0	4.0	5.34	0'94	1.57	0.89	2.36	-
8,,	-	5.3	8.1	5.7	7.8	4.2	5.37	1.38	1.71	0.47	2.23	0.12
4,,	-	4.8	2.6	5.1	5.1	4.4	4.48	0.13	1.81,	0.78	1.98	0.08
5,,		5.4	3.8	3.8	3.6	4.4	4.09	0.81	1.86	0.82	1.69	-
6 "		4.2	5.8	4.8	8.7	3.9	4.85		1.02		1.95	0.04
7"	-	5.2	2.5	3.8	3.5	3.1	8.47		0.84		2.12	·
8 "	-	6.0	8.1	4.3	4.2	4.7	4.28	• •	0.88		2.06	-
9 "		9.2	2.8	4.2	4.9	9.7	6.08		1.13		2.15	-
10 "		10.9	11'4	5.2	8.8	5.1	7.82		1.18		2.57	-
11 "		11.4	11.4	3.6	6.8	4.4	7.80		2.60	0.68	2.43	-

Value of the mean westerly Disturbance of Declination at the same stations, and for the same period.

b The extreme readings of Jan. 25 and Feb. 2 have been omitted here. The mean disturbance W. is 7'.77 at 5 A.M., and 8'.40 at 11 A.M., if they are retained, the monthly values being 9'.6 and 16'.2 respectively.

In the column headed "Excess" the difference between the mean values E. and W. is shown in connexion with the one which is greatest. Thus, at midnight, Table XLII., the mean westerly disturbance of Declination is 0' 78 greater than the mean easterly.

It appears by the foregoing analysis, that the westerly deviations at Lake Athabasca are, to a small extent, greater than the easterly, from 11 A.M. to 5 P.M., and also at midnight and 1 A.M. During the

IRREGULAR FLUCTUATIONS.

remainder of the night, and from 6 to 11 P.M., the easterly deviations are the greatest. Individual months present irregularities, as must be expected, but the general law is apparent in each of them; namely, a slight excess of westerly deviation during the day, and a much greater excess of easterly deviation during the night, but with a temporary preponderance of westerly tendencies at midnight; the latter particular agrees with Dr. Lloyd's deductions from the observations at Dublin. There is a considerable difference in the value of easterly and westerly tendencies at 10 P.M., a feature which these observations have in common with those at Dublin and Toronto; but the greatest difference is not as at the last-named stations at that hour, but much later in the night; it is shown from 4 to 7 A.M., and thus proves that the maximum value of the mean disturbance, included at those hours, is chiefly occasioned by easterly movements. There is no evidence in the means for five months at Sitka of that westerly tendency about midnight which is, with reference to the physical cause of the phenomena, perhaps, an important feature in the curves at the other stations; in other respects the same general law prevails; and it is interesting to observe, that although this station is in a high latitude, and nearer in point of distance by more than one half to Lake Athabasca than it is to Toronto, yet, being on nearly the same lines of equal magnetic inclination and intensity as the latter station, does not partake to a very much greater extent than Toronto in the great magnetic disturbances shown to prevail so commonly at Lake Athabasca.

79

80

readings for the progressive change alluded to above, together with the values of the same quantity for Toronto and Sitka. A Mean of the corrected readings at Fort Simpson, excluding incomplete days, is added; those days having been TABLE XLIII.-Mean Disturbance of the Declination at Fort Simpson in April and May 1844, after correcting the scale included in the Mean given Table.

1	_					ù,																					
	ŝ	. W.	-1	. 1			8`8	29.7	Ľ	80.0	1	99.0	0.52	0-72	1.47	1.50	1.30	96.0	1.20	1.77	2.57	1.7		9-23	1.4	ļ	ł
	Excess.	ы Э́	4,03	9.66	8	8	•	•		•	0.20	•	•	•	•	•	•	•	•	•	•	18.0	2-12		6-72	1.83	1.53
Sitka.	ł	.w	3,32	4.14	8	9 1 0 2	14.6	19.21	4.62	3.64	2.41	2.82	2.38	2.81	8. 8	08.8	2.80	5.84	3.41	70-S	4.31	89.S	90.8	3.18	3.25	8.9	2.78
20	 F		7'35	08.8	2. E	8	9.24	5 8	9.24	99.8	16.3	5.16	%.I	- 60-7 7	1.86	1.80	1.59	1.88	2.21	8	1.81	444	5.18	2.8 8	44-8	4-85	18.4
	 -	TOTAL.	5,18	A-67			10.8	76.8	2.08	09.8	5.69	2.49	2.10	2.46	2.27	2.58	2.53	5.81	2.81	2.36	2.96	4.68	4-16	5-91	3.51	96.8	3.58
		W.	-		1	•	·	,	1.04	88.0	18.8	41.3	0.43	•	•	•	¥0.0	0-55	41-0	92.0	SS.0	83.0	•	ı	•	•	
	Excess.	8	2 ^{,43}	- 47-6		0.4	- 16-2		•	•	•	•	•	- 13	- 87.0	- 0.05	•	,	•	•	•	•	1.20	- 8.0	1.88	4.54	
Foronto.	 		9,0 4	01.0		8	2.01	2.13	2.84	2-86	- 68.9	4.06	2.37	5.04	2.10	2.04	- 98.1	- 80.2	1.65	1.98	2.02	- 61.2	5.09	2-15	04.1	2.69	2.35
ũ		pá	4.47	40.7	8	62.9	16-1	5.24	1-80	2.03	2-02	1.89	F6. I	2.17	2.38	3.06	1.82	1-48	1.48	1.42	1.69	1.90	3.65	2.48	4-53	7-23	3.50
		Total.	0,00	-10	0 10		4.62	3-77	2.42	2.43	46.8	16.7	2.16	2.08	2.24	2.05	1.8	ц.1	1.56	1.68	1.88	3.04	2.78	2.29	2-94	4.58	2-78
		W	., ,,	4 4	00	•	•	•	•	1	•	•	•	•	2.3	•	0.3	3.7	1.5	2-0	2.5	3.2	•	1.0	12.6	7.3	2.0
lination.	Excess.	 8	-	•	•	- 6.4I	21.5	- S-01	- 6.83	- 8.8I	- 0.73	- 9.8I	8.5	4.7	•	- 4-0	•	•	•	•	•	•	2.0	•	•	•	•
nce of Dec		W.	,	1.01	T.21	6.8	12.1	9.11	14.2	14-3	13.8	6.6	6.4	11.4	9.2	8-2	4.8	6.8	6.9	9.9	8 -4	9.6	8.4	12.3	20.4	0.9I	1.01
Mean Disturbance of Declination.		ы.		A. 01	9.6	8.97	9.88	21-9	38.1	33.1	35-8	28.5	16.4	1.91	5.2	8-2	4.5	5.2	5.4	6.9	5.9	7.9	8.6	12.2	8.4	1.8	1.8
Mear		Total.		0.4	1.11	315 °S	22.2	17-3	25.6	52.9	22.3	4.6L	12.0	12.2	6.2	0.8	4.6	0.4	6.3	6-2	P-4	8.1	8.8	12.3	15.4	13-1	9.5
	Diurnal -	Variation.		Ţ	-2.0	-0.2	8.8+	+7.2	0.61+	8.16+	+22.8	4.91+	4-10-7	+6.2	51 51 51	-2.8 -	-8:5 	-11.3	9.0I-	6.01	₹.0I	1.11-		0.9-	4.9-	2.4-	0.2
	Seelo 1			•	_																	_					6.588
		Time.	1				0	4				. a									- 10						.W.4 II

IRREGULAR FLUCTUATIONS.

The diurnal law of mean disturbance of Declination indicated by the observations of April and May at Fort Simpson, appears to differ but little from that of the winter months at Lake Athabasca, as long as we disregard the sign of the movements. There is a maximum of total disturbance at 9 p.m., and another at 5 A.M., or about that hour, the latter being very far the most considerable; on referring, however, to the movements under the respective signs, it appears that the earlier of these two maxima is here caused by _ westerly and not by easterly movements, the great length of the day at this season having apparently the effect of protracting until a late hour of the night, and of increasing in relative importance the westerly tendency, which was also shown to be characteristic of the hours of the afternoon in the winter months. The very great increase in the amount of the mean disturbance is also apparently a result of the advance of the season, being participated in to a certain degree by all the stations. The apparent anomaly of an excess of westerly movements at Sitka, distant less than 500 miles from Fort Simpson, at two hours (3 and 4 A.M.) when the contrary tendency prevails at the latter station, is most remarkable; but this is not the place to follow out the inquiry it demands.

TABLE XLIV.

Mean Disturbance of the Horizontal Force and Inclination at Lake Athabasca, after applying the corrections specified above (page 75), for the changes of mean scale reading; final means for the whole period expressed in scale divisions.

Hour of Local	k:	Bifilar = '000341	x.	Exc	ess.		rclinomet P=0''17		Exc	e ss.
M. T.	-	+	Total.	-	+	+		Total.	+	~~.
16. 17 18 20 21 22 23 Noon 1 2 5 6 7 8 9 9 10 11 13 14 15	$\begin{array}{c} 49\cdot 2\\ 44\cdot 6\\ 25\cdot 9\\ 22\cdot 9\\ 22\cdot 9\\ 15\cdot 5\\ 12\cdot 5\\ 13\cdot 5\\ 13\cdot 5\\ 13\cdot 5\\ 13\cdot 9\\ 13\cdot 1\\ 14\cdot 2\\ 13\cdot 8\\ 16\cdot 5\\ 17\cdot 3\\ 29\cdot 1\\ 33\cdot 4\\ 33\cdot 9\\ 55\cdot 9\end{array}$	$\begin{array}{c} 22^{\circ}1\\ 20^{\circ}4\\ 16^{\circ}1\\ 14^{\circ}3\\ 18^{\circ}6\\ 18^{\circ}1\\ 12^{\circ}7\\ 12^{\circ}7\\ 11^{\circ}7\\ 12^{\circ}7\\ 12^{\circ}7\\ 12^{\circ}7\\ 12^{\circ}7\\ 12^{\circ}7\\ 12^{\circ}7\\ 12^{\circ}1\\ 12^{\circ}6\\ 13^{\circ}0\\ 12^{\circ}7\\ 15^{\circ}4\\ 18^{\circ}4\\ 18^{\circ}4\\ 18^{\circ}4\\ 18^{\circ}4\\ 18^{\circ}4\\ 18^{\circ}4\\ 18^{\circ}6\\ 18^{\circ}6\\ 17^{\circ}5\\ 17^{\circ}9\\ 19^{\circ}7\\ \end{array}$	$\begin{array}{c} 32\cdot 9\\ 30\cdot 8\\ 21\cdot 2\\ 18\cdot 5\\ 17\cdot 5\\ 15\cdot 7\\ 14\cdot 1\\ 12\cdot 5\\ 12\cdot 7\\ 13\cdot 3\\ 12\cdot 9\\ 13\cdot 6\\ 13$	27·1 24·2 9·8 8·0 5·5 2·8 0·4 0·1 1·8 5·0 1·2 0·6 	0.4 0.1 1.6 1.9 3.5	$\begin{array}{c} 75 \cdot 6 \\ 29 \cdot 8 \\ 12 \cdot 0 \\ 14 \cdot 0 \\ 17 \cdot 3^* \\ 9 \cdot 1 \\ 8 \cdot 2 \\ 7 \cdot 9 \\ 6 \cdot 6 \\ 7 \cdot 2 \\ 5 \cdot 2 \\ 7 \cdot 7 \\ 9 \\ 12 \cdot 0 \\ 18 \cdot 6 \\ 7 \cdot 7 \\ 9 \\ 18 \cdot 6 \\ 63 \cdot 5 \\ 94 \cdot 0 \end{array}$	$\begin{array}{c} 21 \cdot 0 \\ 15 \cdot 0 \\ 9 \cdot 8 \\ 10 \cdot 8 \\ 8 \cdot 2 \\ 8 \cdot 1 \\ 7 \cdot 9 \\ 8 \cdot 7 \\ 8 \cdot 7 \\ 8 \cdot 7 \\ 8 \cdot 7 \\ 9 \cdot 3 \\ 10 \cdot 5 \\ 12 \cdot 3 \\ 12 \cdot $	$\begin{array}{c} 42.9\\ 81.1\\ 20:07\\ 11:1\\ 12:8\\ 8:63\\ 7:4\\ 8:3\\ 7:3\\ 8:0\\ 7:4\\ 8:3\\ 9:8\\ 9:8\\ 15:1\\ 12:3\\ 9:8\\ 15:1\\ 12:4\\ 25:7\\ 30:6\\ 48:5\\ 18:5\\ 10:5\\ 1$	54.6 37.2 19.0 14.7 5.5 9.1 1.0 7 1.5 	

* This high value appears to be chiefly produced by the observation of February 2d 6h. Gött.

81° °

It appears by the above table that the mean disturbance of both the Horizontal Force and Inclination, taken without regard to sign, is greatest at 3 A.M., being two hours earlier than the epoch of greatest disturbance of the Declination, and the subordinate maximum, which is shown by the latter element at 9 or 10 P.M., is wanting in these. The tendency to disturbance is very nearly constant, and at its lowest value, by both elements from 11 A.M. to 8 P.M.; it then begins to increase, but not very rapidly, until 11 P.M.; between this hour and midnight there is a large increase, after which very high values are maintained until 5 A.M. Referring again to the relative values, under the positive and negative signs, we find that there is a very great preponderance of negative movements of force and increasing inclination from midnight to 5 A.M.; but for some hours before midnight the contrary tendency prevails, namely, to increase of Horizontal Force and decrease of Inclination; and this latter appears to be more or less the case throughout the day, but the mean disturbance being comparatively small and the opposite tendencies nearly balanced, the latter conclusion is less certain.

All three elements then agree in supporting the conclusion drawn from the daily mean curves in the preceding part of the volume, that at Lake Athabasca a different periodical law governs the irregular fluctuations from the one established for stations in lower magnetic latitudes, or that the *reaction* succeeding the direct influences preponderating during the day, has its maximum influence at a much later hour. It also appears from the observations, that so regular in their operations in these regions are the so called *irregular* influences, that the denomination might with propriety be reversed, the observations of four or five months being sufficient to show that the mean diurnal curves of all the elements derive their chief characteristics from them. We have also seen that a similar result as far as regards the Declination is deducible from the observations of only 46 days at Fort Simpson. As the other instruments were twice adjusted in this short period, it would be scarcely worth while under ordinary circumstances to refer to them. For the purpose, however, of adding all the confirmation possible to the periodical law in question, I have calculated the mean disturbance of the Horizontal Force and Inclination at this station also; the results are contained in the next table, and are in complete accordance with the deductions from the longer period of observation.

TABLE XLV.

Local Mean Time.		Bifilar. = '000291	K .	Exc	ess.		clinome P=0' '14		Exc	ess. ``
		+	Total.		+	+	-	Total.	+	_
15 15 16 15 17 15 18 15 20 15 21 15 22 15 23 15 3 15 4 15 5 15 6 15 7 15 8 15 9 15 10 15 11 15 5 15 6 15 5 15 6 15 5 15 9 15 10 15 11 15 13 15 14 15 15 15 16 15 17 15 18 15 19 15 20 15 2	$\begin{array}{c} 8329\\ 8228\\ 6728\\ 6165\\ 1223\\ 1223\\ 1468\\ 1569\\ 1223\\ 1468\\ 1573\\ 1223\\ 1468\\ 1573\\ 1273\\ 1669\\ 1573\\ 1256\\ 1573$ 1573\\ 1573 1573 1573 1573 1573 1573 1573 1573 1573 1573	$\begin{array}{c} 35 \cdot 8 \\ 39 \cdot 3 \\ 32 \cdot 6 \\ 28 \cdot 2 \\ 27 \cdot 1 \\ 20 \cdot 9 \\ 13 \cdot 4 \\ 9 \cdot 5 \\ 15 \cdot 6 \\ 9 \cdot 4 \\ 13 \cdot 3 \\ 18 \cdot 3 \\ 24 \cdot 8 \\ 23 \cdot 4 \\ 33 \cdot 5 \\ 229 \cdot 4 \\ 33 \cdot 5 \\ 229 \cdot 4 \\ 33 \cdot 5 \\ 16 \cdot 9 \\ 18 \cdot 1 \\ 20 \cdot 9 \\ 18 \cdot 1 \\ 20 \cdot 9 \\ 20 \cdot 4 \\ 20 \cdot 4 \\ 20 \cdot 4 \\ 20 \cdot 4 \\ \end{array}$	$\begin{array}{c} 54\cdot 1\\ 57\cdot 2\\ 47\cdot 8\\ 40\cdot 8\\ 45\cdot 3\\ 38\cdot 8\\ 25\cdot 1\\ 12\cdot 5\\ 13\cdot 4\\ 12\cdot 8\\ 19\cdot 2\\ 19\cdot 2\\ 19\cdot 2\\ 19\cdot 2\\ 19\cdot 2\\ 23\cdot 6\\ 19\cdot 2\\ 23\cdot 6\\ 19\cdot 2\\ 23\cdot 6\\ 19\cdot 2\\ 37\cdot 0\\ 23\cdot 6\\ 19\cdot 2\\ 37\cdot 0\\ 35\cdot 3\end{array}$	47 · 2 48 · 6 40 · 2 29 · 4 40 · 1 40 · 7, 1 25 · 1 6 · 1 - - - - - - - - - - - - -		$\begin{array}{c} 137\cdot 0\\ 192\cdot 5\\ 160\cdot 7\\ 180\cdot 7\\ 181\cdot 2\\ 108\cdot 6\\ 57\cdot 8\\ 35\cdot 5\\ 17\cdot 3\\ 21\cdot 7\\ 20\cdot 3\\ 18\cdot 4\\ 17\cdot 2\\ 20\cdot 6\\ 17\cdot 2\\ 20\cdot 6\\ 17\cdot 3\\ 44\cdot 9\\ 71\cdot 5\\ 17\cdot 3\\ 44\cdot 9\\ 71\cdot 5\\ 96\cdot 0\\ 92\cdot 9\\ 112\cdot 1\\ \end{array}$	$\begin{array}{c} 70 \cdot 0 \\ 70 \cdot 4 \\ 61 \cdot 1 \\ 47 \cdot 8 \\ 33 \cdot 7 \\ 21 \cdot 4 \\ 13 \cdot 5 \\ 23 \cdot 2 \\ 23 \cdot 2 \\ 13 \cdot 5 \\ 13 \cdot 5 \\ 27 \cdot 9 \\ 38 \cdot 5 \\ 42 \cdot 9 \\ 43 \cdot 5 \\ 31 \cdot 6 \\ 31 \cdot 6 \\ 31 \cdot 6 \\ 31 \cdot 6 \\ 35 \cdot 5 \\ 35 \cdot 2 \\ 38 \cdot 5 \\ 38 \cdot $	$\begin{array}{c} 101 \cdot 6 \\ 128 \cdot 4 \\ 98 \cdot 9 \\ 78 \cdot 4 \\ 39 \cdot 9 \\ 78 \cdot 4 \\ 23 \cdot 7 \\ 20 \cdot 4 \\ 23 \cdot 2 \\ 20 \cdot 4 \\ 23 \cdot 2 \\ 37 \cdot 0 \\ 49 \cdot 6 \\ 68 \cdot 0 \\ 59 \cdot 5 \\ 57 \cdot 5 \end{array}$	67 · 0 119 · 1 89 · 7 72 · 8 22 · 4 74 · 9 34 · 6 14 · 1 3 · 8 2 · 5 	8 21 21 9 1 1 1 1 1 1 1 1 1 1 1 1 1

Mean Disturbance of the Horizontal Force and Inclination, as shown by 46 days of observation at Fort Simpson, in April and May 1844, expressed in scale divisions of the instruments.

The co-efficients are added above for convenience, but the values given are probably somewhat exaggerated by the causes before mentioned. They represent the *relative* amount of the disturbing force affecting the Horizontal Force and Inclination, at the different hours of the day and night; and it must be remarked, that the values themselves are so great, that a reduction, of even a fourth part, would still leave them considerable enough to prove, that the force and activity of the causes producing irregular magnetic fluctuations, in the region to which they belong, must be a matter of not less interesting inquiry than the peculiarity of their epoch. For example, the means of total disturbance of the three first hours of the last table, when reduced by one fourth, represent '011 X and 12''4 of Inclination respectively.

The next Table is added for the purpose of completing the comparison attempted in this Report, by bringing into one view the results at all the chain of American stations; and it is of particular interest, as showing a manifest progression, inclining towards the characteristics presented at the northern stations. This is not a proper place to pursue at length the details of such a comparison, or to enter upon the very interesting subject of the annual variations of the mean curves which represent the tendency to disturbance at each hour; but it is desirable to give all the confirmation which can be derived from observations in lower magnetic latitudes, of the special

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IRREGULAR FLUCTUATIONS.

form in which these phenomena present themselves in higher ones, the calculation has been extended to include a full year of observations at the three permanent observatories.

TABLE XLVI.

Mean Disturbance of the Declination for one year, October 1843 to September 1844, at Philadelphia, Toronto, and Sitka, expressed in arc.

Local	I	Philadelphi	8,		Toronto.			Sitka.	·-
Mean Time.	E.	w.	Total.	E.	w.	Total.	E.	W.	Total.
Midnight 1 A.M. 2 3 4 5 6 7 8 9 10 11 Noon 1 P.M. 2 3 4 5 6 7 8 9 10 11 Noon 1 P.M. 9 10 11 Noon 1 P.M. 2 3 4 5 5 6 7 8 9 10 11 Noon 1 1 1 1 1 1 1 1 1 1 1 1 1	226 2240 2241 2231 212 2	$\begin{array}{c} 2 \cdot 20 \\ 2 \cdot 83 \\ 2 \cdot 17 \\ 1 \cdot 70 \\ 2 \cdot 34 \\ 2 \cdot 65 \\ 2 \cdot 55 \\ 2 \cdot 616 \\ 2 \cdot 65 \\ 1 \cdot 89 \\ 1 \cdot 92 \\ 1 \cdot 72 \\ 2 \cdot 006 \\ 1 \cdot 92 \\ 1 \cdot 72 \\ 1 \cdot 32 \\ 1 \cdot 47 \\ 1 \cdot 56 \end{array}$	$2 \cdot 21$ $2 \cdot 29$ $1 \cdot 91$ $2 \cdot 29$ $1 \cdot 91$ $2 \cdot 100$ $2 \cdot 200$ $2 \cdot 100$ $2 \cdot 200$ $2 \cdot 191$ $1 \cdot 931$ $1 \cdot 931$ $1 \cdot 731$ $1 \cdot 731$ $1 \cdot 731$ $1 \cdot 731$ $1 \cdot 732$ $1 \cdot 862$ $2 \cdot 612$ $2 \cdot 612$ $1 \cdot 883$	$3 \cdot 23$ $3 \cdot 369$ $3 \cdot 38$ $2 \cdot 96$ $2 \cdot 188$ $1 \cdot 63$ $1 \cdot 63$ $1 \cdot 63$ $1 \cdot 63$ $1 \cdot 67$ $1 \cdot 67$ $1 \cdot 66$ $1 \cdot 67$ $1 \cdot 60$ $2 \cdot 02$ $2 \cdot 01$ $1 \cdot 67$ $1 \cdot 62$ $1 \cdot 60$ $2 \cdot 02$ $2 \cdot 11$ $2 \cdot 68$ $5 \cdot 13$ $5 \cdot 194$ $5 \cdot 60$	$\begin{array}{c} 2.52\\ 2.52\\ 1.82\\ 2.37\\ 2.53\\ 3.03\\ 2.76\\ 3.06\\ 2.29\\ 1.93\\ 2.09\\ 1.93\\ 2.08\\ 1.86\\ 1.80\\ 1.80\\ 1.86\\ 1.86\\ 1.86\\ 1.86\\ 1.87\\ 1.75\\ 1.77\\$	$\begin{array}{c} 2.80\\ 2.66\\ 2.58\\ 2.58\\ 2.73\\ 2.68\\ 2.73\\ 2.68\\ 2.91\\ 1.95\\ 2.05\\ 1.81\\ 1.80\\ 1.80\\ 1.80\\ 1.80\\ 1.80\\ 1.80\\ 3.17\\ 3.81\\ 2.76\\ 3.12\\ 2.76\\ \end{array}$	5555 4536 4536 4506 5295 25752 2546 25752 2546 25752 2534 25092 55059 5559	$\begin{array}{c} & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & &$	$\begin{array}{c} 4\cdot 57\\ 4\cdot 95\\ 4\cdot 95\\ 3\cdot 51\\ 3\cdot 53\\ 2\cdot 60\\ 2\cdot 60\\ 2\cdot 40\\ 2\cdot 38\\ 2\cdot 60\\ 2\cdot 40\\ 2\cdot 38\\ 2\cdot 51\\ 3\cdot 51\\ 3\cdot 51\\ 3\cdot 51\\ 3\cdot 51\\ 3\cdot 51\\ 3\cdot 51\\ 2\cdot 60\\ 2\cdot 40\\ 2\cdot 38\\ 2\cdot 40\\ 2\cdot 38\\ 2\cdot 40\\ 2\cdot 38\\ 2\cdot 52\\ 2\cdot 51\\ 3\cdot 51\\ 3\cdot 60\\ 7\end{array}$

The observations at Philadelphia were made 19^m, and those at Sitka 28^m after the hour named.

It appears by this Table that the characteristic of a maximum value of the mean disturbance of Declination, extending from 8 to 10 P.M., belongs alike to all the stations, and does not materially differ in relative prominence at any of them; when, however, we compare the course of the mean values during the later hours of the night, a well marked difference presents itself. At each station the maximum just referred to is due entirely to easterly movements, and at each station it is succeeded, in the course of the night, by two other maxima, the first of easterly and the second of westerly movements: it is in the relative prominence of these maxima that the results at the three stations exhibit the difference referred to. At Philadelphia they are too inconsiderable to produce any marked result in the mean taken irrespective of direction; at Toronto they are much more decided, and a comparatively high value of the latter prevails in consequence from 1 to 7 A.M.; lastly, at Sitka they are sufficiently prominent to bear comparison with the maximum at 9 P.M., and so to prepare us for the result of observations in yet

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higher latitudes, by which, as we have seen above, they are shown to outweigh the latter maximum so much, as to reduce it to comparative insignificance, and to make those hours of the night in which the forces producing these movements predominate, the most important of the twenty-four, as regards their influence on the character of the mean diurnal curves of each of the magnetic elements.

There is a test of a very simple nature which the numerous observations of disturbances enable us to apply, for the purpose of ascertaining whether there is a determinate direction in the movements of the Declination magnet upon these occasions, which is different at different hours of the day. This consists in reckoning the numbers of individual readings taken during disturbances, at which the magnet was east and west of its normal mean position for that day. The latter value is found by making each day of disturbance the centre of a group of five or seven complete days, and finding the mean scale reading of the whole.

TABLE XLVII.

Showing the total number of Readings during Disturbances at which the Declination magnet was east and west of its mean position.

Mean	Atha	basca.	Fort S	impson.	Mean	Atha	basca.	Fort Si	mpson.
Time.	East.	West.	East.	West.	Time.	East.	West.	East.	West.
h 16	272	24	159	15	h 4		·	3	2
17	247	11	120	7	5		-	-	49
18	174	27	66	_ 1	6	1	3	-	48
19	86	8	55	-	7	27	6	-	27
20	· 48	14	15	-	8	35	25	4	18
21	27	21	12	-	9	40	50	5	70
22	8	24	2	-	10	72	80	18	52
23	2	13	-	1	11	61	111	16	65
Noon	4	16	-	1	12	57	114	101	38
1		2	-	1	13	120	149	119	6
2	-	1	-	2	14	154	103	105	32
3	-	1	- `	17	15	237	44	168	27

The observations entered at 16^{h} mean time at Fort Simpson were taken at 16^{h} 15^{m} and so on. It appears from the above Table that, from 3 to 7 A.M. the magnet at Lake Athabasca comparatively rarely passes to the westward of its mean position, and from 10 A M. to noon (and doubtless to 5 or 6 P.M.) comparatively rarely to the eastward of it. Westerly excursions have a preponderance which is not shown by the curve of mean disturbance from 9 P.M. to 1 A.M.

during the remaining hours (8 and 9 A.M. and 7 and 8 P.M.) easterly excursions preponderate. The tendency to westerly movements appears by this test also to be rather greater at Fort Simpson in April and May than at Lake Athabasca in the winter, as has been remarked in connection with Table XLIII. With regard to the apparent difference between the tendencies at 9 P.M. and the succeeding hours to 1 A.M. inferred from this Table and from the curve of mean disturbance (Table X.), it must be remarked, first, that no reference is here made to the relative magnitude of the movements to east and west, which is the subject of the other Table; secondly, that the present Table is derived from disturbances connected, it is probable, in almost every instance with the development of Aurora Borealis, that phenomenon having been visible during some part of every disturbance, on which the state of the sky permitted it to be seen with one exception. And it does appear from a careful comparison of the scale readings during disturbances visibly attended by Aurora, that the preliminary tendency in such instances is to a westerly range, the subsequent tendency to an easterly one. As the Aurora was most frequent at midnight and 1 A.M., the consequence of this distinction, if true, will be a comparative preponderance of westerly movements in the early hours of the night, but unless we admit that the same cause which produces the Aurora Borealis produces the ordinary reactionary or irregular movements, it does not appear to follow that the same law should be manifested by the entire body of observations embracing a great majority of hours on which no Aurora was present.

Shocks.—The following Table contains the total number of readings of the Declinometer which may be denominated shocks, according to the usual definition; that is c_{-} say, which differ from the mean scale reading for the same hour by a quantity equal to, or exceeding, twice the amount of the monthly mcan irregular fluctuation of the element as defined by Colonel Sabine. (Introduction to Toronto Observations, vol. 1. p. xv.) The dates and particulars of these readings will be given in a future section, when we consider the degree of correspondence between the movements at Toronto and the northern stations.

TABLE XLVIII.

Mean	l : ▲	thabasc	B. ·	For	t Simp	son.	Mean Time.	A	thabaş	38. , 4	For	t Sim	son.
Time.	East.	West.	Total.	East.	West.	Total.		East.	West.	Total.	East.	West.	Total
16 a	6	1	7	2	1	S	4			-	-	_	-
17	7		7	5	-	5	· 5	-	-	-	-	- [•]	
18	´ 8	1 ·	9	1		1	6	-	2	2		-	
· 19 ·	6 [.]	- 1	7	4		4	. 7			-	-	-	-
2 0 ·	8	-	8 '	2		2	8	-		- '	1	1	2
21	1.	1	2	1.	-	1	9	2	1	8		32	- 2
- 22	·	-	-	1	1	2	•10	5	2	7	— ·	· 1 `	1
23	· 2	2	4	-	-	-	11	5	8	8	-	-	<u>_</u>
· . 0	`		-	-		-	12	4	2	6	11	1	8
··•1		4 -	1	-	-		13	4	4	9	1	1.	8
2	-		-	-	-	-	14	4	2	6	2	-	- 2°,
. 8	-		-	. —	-	-	15	4	2	6	3	-	8
· · · ·				1				61	25	86	24	8	82

Showing the total number of Shocks or Disturbances of Declination, according to the definition of Colonel Sabine just referred to.

a For 0h Gött. Athabasca, and 1h Gött. Fort Simpson.

The total numbers are in the proportion of 1 to every 32 observations at Athabasca, and 1 to every 34 at Fort Simpson. In the five months at Toronto, October to February, we find 116 shocks, being in the proportion of 1 to every 27 observations, and in the two months April and May, we find 50 shocks, being in the proportion of 1 to every 25 observations; thus it appears that the high value of the monthly mean irregular fluctuation, caused by the prevalence of a state of disturbance at the northern stations, occasions a smaller proportion of readings to come under the definition of a shock as here applied, than the low value deduced from a comparatively undisturbed series.

It is to be observed that the proportion of easterly shocks is much greater at the northern stations than at Toronto. We have at the latter station in

1841, 70 easterly to 60 westerly.

1842, 77 easterly to 63 westerly.

In eight months, 1843-1844, 99 easterly to 89 westerly.

In all 246 easterly to 212 westerly; whereas we have seen that at the northern stations the easterly deflections are more than double the westerly in number, showing that whatever may be the cause which determines the north end of the magnet to the west, it decreases in activity in the winter season as we proceed to the northward in the American continent.

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ON THE CONNEXION BETWEEN THE CHANGES OF THE MAG-NETICAL ELEMENTS OBSERVED AT THE NORTHERN STATIONS AND THOSE OBSERVED AT TORONTO AND ELSEWHERE.

The circumstance that frequent and very considerable magnetical disturbances were observed at Lake Athabasca and Fort Simpson. during the winter of 1843-4 and the following spring, although the same seasons were remarkable for absence of disturbance at most of the other stations of observation which have been examined. would seem to afford a presumption that some of these disturbances were of a local character, or that their influence, when it extended to Toronto or the European stations, was too slight to attract attention. To this we may add the fact, that the hours of the day most affected by them are apparently not the same in high and in medium latitudes, as has been shown in the previous discussion of the irregular changes; lastly, it has been shown by Colonel Sabine from the Toronto observations of 1841 and 1842 (p. xx.) that the tendency of disturbances at that station is to produce westerly deviations of the declination magnet in the morning hours; and the eight months observations of 1843-4 which are here discussed. (Table XLIX.) lead to the same conclusion; indeed an inspection of any of the more important disturbances will show that the greatest movements of the declination magnet at Toronto are to the westward, whereas at Lake Athabasca and Fort Simpson they are almost invariably to the eastward, particularly in the same morning hours. In the case of this element, therefore, we have an opposite tendency in respect to direction, in addition to the difference of epoch in the Notwithstanding all these circumstances, however, two localities. a careful comparison with other published observations has led to the conclusion, that a state of magnetical disturbance prevailed at one or more other stations upon so many of the occasions upon which it was observed at Lake Athabasca and Fort Simpson, as to leave it doubtful whether, without more positive evidence, any of the disturbances, considered generally, can be considered to have been merely local. It is to be hoped, that the extension of automatic registration by means of photography will soon throw more light upon the question, whether any and what magnetic changes may be regarded as local, and how far we may consider movements which have few or no features of resemblance, to be due to a common cause, because they occur simultaneously in distant localities; meanwhile it would be to neglect a principal purpose of the observations under discussion, to omit to pursue the inquiry as far as they permit.

Extra observations at short intervals were taken at the two northern stations, on sixty-six occasions, exclusive of term days, in a period of about one hundred and sixty days of observation. Upon examination of all the records of magnetical observations for the years 1843-4 which have been published hitherto, namely, those of the four British colonial observations, those of the Russian stations, of Greenwich, Makerstoun, and Philadelphia, there are to be found only twenty-nine instances of corresponding observations elsewhere, and in this number are included five on which the correspondence consists only in one or two extra readings interpolated in the usual series at Greenwich or Makerstoun. This, however, is sufficient to show that in the view of the observers some disturbance existed. The dates to which this remark applies are October 26¹, December 8^d and 26^d 1843, April 30^d, May 3^d 1844. Of the remaining thirty-seven northern disturbances, about ten were of the first order as regards magnitude and duration, namely, those of October 15^d, 16^J, October 17^d commencing 17^h, October 25^d, 26^d, October 30^d, 31^d, December 5^d, 6^d, December 19^d, 20^d, December 29^d 1843, April 9^d, 10^d, April 14^d, 15^d, April 22¹1844; but on the whole, the coincidences of observation occur generally at the more considerable of the northern disturbances. December 28^d, February 8^d, and February 29^d, being the principal exceptions.

Proceeding next to examine the simultaneous changes of the several elements in detail, we find considerable diversity. Sometimes the movements of one or more elements correspond in epoch and in direction; sometimes in epoch when they are reversed in direction; sometimes the principal movement at one station is represented by the principal movement at the others, and as often by one of secondary prominence; sometimes there is marked agreement during part of a disturbance, no agreement during the remainder; lastly, there are several instances when movements remarkably similar in character occur at remote stations, but separated by a considerable interval of time.

All this may be shown without the aid of diagrams, by selecting the principal features of each disturbance alone for comparison, for which purpose the following brief notes are subjoined. The references are all to Göttingen time.

1843, October 17^d, 1^h to 3^h.—A great reduction of the Horizontal Force at Lake Athabasca between 0^h and 3^h, lowest value - '064 X*

* The values here given are the differences of the actual readings from the mean for the same hour and month; + or - signs before the change of declination indicate increase or decrease of the absolute value of that element, not simply easterly or westerly movements, as the absolute declination is east at Lake Athabasca, Fort Simpson, and Sitka, but west at Toronto, Philadelphia, Greenwich, Makerstoun, and St. Petersburg; the + sign indicates an easterly movement at the former and a westerly movement at the latter stations. It will be seen that the general tendency in disturbances is to an increase of absolute declination at all these stations, which reduces the difference of direction remarked above to a common principle. In selecting as the characteristic of each principal movement referred to, that one reading which happens to differ most from the mean, it is

at 1^h 46^m, but - 048 X at 2^h 1^m. Easterly extreme of Declination, +52' 7 at 1^h 35^m. At Makerstoun observations commenced at 2^h, apparently on account of a low range of Horizontal Force, - 0019 X, and the same at St. Helena, where they were also commenced at 2^h with a value of - 0012 X; there is no other obvious correspondence.

October 18-19, Term-day.-The principal movement of the Declination, which occurred between 15^h and 17^h, corresponds in general character at Lake Athabasca, Sitka, Toronto, and Philadelphia, a movement in the contrary direction being presented at the same hour at all the European stations. In the first part of the movement in question the direction is the same at all the American stations; during the latter part it is reversed, and we then have a westerly extreme -44''5 at Lake Athabasca corresponding to an easterly one $+10^{\prime}$ 8 at Sitka, with which the other stations agree. The changes of Horizontal Force between 15^h and 17^h have a general resemblance at Toronto and Lake Athabasca, save that where the element rises to a high value + '0172 X at the former station, at 17^h 6^m, it hardly passes its mean value at the latter, and they are very precisely reversed at the European stations at a later period 29^d 4^h to 6^h. The close resemblance of the changes at all the stations in America and Europe is very striking, and they here agree in direction.

October $26^d \ 20^h$ to $27^d \ 2^h$.—The principal movement at Lake Athabasca was between 0^h and 2^h , the extreme of Horizontal Force — '0624 X at $0^h \ 56^m$, and of Declination (easterly) +41' 7 at $1^h \ 5^m$. a single extra reading at $1^h \ 10^m$ at Makerstoun is the only proof that this disturbance, as such, was observed elsewhere; it shows a low value of the Horizontal Force — '0017 at $1^h \ 12^m$, and an easterly range of Declination —4'' 4 at $1^h \ 10^m$.

November 13^{i} 4^h to 7^h, and 20^h to 23^h.—A low value of the horizontal force prevails at Lake Athabasca from 4^h to 6^h, lowest -0347 X at 4^h 6^m. Declination not particularly affected, but an easterly extreme +17' 6 at 4^h 0^m. At Philadelphia the minimum of horizontal force, -0018 X, occurs at 4^h 11^m, and a low value is also maintained until 6^h. Declination, an easterly extreme -6' 2 at 4^h 0^m. This was a considerable disturbance at the last-named station, and observations were continued without intermission until 14^{d} 2^h. They were discontinued from 7^h to 20^h at Lake Athabasca, and then resumed on account of an unusual westerly range of Declination, giving a minimum -1° 6' at 22^h 16^m. At Philadelphia we

necessary to remember that from various causes, some of them perhaps instrumental, there may be an apparent difference of many minutes between the epoch of movements at two stations, which, nevertheless, viewed generally are coincident, and this is considered to be the case in all the cases cited unless otherwise stated. have a small but well marked easterly movement at the same hour, the extreme being only -1' 9 at 22^{m} .

November 24^{a} 1^h to 2^h. —A minimum of the Horizontal Force —: 0240 at Lake Athabasca at 1^h 1^m; no great change of Declination. At Hobarton extra observations also from 1^h to 2^h, the Declination chiefly affected; extreme -8'. 3 at 1^h 2^m; the Horizontal Force above the mean + 0008 X at 1^h 7^m.

December 1^d 21^h to 2^d 5^h.—Unusually large westerly movement of magnet at 22^h 15^m, -1° 37', and westerly movements prevailing until 23^h 30^m; afterwards easterly extreme +59' 2 at 3^h 27^m. Lowest value of Horizontal Force - 0443 X at 2^h 34^m, but a very low value about 22^h 45^m, and again from 2^h 0^m to 3^h 30^m. At Hobarton a low value of the Horizontal Force prevailed from 2^h 52^m, when extra observations commence, to 5^h, the lowest being - 0015 X at 3^h 47^m; Declination most affected about 3^h, extreme $-7' \cdot 0$ at 3^h 5^m.

December 8^d 18^h to 20^h .—Observations commenced at Lake Athabasca for an easterly range of Declination, maximum +44' 5 at 18^h 0^m ; disturbance of Horizontal Force not particularly marked, a minimum - '0087 X at 18^h 1^m , a maximum + '0085 at 19^h 10^m . A few readings were taken at Makerstoun, commencing at 18^h , apparently in consequence of a westerly range of the Declination of no great extent, extreme +3' 5 at 18^h 0^m ; the Horizontal Force a maximum + '0016 X at 18^h 2^m .

December $26^d 21^h$ to $27^i 2^h$.—A low value of the Horizontal Force from 22^h to nearly 0^h , minimum - 0354 X at $23^h 28^m$. Declination not particularly affected, maximum +30' 4 at $23^d 30^h$. At Makerstoun there is one extra observation only, at $23^h 35^m$. Declination +2' 8. Horizontal Force + 0001 X.

December $28^d 3^h$ to 4^h .—A great easterly movement of Declination at Lake Athabasca from 2^h to 3^h , extreme $+52' \cdot 3$ at $2^h \cdot 0^m$; the Horizontal Force not particularly affected, a minimum -0188 X at $3^h \cdot 1^m$, a maximum $+ \cdot 0105 X$ at $5^h \cdot 1^m$. At Makerstoun this disturbance attracted attention two hours earlier, a westerly extreme of Declination $+9' \cdot 7$ occurs at $1^h \cdot 52^m$, but the minimum of Horizontal Force occurs at $1^h \cdot 57^m$, $- \cdot 0018 X$, when this element differed very little from its mean value at Lake Athabasca. At Hobarton observation appears to have been commenced at 2^h , on account of an easterly range of Declination, extreme $+9' \cdot 2$ at $2^h \cdot 22^m$; the minimum of Horizontal Force coincides with that of Lake Athabasca, being $- \cdot 0013 X$ at $3^h \cdot 2^m$.

1844. January 4^d 16^h to 5^d 9^h .—Observations commenced at Lake Athabasca on account of the high range of Horizontal Force, which continued from 16^h to 20^h , maximum + '0287 X at 19^h 10^m .

IRREGULAR FLUCTUATIONS.

This is succeeded by very low values, giving two marked minima, the first and most important - '0635 at 23^h 4^m, the second - '0342 at 0^h 43^m; the Declination is also much disturbed, the extremes being -40' 7 at 21^h 0^m and $+1^{\circ}$ 6' at 0^h 57^m, but with many other great inflexions. A state of disturbance was very generally observed on this day. At Makerstoun extra observations were taken with various intermissions through the 4th, 5th, and 6th of January, and we find a maximum of Horizontal Force + 0012 X at 19^{h} 12^{m} , and the minimum at 23^{h} 17^{m} , -0021 X; also the maximum of Declination +8' 8 at 5^d 0^h 50ⁿ; in the other features no particular coincidence is to be remarked, and the great easterly movement of Declination at Makerstoun between 7^h and 8^h, giving a minimum -21' 0 at 7^h 35^m, is entirely wanting at Lake Athabasca. when the observations were resumed at that hour on account of a decrease of Horizontal Force of no great amount, which on the other hand does not appear at Makerstoun. The mean irregular fluctuation of the Declination and Horizontal Force at Toronto, on the 4th January, was the highest value of the month; the extra observations embrace but the earlier part of the disturbance, and the minimum of Horizontal Force coincides nearly with the maximum at Lake Athabasca, being -0019 X at $19^{\text{h}} 2^{\text{m}}$; the value at the regular observation of 4^d 23^h 2^m, which coincides very nearly with the principal minimum at Lake Athabasca, although also a low one - 0005 X, is not nearly so low as the reading at the epoch of greatest force at the northern station. The Declination appears to have been the most affected at Hobarton, but the minimum of Horizontal Force, - '0004 at 23^h 12^m, although very small in amount, coincides nearly with the principal one at Lake Athabasca.

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January $5^{1}23^{h}$ to $6^{1}3^{h}$.—An extreme depression of the Horizontal Force prevailed at Lake Athabasca from 23^{h} to almost $1^{h}30^{m}$, lowest — '0627 X at $23^{h}1^{m}$; at the same hour occurs the lowest value of this element at Makerstoun, — '0021 X. Again a westerly extreme of Declination, —19''4, occurs at Lake Athabasca at $23^{h}0^{m}$; a minor westerly extreme, +3''0, at Makerstoun at the same time, but the principal one, +4''5 at $1^{h}25^{m}$, coincides with a considerable easterly inflexion at the former station, +24''9 at $1^{h}33^{m}$.

February 1^d 0^h to 4^h.—Great depression of the Horizontal Force from 0^h to nearly 3^h, lowest — '0465 X at 0^h 27^m. At Makerstoun this element was not particularly affected at this time; and extra observations were not commenced until 3^h, when they show a westerly extreme of Declination +7'. 6, corresponding nearly to an easterly extreme, +29'. 5, at Lake Athabasca.

Again, from 1^d 19^h to 21^h an unusual westerly range of Decli-

nation prevailed at Lake Athabasca, extreme $-1^{\circ} 22'$ at $19^{h} 27^{m}$. Extra observations were taken at Makerstoun from 18^{h} to 19^{h} , but only one between 19^{h} and 20^{h} , which one does not indicate a correspondence of this element, but shows a minimum of Horizontal Force -0011 X, coinciding with the one at Lake Athabasca, which is -0239 X, also at $19^{h} 40^{m}$.

Februarv 2^d 6^h to 8^h.-An unusual westerly range of Declination at Lake Athabasca, extreme -48''2 at 7^h 0^m. There is also a minimum of Horizontal Force - '0258 at 6^h 10^m. Coincident observations were made at Makerstoun and St. Petersburg; at the former also occurs a minimum of Horizontal Force - 0036 X at 6^{h} 12^m, and an easterly extreme of Declination - 11''3 at 6^{h} 30^m, being half an hour before the - extreme at Lake Athabasca. At St. Petersburg an easterly extreme of Declination, +18''0, occurs at 6^h 10^m, and a maximum of Horizontal Force at 6^{h} 30^m, + 0022 X. Again, 2^d 17^h to 21^h, we have a marked prevalence of westerly Declination, and a high value of the Horizontal Force, at Lake Athabasca; the extremes -37' at 17^h 42^m, and + 0264 X at 18^h 53^m. At Toronto extra observations were commenced at the same time as at the northern station, a westerly extreme of Declination, +18' 1, occurs at 17^{h} 2^{m} , and another of small extent, +2'.6, at 17^h 42^m; a minimum of Horizontal Force accompanies the former, -0.0034 at 17^{h} 7^m; the lowest of this element value at the northern station is also at 17^h 1^m, but it is still above the mean, + 0015 X.

February 5^d 0^h to 6^h.—An excessive reduction of the Horizontal Force occurs at Lake Athabasca between 23^h and 0^h, extreme – '0678 at 0^h 4^m; great changes of Declination accompanied this shock, the extreme values being $+1^{\circ}$ 4' at 0^h 21^m, and -1° 23' at 0^h 30ⁿ. At Makerstoun but a single extra observation is given between 0^h and 1^h, namely, at 0^h 20ⁿ, which shows a considerable reduction of the Horizontal Force also, – '0029 X, but no particular disturbance of Declination. At Hobarton extra observations were commenced at 1^h, and the lowest value of Horizontal Force is at 1^h 12^m, – '0017 X, being an hour later than that at Lake Athabasca, a westerly extreme of Declination, -9''0, accompanies it.

Disturbance observations were resumed at 5^{d} 16^h with a high value of the Horizontal Force, giving a maximum + '0238 at 16^h 58^m; extra observations were taken at the same time at Makerstoun, showing low values of this element, minimum - '0034 X at 16^h 32^m. We have for the Declination the easterly extreme + 42' 1 at 16^h 21^m at Lake Athabasca, and the easterly extreme -0' 5 at 16^h 10^m at Makerstoun; again, the westerly extreme -20' 1 at 17^{h} 0^m a) the former station, and +6' 5 at 17^{h} 15^m at the latter.

February 8¹ 0^h to 1^h and 5^h to 6^h.—Two sudden changes of the Horizontal Force, but of no great extent; the lowest value was that at the regular reading at 5^h 1^m, -0235 X. Extra observations were made at Makerstoun from 4^h to 6^h, and at Hobarton from 5^{h} to 6^h; at the former station we find a minimum of Horizontal Force -0038 X at 4^h 52^m, at the latter a relative maximum of the same element -0004 at 5^h 2^m. Again we have, of the Declination, an easterly extreme +19' 7 at 5^h 9^m at Lake Athabasea, an easterly extreme -6' 3 at 4^h 55^m at Makerstoun, and a westerly extreme -7' 3 at 5^h 7^m at Hobarton.

February 29^d 0^h to 1^h.-The Bifilar was not in adjustment at Lake Athabasca during this disturbance, which was one of those most generally observed. We find, however, a relative maximum of the Inclination + 3' 1 at 16^b at that station, the value being below the mean at 15^h, 17^h, 18^h, 19^h, and 20^h; the maximum of the same element + 3''8 being at 16^h 12^m at Toronto, and apparently a little earlier at Philadelphia; on the other hand, the observations at these two stations do not show the minimum which follows at Lake Athabasea at 17^{h} , -10''2; they also show a very considerable easterly movement of Declination at 16^h, +25' 1 at Toronto, +22' 2 at Philadelphia, when that element was little disturbed at the other station. Extra observations were discontinued at Toronto at 28^d 19^h; they were continued at Philadelphia until 29d 3h, and we find a minimum of the Horizontal Force at 23^h, at which time a maximum of Inclination indicates the same thing at Lake Athabasca. At Makerstoun we find an unusually large easterly movement of Declination between 16^{h} and 17^{h} , extreme -21' 3 at 16^{h} 35^{m} , half an hour later than at Toronto and Philadelphia, and an equally great reduction of the Horizontal Force, extreme - '0051 X at 16^h 27^m. agreeing, probably, nearly with the maximum of this element at the American stations.

April 2^d 22^h to 0^h.—A very great and sudden shock at Fort Simpson, affecting first the Inclination and Horizontal Force, the former gives $+ 1^{\circ} 5' \cdot 6$ at 22^h 22^m, when the latter was less than the lowest scale reading of the Biflar (< $-0^{\circ}048 \text{ X}$)* a secondary minimum of the latter element - 0028 X is shown at Makerstoun at 22^h 17^m, but the lowest value - 0042 X is there at 21^h 22^m, when there does not appear to have been any corresponding movement at Fort Simpson. We find the minimum of this element - 0013 X at 22^h 35^m at Hobarton. The regular observations at

* The readings at Fort Simpson are referred to the mean for the 24ⁿ.

Toronto at 21^h and 22^h indicate a great reduction of the same element. The westerly extreme of Declination $+9'^2$ occurs at $22^{\text{h}} 25^{\text{m}}$ at Makerstoun, and at 22^h 27^m at Fort Simpson -43''O, at the same time is the westerly extreme -14' 3 at Hobarton. Of the great easterly range which followed at Fort Simpson, there is no very obvious sign at either of the other stations. Again, the extra observations were resumed at 3th 4th, on account of a great easterly range of Declination, with its usual accompaniments, increase of Inclination and Total Force, decrease of Horizontal Force, giving the extremes of each element at or near 4^{h} 30^m, namely + 2° 5' of Declination - '0505 $X + 45'' \theta$. Extra observations were resumed at Makerstoun at 5^h, but the extreme movements do not occur until near 6^{h} , when they are decidedly past at Fort Simpson. We have at the former station the unusual values of -20^{\prime} 3 Declination at 5^h 55^m, and + '0051 X at 5^h 57^m, a time when no very marked change is shown at Fort Simpson. This second disturbance was not observed at Hobarton, but a few extra observations were made about 6^h at Greenwich, and agree with those at Makerstoun.

April 16-17, 1844.-This great disturbance was recorded at nearly every station of observation, and furnishes at many, probably at all of them, the greatest amount of change of all the elements which had been recorded up to that date. There are, however, several remarkable differences in the character of the changes at different stations: first, as regards the Declination, we have an extraordinary easterly movement at Fort Simpson between 1^h and 2^h on April 17, the extreme range being no less than $+6^{\circ} 40'$ at 1^h 24^m; at this hour no marked feature is presented at Philadelphia or Toronto, whereas at stations in Europe and at Hobarton we find a resemblance. At Makerstoun the westerly extreme observed is +17' 9 at 1^h 0^m; at Greenwich the westerly extreme is +16' 9 at 1^h 9^m; at St. Petersburgh the easterly extreme is -14' 6 at 1^h 25^m. but followed at 1^{h} 35^{m} by the westerly extreme + 15' 2; at Hobarton the westerly extreme is +31' 7 at 0^h 57^m; at St. Helena there is no marked feature at this hour; at the Cape the extra observations were discontinued at 1^h. On the other hand, we have at Toronto and Philadelphia a great easterly movement between 16^d 20^h and 21^h, which answers to a shock of short duration at Fort Simpson; the extreme readings are at Toronto +39' 3 at $20^{\text{h}} 45^{\text{m}}$; at Philadelphia +26' 9 at 20^{h} 50^m; and at Fort Simpson $+2^{\circ}0'$ 4 at 20^h 50^m. A similar correspondence appears at 21^h 50^m. Referring next to the Horizontal Force, the greatest reduction of this element at Fort Simpson commenced very suddenly at 17^d 0^h 55^m; the extreme observed was -0'128 X at 1h 28m, this is, however, but an approximation, the range having passed the limit of the scale :

here are also great negative extremes at or near 173th, 19th, and 231, but none of them approached the one just cited; this is also the epoch of greatest reduction of this element at Hobarton, the extreme being - '0069 at 17^h 27^m, and we find it a little later at St. Helena; at Toronto we have at the same hour a considerable negative movement also, giving a minimum - '0106 X at 0^h 17ⁿ, but at this station and at Philadelphia the lowest value of the day is nearly an hour earlier, and answers to a movement of secondary. importance at Fort Simpson; the values are - '0148 X at 23^h 32^m at Toronto, - '0080 X at 23^h 27^m at Philadelphia, and - '0694 at 23^h 19^m at Fort Simpson; about the same time is the lowest value at Sitka and at Greenwich, while at Makerstoun it occurs between It deserves remark that the Horizontal Force begins 21^h and 22^h. to return to its normal value at Toronto and Philadelphia at 17^d 3^h, at Fort Simpson not until 17^d 5^h, in both cases by a regular change which is perfectly similar in other respects.

April $24^d 25^d$ Term day.—An easterly movement of Declination of very marked character and great extent prevails at Fort Simpson between $25^d 2^h$ and 4^h , the extreme being $+3^\circ 7'$ at $2^h 55^m$; we have a corresponding shock at Sitka, but reduced in amount to $+19' \cdot 0$, this extreme reading being at $3^h 0^m$. A sustained westerly movement of comparatively small extent, but very obviously coinciding in epoch, occurs at Toronto and Philadelphia, giving at the former an extreme westerly reading of $+10' \cdot 9$ at $2^h 32^m$, at the latter a westerly extreme $+10' \cdot 1$ at $2^h 48^m$. The European stations do not exhibit any particular movement at this hour.

Referring to the Horizontal Force, we find a very low value of this element at Fort Simpson from 2ⁱ 17^m to 3^h 7^m, the extreme being - '0585 X at 2^h 57^m; the lowest value at Sitka - '0101 X occurs at the same reading; the movement generally is well marked at that station. There is a well marked minimum at Toronto about 2^d 17^h being half an hour carlier than the one in question, but the lowest value at this station is -'0009 X at 7^h 32ⁿ. Viewed generally, there is a marked resemblance in the successive changes of the element at these two stations, but the epochs of maxima and minima do not coincide; they would be made to do so pretty nearly if the whole northern curve were advanced about two hours of time: for example, the first important minimum at Fort Simpson occurs at 0^h, at Toronto at 2^h 10^m, the following maximum, Fort Simpson at 1^h 40ⁿ, Toronto 3^h 10^m. The next minimum Fort Simpson 2^h 57^m, Toronto 5^h 30^m, the next maximum Fort Simpson 4^h 30^m, Toronto 6^h 30^m. An unusually high value of the element prevailed at both stations on the 24th and 25th April.

Extra observations were resumed at Fort Simpson at 20^h on the

25^h April, and continued until 26^d 2^h; they were resumed at 26^d 0^h simultaneously at Philadelphia, Makerstoun, and Hobarton. Referring them to this part only of the disturbance, we find a very great reduction of Horizontal Force at Fort Simpson between 23^h and 0^h, the extreme being — '0845 X at 0^h 7^m; we find a similar movement at Philadelphia, the extreme being — '0016 X at 0^h 2ⁿ, followed by an immediate return to high values, giving a maximum + '0010 X at 0^h 58^m. At Fort Simpson the succeeding maximum is less marked, and not attained until 1^h 30^m; at Makerstoun we find a minimum at 0^h 12^m — '0033 X, but the lowest value occurs at 0^h 47^m, and there is no maximum before 2^h. At Hobarton the Declination is the element chiefly affected, but we have a maximum of Horizontal Force at 0^h 7^m + '0008, and the minimum — '0019 at 1^h 22^m.

April 26^d 18^h.—A great westerly range of Declination prevailed at Fort Simpson from 18^h to 19^h 20^m, extreme —1° 24' ⁴ at 18^h 0^m. At Philadelphia extra observations were commenced at 15^h; we have an easterly extreme —8' ⁸ at 17^h 54^m, but the principal is at 19^h 20^m, —11' ¹, and a westerly movement intervenes, corresponding to an easterly one, or a return towards normal values, at Fort Simpson. Philadelphia at 18^h 14^m, +1' ⁹, Fort Simpson at 18^h 30^m, —23' ⁸. Again, the Horizontal Force at Philadelphia presents two minima, the greater at 18^h — ¹0013 X, the next from 18^h 55^m to 19^h 20^m. At the same periods we have minima at Fort Simpson, but the latter

in this case the greater, the extreme being -0300 X at $19^{\text{h}} 31^{\text{m}}$. At Makerstoun observations occur from 13^{h} to 18^{h} , and indicate, at the latter hour, values of both elements differing very little from their mean.

April $28^d 21^h$ to $29^d 5^h$.—The corresponding readings are confined to a couple at Makerstoun, between 2^h and 3^h . Referring to this period only, we find a great easterly movement of Declination at Fort Simpson, the extreme $+2^\circ 5'$ at $2^h 3^m$, accompanied by a very low value of the Horizontal Force, the extreme — 0379 Xat $1^h 52^m$, but with no great change for about 20^m before and after that hour. The observations at Makerstoun indicate a minimum of this element between $2^h 0^m$ and $2^h 45^m$, the lowest value of those recorded being — 0015 X at the $2^h 32^m$, but the Declination differs very little from its mean value.

April 30th.—Extra observations were taken at Fort Simpson every 15^m from 14^h to 16^h, in consequence of an unusually high value of the Horizontal Force, but no marked changes occurred; as usual under similar circumstances, the Declination is westward of its mean. Afterwards, at 21^h, a considerable disturbance commences. At Makerstoun a few extra readings were taken from 14^h to 18^h, showing a

small westerly extreme $-7^{\prime \cdot 9}$ at $14^{h} 5^{m}$ accompanied by a minimum $-^{\circ}0014 \times 06$ Horizontal Force; the subsequent disturbance was not observed.

May 2^d 19^h.—The commencement of extra observations at Fort Simpson coincides with the conclusion of them at Makerstoun.

May 3.—A sudden and great reduction of the Horizontal Force occurs from 3^{h} to 4^{h} at Fort Simpson, giving a minimum — '0619 X at 4^{h} 7^{m} . At the same time is a considerable easterly movement of Declination, the extreme being $+1^{\circ}$ 57' at 4^{h} 21^{m} ; at Makerstoun extra observations were also commenced at 4^{h} 35^{m} . Apparently in consequence of the easterly movement of the declinometer, since 4^{h} 0^{m} the readings were $+5' \cdot 0$ at 4^{h} 0^{m} , and $-4' \cdot 2$ at 4^{h} 35^{m} ; a maximum of the Horizontal Force + 0019 X appears at 4^{h} 42^{m} , but the disturbance was apparently not considered to call for more than occasional readings.

May $8^d \ 13^h$ to 19^h .—An unusual westerly range of Declination prevailed at Fort Simpson, but of no great extent, and without much change. Extra observations were taken at intervals at Makerstoun from 10^h to 20^h on this day, but present no particular features of correspondence or the reverse.

May 13^d, 18^h to 21^h.—Again a westerly range of Declination, attended, as in the last instance, with high value of the Horizontal Force and diminished Inclination. Extra observations were commenced at Makerstoun at 20^h for a small easterly extreme of Declination, but present no marked features.

May 22¹, 1^h to 4^h.-Extra observations were commenced simultaneously at Fort Simpson and at Hobarton. At the former we find an easterly range of Declination prevailing the whole time, extreme $+2^{\circ}$ 11' at 1^h 33^m, accompanied as usual with increased Inclination and a low value of the Horizontal Force, extreme - 0442 X at 1^h 43^m. At Hobarton the disturbances commences with a marked westerly range of Declination, the extreme -11' 9 at 1^h 5^m; the Horizontal Force is also below the mean until the observations ceased at 3^h, extreme - '0009 X at 1^h 32^m. At 5^h extra observations were began at Makerstoun; they were again resumed simultaneously at Fort Simpson and Hobarton at 12^h, and on this occasion, as well as on the 17th April, already described, nearly every stoatin appears to have experienced the disturbance. We find extra observations at Toronto from 13^h to 20^h, Philadelphia 10^h to 20^h, Makerstoun 9^h to 20^h, the Cape of Good Hope 17^h to 22^h, St. Helena 20^h to 0^h, and Hobarton 10^h to 0^h; nevertheless, this disturbance does not appear to have been among the most considerable in point of amount. Referring first to the Declination: the

observations commence at Philadelphia at 10^h with an unusual westerly range, extreme $+8'^{5}$ at 10^{h} 12^{m} ; the regular observation at 10^h 0^m at Fort Simpson shows no corresponding feature. We have again an easterly inflexion at Fort Simpson at 13^h 6^m, but the general range being westerly, it only reaches +3' 1 as referred to the mean, although a change of nearly 56' as referred to the preceding westerly extreme at 12^h 24^m; small as it is in amount it answers to an easterly extreme -9''9 at 13^h 7^m at Toronto, or -3''9 at 13^h 0^m at Philadelphia. Again, we have a westerly extreme -50' 1 at 13^{h} 33^{m} at Fort Simpson, and corresponding to it a westerly extreme +1''8 at $13^{h} 32^{m}$ at Toronto, or of +0' 8 at $13^{h} 24^{m}$ at Philadelphia. The easterly extreme of the day, +12' 4, occurs at Hobarton at 13^{h} 22^{m} . We have then another easterly extreme. $+10^{\prime}$ 4 at 14^{h} 52^{m} at Toronto, and +7''0 at $14^{h} 44^{m}$ at Philadelphia, to which there is no corresponding feature at Fort Simpson; then a westerly extreme at both those stations -0' 5 at $15^{\rm h}$ $52^{\rm m}$ at Toronto, to which a return toward mean values at Fort Simpson appears to answer, it gives -12' 5 at 16^h 0^m, being still to the westward. So far, therefore. this element has shown several movements apparently common to Fort Simpson and Toronto or Philadelphia, but at the northern station the readings have been chiefly westerly, or of the kind which marks the beginning of a disturbance. At 22^d 23^h we have the more active disturbance, marked by a range of about 2° to the eastward, the extreme is $+2^{\circ}$ 96' at 23^h 6^m; disturbance observations had been discontinued at all the stations, except St. Helena, before this hour, but the regular observations at Toronto and Philadelphia give no proof whatever that this shock, or a similar one at 23^d 2^h, extended to them.

Referring next to the Horizontal Force ; we find at Fort Simpson a high value prevailing about 12^h, extreme + '0285 X at 12^h 31^m; a similar feature is presented at Toronto and at Philadelphia. The regular reading at 12^h 2^m at Toronto gives + 0010 X, and at Philadelphia we have + 0012 X at 11^h 58^m, which is, however, somewhat less than a value observed an hour earlier. We have next. at the same stations, a minimum between 1^h and 2^h, the whole range being as yet high at Fort Simpson; the minimum in question is only - '0056 X at 13^h 7^m at Toronto, the lowest value is - '0030 at 13^h 42^m, and at Philadelphia - '0018 X at 13^h 18^m; the correspondence ceases with the minimum. At Fort Simpson the element returns very rapidly to its high value, and gives +0.0242 X⁻ at At Toronto and Philadelphia there is no corresponding 13^h 46^m. feature; it returns to its mean value gradually, not attaining a maximum until 15^h. We have next a maximum at Toronto between 16^h and 17^h, and again between 17^h and 18^h, to which there

are answering features at Fort Simpson; the lowest value at Toronto is -0040 at 18^{h} 17^{m} ; at this hour the values are very slightly below the mean at the northern station, where, on the other hand, we have a very great decrease of this element between 23^{h} and 0^{h} , which is indicated by the regular observations at Toronto. The lowest value at Fort Simpson is -0609 at 23^{h} 25^{m} .

The foregoing disturbance completes the list of actual coincidences of observation. In the following cases the observations, although not coincident, correspond so nearly in point of time as to make it probable that the disturbances observed were magnetically the same.

1843, October 25, 26.—Lake Athabasca, 25^d 19^h to 26^d 3^h; Makerstoun, 26^d 4^h to 11^h; Greenwich, 26^d 7^h to 12^h.

October 30, 31.—Lake Athabasca, 30^{1} 21^{h} to 31^{d} 4^{h} ; Makerstoun, 31^{d} 6^{h} to 10^{h} .

December 27.—Lake Athabasca, 27^d 18^h to 20^h; Makerstoun, 27^d 22^h to 23^h.

1844, January 8.—Lake Athabasca, $8^d 15^h$ to 16^h and 20^h to 22^h ; Makerstoun, $8^d 6^h$ to 13^h and 19^h to 21^h .

February 16.—Lake Athabasca, 16^d 21^h to 22^h; Makerstoun, 16^d 18^h to 19^h.

May 2.-Fort Simpson, 2^d 19^h to 24^h; Makerstoun, 2^d 11^h to 19^h.

Lastly, we have several instances in which magnetical disturbances were observed at other stations when they were not observed at Lake Athabasca or Fort Simpson, although the attention paid to the instruments was so close as to make it improbable that any considerable disturbance could escape notice. I select those only at which the observations were made at more than one other station, and a few of the more decided disturbances at single stations.

1843, December 8.—Extra observations for disturbance at Makerstoun 6^{h} to 10^{h} , at St. Petersburg 7^{h} to 10^{h} .

December 10.—Extra observations, Hobarton 5^{h} to 7^{h} , St. Petersburg 5^{h} to 8^{h} , Makerstoun 13^{h} to 14^{h} .

December 11.—Extra observations, Makerstoun 6^{h} to 12^{h} , also 18^{h} to 20^{h} , Greenwich 8^{h} to 9^{h} .

December 12.—Extra observations, Makerstoun 2^h to 11^h , St. Petersburg 3^h to 4^h , and 11^h to 12^h .

1844, January 2.-Extra observations, Makerstoun 7^h to 14^h, St. Petersburg 7^h to 9^h.

January 9.—A state of disturbance appears to have prevailed more or less all day at Makerstoun.

January 10.—The same remark applies, the station the same.

January 23. — Extra observations, Makerstoun 6^{h} to 8^{h} , Philadelphia 12^{h} to 24^{h} .

February 7.—Extra observations, 6^{h} to 7^{h} St. Petersburg, 6^{h} to 15^{h} Makerstoun, 9^{h} to 11^{h} Greenwich.

February 22.—Extra observations, 7^h to 9^h Makerstoun, faint Aurora being visible.

April 1.—A state of disturbance appears to have prevailed at Makerstoun more or less all day.

April 5.—Extra observations at Makerstoun 12^{h} to 19^{h} , at the Cape of Good Hope 13^{h} to 23^{h} . Aurora visible at the former station.

May 14.—Extra observations, 14^{h} to 17^{h} Makerstoun, 15^{h} to 17^{h} Toronto.

The following Table contains the value of the daily mean irregular fluctuation of both elements at Toronto and the northern stations, to which is added that of the Declination for the same days at Sitka, the whole calculated according to the method of Colonel Sabine (Observations on days of unusual Magnetical Disturbance, Part I. ix.), which is as follows:—The difference is first taken between the scale reading at each observation (reduced to an invariable temperature in the case of the Bifilar Magnetometer), and the mean of the month for the same hour; these differences are regarded as the effect of the irregular disturbing force at the time of observation, and are represented, by Colonel Sabine, by the symbol $\nabla \psi_n$, *n* being the number of the Göttingen hour of observation. The *fluctuation* of the element, due to the irregular action between two consecutive hourly observations, is $\nabla \psi_n - \psi_{n-1}$, which is expressed by $F\psi_n$, and the mean irregular fluctuation for a whole day will be $F\psi =$

 $\sqrt{\frac{1}{24}} \Sigma(F\psi_n)$, if the number of observation hours have been 24, as was the case in the present series. Similarly the mean irregular fluctuation for a month or longer period may be found, by dividing the sum of all the squares of $(F\psi)$ by the total number. The scale values employed to convert the mean fluctuation in scale divisions of the Bifilar into parts of the Horizontal Force, were the following: at Toronto k = 0001056, at Lake Athabasca k = 000341, and at Fort Simpson, from 15th April to 25th May 1844, k = 000283.

TABLE XLIX.

		Declinat	ion.	Hor	izontal orce.			Declina	ion.	Horizontal Force.		
Date.	Toronto.	Sitka.	Athabasca.	Toronto.	Atlıabasca.	Date.	Toronto:	Sitka.	Athabasca.	Toronto.	Athabasca.	
1843.						1843.			1		1.	
Oct. 1	- 1	1 -	1 -	-	-	Nov. 1	1.0	1 -	8.1	·0005	0048	
2	2.9	-	-	-,	-	5	2 2.8	-	11.1	•0006	•0049	
3	2.0	3.4	-	—'	-		3 1.2	-	2.0	·0003	·0070	
4	3.5	3.1	-	-	-	4	1.0	0.8	5.2	•0003	·	
5	1.2	3.1	-	-	-	1	5 -	1.3		-	-	
6	1.3	3.5	-	-	-	6	3 1.0	1.3	9,1	.0002	•0066	
7	1.6	1.3	-	-	-	. 7	1.1	1.8	4.1	.0003	.0024	
8	-	1.8	-	-	-	8	4.5	2.8	16.5	·0004	•0064	
9	1.0	1.6	-	-	1.1-	9	1.4	2.3	3.8	.0003	•0047	
10	0.9	2.1	-	-		10	0.8	1.6	3.4	.0005	·0034	
11	0.6	1.3	-	.0003	-	11	1.0	1.1	4.2	•0003	·0024	
. 12	2.5	2'4	-	.0003	-	12	-	1.1	-	-	-	
. 13	1.9	2.5	-	.0002	-	13		4.1	7.3	.0006	.0085	
14	2.0	1.9	-	.0007	-	14		1.8	5.8	.0002	.0021	
15	-	2.7	-	-	-	15	1	1.3	6.2	.0003	.0040	
16	3.2	6.2	38.0	.0008	•0130	16		2.1	8.0	.0002	·0026	
17	3.6	3.0	47.7	.0015	•0163	17	1.8	2.0	2.6	.0005	.0028	
18	2.3	2.3	15.3	.0006	•0052	18	1.5	1.5	2.2	.0003	.0015	
19	1.8	2.2	30.4	•0006	•0104	19	-	0.2	-	-	-	
20	0.9	1.4		.0003	-	20	1.4	1.8	5.4	·0003	.0030	
<u> </u>	0.2	0.8	11.0	.0002	•0037	21	0.2	1.1	2.7	.0003	'0015	
22	0.7	0.9		-	-	22	0.9	0.9	4.9	•0002	0024	
23 24	1.0	1.2	14.2	•0003	.0048	23	0.7	1.1	1.6	•0002	.0016	
, 25	1.1		17·7 19·5	•0004	.0060	24	1.3	1.4	7.0	•0003	0071	
. 26	3.8	4·8 4·3	24.1	·0003	.0066	25	0.6	2.5	3.0	·0001	.0015	
. 20	2.1	2.4	32.2	.0004	·0083 ·0111	26	0.7	2.3	0.0		.0010	
28	1.6	1.0	32 5 13·8	.0003	·0111	27 28	1.0	0.8	3.3	·0004	·0016	
, 20 29	_	1.8			0097	28 29	1.4	1.4	5.9	·0002	·0014 ·0045	
30	1.8	1.8	24.9	·0004		29 30	1.2	1.4	5·1 5·5	·0004		
31	2·4	2.0	19·9	•0004	·0068	30	1.2	1.9	0.0	•0003	0024	
Mean .	2.07	2.99	11.62	·00054	^{,00887}	Mean -	1.62	1.70	6.38	·00067	•00426	

Values of the daily mean Irregular Fluctuation of the Declination and Horizontal Force $F(\psi_n)$, from October 1843 to May 1844 inclusive.

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TABLE XLIX.—continued.

		Dec	clinatio	n.	Horizo For			De	clinatio	n.	Horizo For	ontal ce.
Date	».	Toronto.	Sitka.	Athabasca.	Toronto.	Athabasca.	Date.	Toronto.	Sitka.	Athabasca.	Toronto.	Athabasca.
1843	.		,				1844.					
Dec.	1	1.0	1.9	12'1	·0003	·0071	Jan. 1	0'8	2.1	- : [.0003	
	2	2.2	1.0	7.1	·0005	·0068	2	1.3	1.3	7.0	·0004	.0082
	8	-	1.2				3	0.6	0.9	4.0	·0002	*0017
<i></i>	4	0.6	0.8	2.8	·0002	•0017	4	3.9	4.8	16.4	:0008	0189
-	5	0.8	1.4	4.2	·0001	•0037	5	2.0	2.1	18.0	·0005	•0147
•	6	0.8	1.1	4 '5	·0004	•0039	6	1.4	3.1	10.0	0004	•0111
	7	1.9	0.8	2.0	·0002	·0015	7	-	3• 0 ·	-	. — ¹	
	8	1.7	2.4	16.5	·0005	·0047	8	2.0	2.2	5.9	·0005	•0034
••	9	2.1	1.6	5.0	•0008	·0034	9	1.3	1.7	7.2	·000 3	•0030
-	10	— ,	7•4	-	-		10	1'3	2.0	6.5	.0002	.0026
	11	2.3	8 2	5.2	•0006	·0032	11	1'4	1.3	5.3	:0004	.0034
• •	12	2.6	1.2	5.6	·0006	•0026	12	1.0	1.3	7.2	·0004	•0017
	13	1.8	1.5	3.8	·0004	•0030	13	0.2	1.2	2.2	.0003	.0020
	14	0.8	1.2	2.8	•0003	•0014	14	-	0.8	- '	-' '	
	15	0.9	1.0	3.2	·0003	·0015	15	0.8	1'4	4.4	·0002	•0019
	16	0.4	0.2	. 3.3	·0002	·0026	16	0.2	1.0	4'8	•0002	'0030
	17	-	0.2	-	-	-	17	0.8	0.9	4.2	·0003	·0027
	18	1.1	0.6	3.2	·0002	•0015	18	1.0	1.1	5.8	.0003	0028
•	19	1.2	1.8	10.0	·0002	•0051	19	1.0	3.1	5.2	·0002	•004/7
- •	2 0	0.2	1.1	6.3	·0002	.0018	20	0.6	1.0	3.2	•0002	·0027
••	21	0.4	1.9	4.1	•0002	·0016	21	-	1.4	-		-
	22 22	0.2	0.6	4.9	•0002	.0017	22	1.6	1.8	8.9	•0004	•0035
*	23	0.2	0.7	3.1	·0003	•0013	23	0.9	1.2	6.2	·0008	*0026
	24		0.9	-	-	-	24 07	2.0	1'8	15.6		·0071
-	25 26	0.9	1.0	4.9	.0003	·0063	25 26	2.3	3·8	23·3	·0005	·0055 ·0039
	20 27	2.1	4.0	6'7	·0003	.0087	20 27	1.0	1.2	4.0	.0003	.0039
'	21 28	1.8	2.5	19.0	·0004	•0068 ·	27		1.0	1 -	0005	0022
	20 29	0.8	1.2	6.0	·0004	.0071	20 29	0.8	1.4	5.4	.0002	.0031
	30	1.0	1.1	8.7	·0008	.0017	25 30	1.1	0.9	4.3	.0004	.0025
	81		1.5	-	-		30 81	1.3	1.9	8·1	.000	•0071
Mean		1.42	2.04	7.32	•00042	•00409	Mean -	1.48	2.00	9.29	•00041	•00635

TABLE XLIX.—continued.

	D	eclinzti	on.		zontal rce.	1		eclinati	on.	Hori: Fo	zontal rce.
Date.	Toronto.	Sitka.	Athabasca.	Toronto.	Athabasca.	Date.	Toronto.	Sitka.	Athabasca.	Toronto.	Athabasca. Fort Simpson.
1844.			1	1	,	1844.		1		1	· · ·
Feb. 1	2.5	3.2	13.5	·0006	·0078	Mar. 1	2.1	1.8	1 -	·0003	-
2	7.1	7.1	14.4	.0000	.0063	2	3.1	3.5	-	·0006	-
3	1.6	1.7	4.1	•0005	·0108	8	-	3.2	·	-	-
4	-	1.2	-	-	-	4	3.6	3.0	-	•0007	-
5	2.9	3.6	18.9	•0007	·0148	5	8.0	7.6	-	•0009	-
6	1.8	3.5	7.0	·0004	·0073	6	8:1	7.8	-	•0011	-
7	1.2	5.0	5.3	.0002	.0029	7	4.8	9.5	-	·0011	-
8	2.6	4.2	8.9	.0006	•0057	8	4.5	3.0	-	•0005	-
9	1.5	1.3	4.2	.0003	·0041	9	2.1	7.0	-	.0002	-
10	3.9	1.3	6.5	.0002	•0046	10	-	3.5	-	-	-
11	-	0.8	-		-	11	1.3	1.8	-	.0003	-
12	2.0	1.1	3.6	.0002	•0047	12	2.5	2.1	-	•0004	-
13	0.8	1.0	3.2	.0003	•0023	13	1.5	1.4	-	·0003	-
14	0.9	1.9	4.3	·0002	·0022	14	1.6	1.8	· -	·0003	-
15	1.1	1.9	4.8	.0003	•0017	15	1.3	1.3	-	·0003	-
16	1.1	1.4	7.3	.0003	•0031	16	2.5	1.2	-	•0003	ŀ -
17	1.5	1.0	7.8	·0004	•0017	17	-	1.2	-	-	-
18	-	0.2	-	-	-	18	2.1	3.2	-	·0004	-
19	0.9	1.0	2.2	·0003	·0018	19	2.8	4.0	-	.0002	-
20	1.1	0.9	3.5	.0003	·0016	20	2.1	1.2	-	·0003	-
21	1.0	2.4	5.2	.0003	·0040	21	1.6	2.7	-	•0003	-
22	1.1	2.1	6.1	.0003	•0019	22	1.3	1.4	-	•0003	-
23	0.8	1.5	4.9	.0002	•0017	23	0.9	1.2	-	·0004	-
24	1.3	1.0	7.8	.0003	•0017	24		1.4	-	-	-
25		1.1				25	1.3	1.2	-	.0003	-
26	1.3	0.9	5.0	·0004	.0073	26	1.3	1.4	-	·0002	-
27	1.1	1.0	4.9	.0002	·0010	27	2.2	3.2	-	•0007	-
28	-7.4	7.1	14.3	·0010	-	28	1.4	5.9	-	•0007	-
29	1.6	2.1	-	•0003	-	29	_	15.8	-	·0015	-
						80	6.6	5.4	-	•0016	-
						31	*****	5'6	-	-	
Mean •	2.62	2.80	7.20	•00049	•00570	Mean -	4.02	4.86		•00070	

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TABLE XLIX.-continued.

	Declination. Horizontal Force.			· 1	Declinat	ion.	Hor F	izontal orce.			
Date.	Toronto.	Sitka.	Fort Simpson.	Toronto.	Fort Simpson.	Date.	Toronto.	Sitka.	Fort Simpson.	Toronto.	Fort Simpson.
1844.	1		1	1		1844.		1	T	1	
April 1	4.9	6.1	17:4	·0009	-	May 1	1.8	8.4	11.9	·0007	·0064
2	2.4	3.3	24.5	·0009	-	2	2 1.7	2.9	10.9	·0006	•0069
3	8.4	4.8	31.0	·0007	-	8	1.2	2.2	12.2	·0005	•0148
4	2.4	1.7	12.1	•0005	-	4	1.3	0.8	5.2	·0002	•0035
5	-	3.8	-	-	-	5	-	2.4	-	-	
6	1.4	8.3	12.0	•0007	-	e	1.4	1.6	9.2	·0004	.0014
7	-	2.9	-	-	- [.]	7	4.6	1.8	14.2	·0008	.0082
8	2.0	1.1	10.1	·0003	-	8	8.1	1.2	9.4	•0005	.0049
. 9	1.0	1.3	8.0	·0003	-	9	1.0	1.5	8.2	.0003	.0063
10	1.7	4.7	21.3	·0006	-	10	1.8	1.3	17.2	·0005	·0059
11	1.7	1.8	6.0	·0004	-	11	1.5	1.1	8.1	.0003	·0021
12	1.0	1.0	4.8	.0003	-	12	-	1.4	<u>-</u>	-	-
13	0.8	1.2	9.7	•00.)3	-	<u>1</u> 3	2.3	1.8	6.8	·0004	.0042
14		2.0	-	-	-	14	5.3	1.8	7.3	.0008	·0048 ·
15	1.1	1.2	27.8	.0004	•0110	15	1.5	1.2	5.2	.0003	.0042
16	8.6	6.1	18.8	·0016	•0112	16	1.0	1.5	7.8	.0003	.0023
17	5.0	6.1	26.0	•0027	•0171	17	0.9	1.2	4.8	.0003	.0022
18	1.3	2.1	4.2	•0006	.0030	18	1.3	1.7	5.8	•0004	.0042
19	1.0	1.2	7.3	•0003	·0064	19	-	1.3	-	-	-
20	1.0	1.1	7.9	.0003	•0069	20	0.2	1.5	5.5	.0003	.0046
21	-	1.7	-		-	21	1.7	2.0	6.2	.0008	•0060
22	0.2	1.5	6.6	.0003	·0028	22	5.0	6.6	29.8	.0011	.0116
23	1.2	2.0	12.1	*0004	·0050	23	1.2	11.2	22.2	.0008	.0090
24	2.5	1.9	7.9	·0004	·0033	24	2.9	2.2	9.0	.0004	0063
25	2.8	6.5	28.3	•0009	•0129	25	1.2	1.4	-	•0006	-
26	4.5	4.4	27.9	•0012	•0193	26	-	1.6	-	-	-
27	3.8	4.8	21.1	•0008	•0104	27	1.8	1.9	~	.0002	-
28	_	1.3	-		—	28	1.1	1.5	-	.0003	-
29	1.3	2.5	26.6	•0007	·0072	29	1.4	1.2	-	•0004	-
30	2.6	5.6	24.8	•0007	•0128	30	1.0	0.9	-	.0003	-
						31	1.0	1.1	-	•0006	-
Mean •	2.99	3°45	16.45	•00088	-	Mean -	2.27	2.93	11.43	·00054	•00832

It appears by the foregoing Table that, with a few exceptions, the days of the larger mean irregular fluctuation of the Declination and Horizontal Force in each month coincide at all the stations, and that very low values, indicating a freedom from disturbance, are also generally the same; the exceptions may arise from an actual difference in the relative condition of the elements as regards this characteristic, but may also, in part, be caused by extreme movements concurring with the periods of regular observation at one station and not at another. It is due to this accidental circumstance that the mean fluctuation of both elements has a lower value on the 16th and 17th of April than on the 25th and 26th, although the amount of disturbance was considerably greater in reality on the former than on In the following Table a few instances of this the latter occasion. correspondence are selected, the number against each date being the relative place of that day among the other days of the same month at the same station, as regards the magnitude of the mean irregular fluctuation of the elements referred to.

TABLE L.

Extremes of each	instrument	during	Disturbances	at Lake	Athabasca
	and	Fort S	impson.		

	I	Relative place of each day.					Relative place of each day.					
Date.	De	clinati	on.	Hor. Force.		Date.	D	eclinati	ion.	Hor.	Force.	
•	Toronto.	Sitka.	Athabasca.	Toronto.	Athabasca.		Toronto.	Sitka.	Athabasea. Fort Simp.	Toronto.	Athabasca. Fort Simp.	
Oct. 16	3	1	8	2	2	Jan. 8	8	5	11	6	12	
17	2	8	; 4⊧	1	1	24	4	8	4	3	5	
25	10	2	' 2	11	8	25	2	2	1	6	7	
26	1	3	6	4	6	Feb. 1	6	6	4	5	3	
80	13	18	1	8	5	2	2	1	1	1	6	
Nov. 2	2	wants	2	4	6	5	4	5	3	2	1	
. 8	1	2	1	6	5	28	1	1 bis	2	1 bis	wanting.	
13	3	1	5	2	1	<u> </u>						
14	5	7	9	1	19	Apr. 16	1	2	11	2	7	
Dec. 1	12	4	8	13	1	17	2	2bis	6	1	2	
ິ 2	2	18	5	6	2	25	7	1	. 2	5	4	
12	1	9	9	4	14	26	4	9	8	8	1	
27	4	-•1	6	10	9	May 1	7	3	5	5	5	
28	7	3	1	5	3	14	1	10 -	13	8	12	
Jan. 4	1	1	8	1	1	22	2	2	1	2	2	
. 5	5 -	6	2.	2	2 .	23	18	1	2	1	8	

November 14, December 12, January 8, and May 14, are inserted to show that occasionally a high relative value of the mean irregular fluctuation of one or both elements prevailed at Toronto, with a low one at the northern station; but the general conclusion from this comparison must be, that such a state of things is exceptional, a state of disturbance being more commonly prevalent at the same time over the whole area embraced, which is not an inconsiderable fraction of It has already been shown that there is not in that of the globe. general a correspondence in detail in the movements during disturbances at Lake Athabasca or Fort Simpson and the other stations in America or Europe, although it sometimes exists to a limited The first of these stations is rather less distant, and the extent. latter rather more distant from Toronto, geographically, than Barnaoul in Siberia from St. Petersburg. On referring to the curves of magnetic term days given in the Annuaire Magnetique et Meteorologique. &c. for these two stations, it will be seen that distance has apparently less to do with this want of correspondence than difference of magnetical position, for while there are numerous and interesting examples of great movements at St. Petersburg, not shown in the curve for Barnaoul, or only to be identified in some minor inflexion by the aid of the curves given for intermediate stations, yet these cases appear to be rather the exceptions, and in general a correspondence is at once perceptible, notwithstanding the distance, which is about 1,750 geographical miles, and exists both in the character and the precise epoch of the greater movements. For the purpose of showing more fully that this is not the case in the stations we are here comparing, a selection has been made of all the observations at Toronto, Sitka, and the northern stations, which differ from the mean for the month by a quantity exceeding twice the amount of the mean irregular fluctuation of the element for the same month. The values of the latter quantity will be found in the preceding Table. The dates of these observations are given in the next Table, together with the amount of the difference in each case from the mean, both at the station at which such difference reaches the given limit or amounts to a shock, and at the remaining stations. To distinguish the latter or corresponding readings from the shocks, they are printed in Italics.

TABLE LI.

A List of Shochs of the Declination at Lake Athabasca, or Fort Simpson, Toronto, and Sitka, with the differences of the scale readings at all these Stations from their means respectively at each date. Differences which fall short of $2\sqrt{\frac{\sum}{n}\overline{F\psi^2}}$, and therefore

do not come up to the definition of a Shoch, are printed in Italics. A movement of the north end of the magnet to the east is marked with the + sign at all the stations, the contrary movement with the - sign.

* Observation wanting. S. Sunday, Good Friday, or Christmas Day at the station. d Disturbance observed.

	a Distandance onserveu.										
Gött.		Station.		Gött.		Station.					
Date.	Toronto.	Sitka.	Athabasca.	Date.	Toronto.	Sitka.	Athabasca,				
		TOBER.		d. h.	Oct	OBER.					
d. h.	4.9	2.5	,		5.2	3.4	1 11.7				
. 2 19	49 91	2032		$\begin{array}{c} 26 & 14 \\ 26 & 19 \end{array}$	-4.7	34 61	-29.8				
2 20	9'2	-7.9		26 19	-4.1	-0.2	1.3d				
2 21 2 23	-7.0	-25.6	11	20 20 26 22	-2.8	-10.2	1.6d				
2 23 3 0	-0.8	-25 0		20 22 27 0	0.1	-10 2	8·1d				
3 16	-2.2	6.4	_	27 1	-6.5	-12.0	19.8d				
3 18	-1.4	6.1	_	29 22	-4'2	-12 0	-1.8				
3 10 4 15	8.9	5.5	_	30 0	0.7	0.5	28.0				
5 0	1.7	8.1		30 17	4.2	-0.1	9.1				
5 1	2.7	7.3		31 14	8.6	1.2	1.7				
56	-4.8	-10.7		01 II		EMBER.					
59	-1.4	-6'9	_	14	3'2	#	-2.5				
5 15	4.6	-1.9		1 5	3·5	*	0.8				
· 6 18	-2.7	-9.0		2 17	6'6	*	-3.0d				
8 21	-4.1	-0.0	_	2 18	+1.7	*	-43'8d				
12 15	5.0	1.2		2 19	1.7	*	-36.6d				
12 23	-4.5	0.1		2 20	58	*	-11.2d				
13 0	-1.9	9'4		3 0	-4.0	*	-2.7d				
13 22	-4.3	-2.4		5 21	0.6	· 3.7	-11.5				
14 11	-4'2	-0.4		5 22	0.9	6.1	-0.7d				
14 14	1.4	- 5'9		5 23	2.4	7.9	14'3d				
16 0	-11'5	-5.7	63°0 d	6 0	1·9	8.7	43'3d				
16 10	-4'5	-3'3	-1.3	6 1	0.4	6'4	#				
16 20	+0.1	26'1	0.1	62	0.4	4.3	22.1				
16 21	-1.5	26'0	5.9	69	0.2	5 •6	-0.6				
16 22	-6'0	16'3	3.0	7 1	-0.9	3•4	18'3				
16 23	1.5	10.2	3.7	72	0.9	5•3	-10.2				
17 2	-11.0	-6'9	-12.71	7 3	0.5	4•4	-2.8				
17 3	-3'4	-7.7	-12.8d	74	1.7	3.7	-1.1				
174	-4'1	-3'9	- 18.8	75	-4'1	1.0	2.8				
17 18	-3.2	5.9	35°6 d	77	-3.6	-3.6	-12.2				
17 20	-5'5	-1.3	-17.6d	89	-0.6	3.5	-2.7				
18 16	9'3	+3.0	-3.6	8 1	-0.4	4.6	-5.7				
19 16	-0.0	-6.0	4.4	8 3	0.5	4.2	2.3				
19 17	-6.8	12.1	-20.9	84	-0.3	4'9	1.7				
19 18	-2.1	7.5	-30.7 d	85	-1.5	5.1	0.8				
24 1	-0:9	8'4	5.3d	8 15	15.1	3.2	8.9				
25 19	-0.7	12.1	62°0 <i>d</i>	8 17	0.3	4.2	-1.0				
26 0	-7.6	-0.3	-8.6d		-3.1	11.1	56°6 d				
26 3	4'2	-0.8	-3.3d		-0.7	8.4	5'6				
26 5	-0.3	-6.4	-5'3	8 21	1.6	5.2	4.3				
26 10	-4.2	-3.0	1.3	8 22	1.1	6'9	11.0				

Gött.		Station.		Gött.		Station.	
Date.	Toronto.	Sitka.	Athabasca.	Date.	Toronto.	Sitka.	Athabasca.
J L	Nov	EMBER.		d. h.	Nove	MBER,	
d. h. 8 23)	6.7	12.5	14'3d	13 4	-4.8	-9'3	1 17.50
9 0	2.7	8'1	1•3 d	13 5	-4.6	1.9	-5.0d
94	1.1	S* 5	-0.9	13 6	-4.5	0.6	-8.1d
95 96	0·0 1·7	3°8 4°7	2.8 -0.1	13 9 13 14	-3.3 7.1	-4'7 1'2	0.1
96 97	0.1	5.7	4.3	13 15	4.1	1.3	-2.1
98	0.0	5*3	4.4	13 21	-0.1	-0.7	-13.1 d
99	0.2	6.1	2.6 3.0	13 22 13 23	+0.8 -0.8	-5'0 -8'6	$\begin{array}{c c} -2 \cdot 2d \\ -2 \cdot 7d \end{array}$
910 911	+0.6	5°2 5°6	2.5	13 23 14 11	-4.2	-5.0	$-\frac{2}{-3.0}$
9 12	-0.2	5.4	5.5	14 12	-0.8	-6'1	-4.2
9 13	-0.6	. 5.5	5.1	14 13	-0.4	-3'8	0.4
9 14	+0.0	5.6	1.2	14 15	-0.4	-4'8	-2.1 -2.1
9 15 9 16	-1·1 +2·6	7°3 4°1	3.5	$15 12 \\ 15 14$	-0.8 3.9	-3'8 -1'7	3.2
9 17	-0.6	S .6	3.0	16 10	-1.1	- 3'5	-5.0
9 22	-1.7	-7.3	+5.8d	16 17	3.4	0.6	-1.8
9 23	0·1 0·8	-5.0 -3.9	1.5d -0.1d	16 18 17 13	2·9 0·2	4'4 -4'0	21·2d 1·2
10 0 10 6	0.1	-39	+1.9	17 15	4.4	-9.2	1.9
10 7	-0.2	6.3	-1.3	17 18	-1·0	-4.4	-2.8
10 8	-0.1	5.1	2.4	17 20	0.1	-5.0	1.8
10 9 10 10	-0.1 -0.2	4°3 4°8	3.7	$17 \ 21$ 18 6	0.0	-3.8 -3.8	0.3 - 3.1
10 10	+0.1	4.8	0.7	18 8	2.0	-5.2	-6.6
10 12	-0.4	4.0	-1.8	18 9	-0.4	-5'0	-5.8
10 13	-1.1	4.5	-2.4	18 10	-0.5	-4'3	-2.4
10 14 10 21	-1.3	3°9 7°6	-0.8 8.1d	195 196	S. S.	$-4^{\cdot}4$ -5'0	S. S.
10 21	0.1	7.0	2.0d	19 7	S.	-4'4	s.
10 23	1.3	7.2	0.3	20 0	-0.8	-4.1	-2.3
11 0	-0.6	5.3	-3.7 -3.7	20 1 20 21	0.4 -3.8	-3.8 +2.9	-0.6
$\begin{array}{ccc}11&1\\11&2\end{array}$	0.2 0.6	4 3 3 5	-6.2	20 21 21 0	-3.8	+29	-0.7
11 3	0.2	3.2	-3.6	22 2	-2.2	- 3.2	14.1
11 4	-0.2	4.1	-1.1	22 3	-1.7	-3.1	14.8
$\begin{array}{ccc} 11 & 5 \\ 11 & 6 \end{array}$	-0.6	3'9 4'0	+1.6	$\begin{array}{ccc} 22 & 18 \\ 23 & 4 \end{array}$	-1.8	-3.9 -4.4	-4.8
11 12	-1.5	5'8	+1.8	24 1	-3.2	1.5	14°3d
11 13	-0.9	4.2	-0.2	24 2	-1.7	2.5	13.8 d
11 14	-0.3	4'8	-6.8	24 4	-2.6 -0.4	+4.4	9'5 17'4
11 15 11 16	-1.1 -0.1	4·4 3·4	-2.1 + 3.6	24 19 26 5	-04 S.	1.7	S,
11 17	-0.8	4.2	-3.0	26 6	S.	-11.4	S.
11 18	S.	3 .2	-2.8	27 4	3.2	-0.8	-0.2
11 19	S. S.	4'3 5'2	-2.6 S.	$ \begin{array}{ccc} 27 & 5 \\ 28 & 5 \end{array} $	3·5 3·0	+0.2 -3.8	2.0
$ \begin{array}{ccc} 11 & 23 \\ 12 & 2 \end{array} $	s. S.	3.6	S.	20 3	0.4	-4.8	-3.7
12 3	S.	4.4	S.	29 2	-1.1	-4.4	-0.4
12 4	S.	4.3	S.	29 4	-0.4	-4.0	-6.5
12 5 12 6	S. S.	4'1 4'3	S. S.	29 14 30 0	0.8	-5.0 -4.3	$-13^{\circ}2$ -4.7
12 0	-1.3	-4.8	S.	30 3	-0.8	-4.0	-6.0
12 20	0.0	-4'0	S.	30 4	1.1	-4'0	-8.5
12 21	0.1	-4·2 -4·9	-51 2.6	30 <i>5</i>	2.7	-3.2	-5.0
13 2 13 3	1.7 2.9	-4.9	14.8	30 9 30 18	-0.4 -0.9	-3.4	-3.6
0	. ~ /					· · · ·	,

TABLE LI.-continued.

Gött.		Station.	-	Gött.	e'	Station.	. Y
Date.	Toronto.	Sitka.	Athabasca.	Date.	Toronto.	Sitka.	Athabasca.
		EMBER.	ξ.	4 6	Dec	EMBER.	,
d. h. 1.20 1.21 1.22 2.1 2.2 2.2 2.2 2.2 2	$ \begin{array}{c} 3^{\circ}3\\3^{\circ}6\\3^{\circ}0\\6^{\circ}1\\4^{\circ}8\\-2^{\circ}8\\-2^{\circ}8\\-2^{\circ}8\\-4^{\circ}5\\+0^{\circ}7\\-4^{\circ}5\\5\\-1^{\circ}7\\-5\\5\\3^{\circ}1\\-0^{\circ}2\\-1^{\circ}7\\3^{\circ}5\\-1^{\circ}0\\4^{\circ}5\end{array} $	$\begin{array}{c} & 2 & 4 \\ & 2 & 8 \\ & -3 & 8 \\ & -0 & 4 \\ & 2 & 1 \\ & 1 & 7 \\ & -1 & 1 & 1 \\ & -0 & 7 \\ & -6 & 5 \\ & -5 & 5 \\ & -4 & 9 \\ & 0 & 7 \\ & -5 & 9 \\ & -4 & 4 \\ & -6 & 6 \\ & -13 & 9 \\ & -10 & 6 \\ & -10 & 9 \\ & -10 & 6 \\ \end{array}$	$ \begin{array}{c} -8'.9 \\ -28'.74 \\ 20'.14 \\ -73'.04 \\ 17'.34 \\ 20'.84 \\ 20'.84 \\ 20'.8 \\ -27'.4 \\ -7'.4$	d. h. 27 3 27 6 27 7 27 8 27 22 27 28 28 0 28 1 28 2 28 3 29 8 29 8 29 20 31 9 31 10 2 2 4 12 4 16	2'8 -3'3 +6'3 -2'4 -4'4 -4'4 -4'7 -4'2 -4'2 -5 -5'1 S.	$-0^{2}2$ $-2\cdot8$ $-2\cdot8$ $0\cdot3$ $20\cdot0$ $16\cdot4$ $14\cdot8$ $12\cdot6$ $11\cdot6$ $1\cdot4$ $4\cdot2$ $2\cdot2$ $4\cdot5$ $4\cdot2$ NUARY. $2\cdot4$ $-4\cdot3$ $-2\cdot7$	$\begin{vmatrix} -5.6 \\ -3.7 \\ -10.5 \\ 3.7 \\ -2.7 \\ -0.8 \\ -3.6 \\ 0.3 \\ -22.4 \\ 52.6 \\ -4.3 \\ 17.4 \\ S. \\ S. \\ \end{vmatrix}$
	0°3 2°4 4°2 S. S. S	$ \begin{array}{c} 1455\\ -4158\\ -9416\\ -9416\\ -9416\\ -9416\\ -9416\\ -9416\\ -9416\\ -9416\\ -9416\\ -9416\\ -9416\\ -9416\\ -9616\\ -9$	- 10.7 - 10.7 - 42.05 - 5.5 - 7.85 - 7.85	$\begin{array}{c} 4 & 17 \\ 4 & 19 \\ 4 & 20 \\ 4 & 21 \\ 4 & 22 \\ 4 & 23 \\ 5 & 1 \\ 5 & 10 \\ 5 & 10 \\ 5 & 23 \\ 6 & 20 \\ 7 & 6 \\ 7 & 19 \\ 8 & 1 \\ 5 & 23 \\ 6 & 20 \\ 7 & 6 \\ 7 & 19 \\ 8 & 3 \\ 8 & 4 \\ 8 & 5 \\ 6 & 8 \\ 7 \\ 8 & 8 \\ 8 \\ 8 \\ 9 \\ 20 \\ 10 \\ 10 \\ 2 \\ 10 \\ 5 \\ 10 \\ 9 \end{array}$	14 8 9 - 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	$-\frac{1}{16} + \frac{1}{5} + $	$\begin{array}{c} 3 & 5 & 3 & d \\ 1 & 5 & 3 & 2 & d \\ - & 4 & 1 & 8 & 5 & 3 & d \\ 1 & 9 & 5 & 5 & d & d \\ - & 4 & 1 & 8 & 5 & 3 & 2 & 0 & 0 \\ 0 & 0 & 2 & 2 & 2 & 1 & 1 & 0 & 2 \\ - & 1 & 9 & 5 & 2 & 0 & 1 & 0 & 0 \\ - & 3 & 2 & 2 & 2 & 1 & 1 & 0 & 2 \\ - & 1 & 9 & 2 & 2 & 0 & 0 & 0 & 0 \\ - & 3 & 2 & 2 & 1 & 1 & 0 & 0 & 0 \\ - & 3 & 3 & 5 & 3 & 2 & 0 & 1 & 0 & 0 \\ - & 3 & 4 & 0 & 2 & 3 & 5 & 0 & 0 & 0 & 0 & 0 \\ - & 4 & 0 & 3 & 8 & 0 & 0 & 0 & 0 & 0 & 0 \\ - & 4 & 0 & 3 & 8 & 0 & 0 & 0 & 0 & 0 & 0 \\ - & 0 & 3 & 8 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ - & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 &$

TABLE LI.—continued.

Gött.		Station.		Gött.		Station.	
Date.	Toronto.	Sitka.	Athabasca	Date.	Toronto.	Sitka.	Athabasca.
d. h. 11 4 12 5 12 6 12 7 12 8 12 9 12 14 13 5 13 6 13 7 13 8 13 9 13 15 13 6 13 7 13 8 13 15 13 20 14 7 14 8 14 9 14 20 14 22 14 22 14 22 15 10 15 11 15 2 15 10 15 11 15 2 15 10 15 11 15 2 15 10 15 1 15 2 15 2 15 2 15 2 15 10 15 1 15 2 15 2 22 3 22 4 22 5 22 2 24 22 25 2 25 2 2	$ \begin{array}{c} J_{A} \\ & 9 \\ -1 \\ -2 \\ 2 \\ 3 \\ -1 \\ -2 \\ 2 \\ 3 \\ -1 \\ -2 \\ 2 \\ 3 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 $	NUARY. + 1° 4 5 3° 6 5° 2 4 3° 4 4 4° 5 6 5° 2 4 3° 4 4 4° 5 5 3° 7 4 4° 4 5 5° 7 4 4° 9 5 5° 7 4 4° 9 5 5° 7 4 4° 7 5 5° 7 4 4° 7 4 5° 5 6 4° 7 4 5° 5 6 4° 7 4 5° 5 6 4° 7 4 5° 5 6 6° 2 7 1 1° 5 6 6° 3 7 - 4° 0 - 4° 0 - 4° 0 - 4° 4 - 4° 0 - 4° 0	$\begin{array}{c} & & & & & & & & & & & & & & & & & & &$	d. h. 27 19 28 3 20 4 28 5 29 11 29 5 29 8 29 9 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 29 217 31 8 19 31 10 31 20 31 22 31 23 1 17 1 18 31 19 31 20 31 22 31 23 1 1 1 2 1 3 1 4 1 5 1 9 1 10 1 9 1 10 1 9 1 10 1 9 1 10 1 29 2 7 2 12 2 13 2 17 2 18 2 27 2 18 2 27 2 18 2 27 2 18 2 27 5 5 7 5 8 5 9 4 5 7 7 20 5 7 7 22 7 23 8 0	JA2 S. S. S. S. S. S. S. S. S. S. S. S. S.	$\begin{array}{c} \text{JUARY.} & -4\cdot3 \\ -7\cdot3 \\ -4\cdot9 \\ -7\cdot3 \\ -4\cdot9 \\ -7\cdot3 \\ -7\cdot6 \\ -5\cdot3 \\ -7\cdot6 \\ -5\cdot8 \\ -7\cdot3 \\ -6\cdot1 \\ -7\cdot3 \\ -6\cdot7 \\ 21\cdot0 \\ 2\cdot7 \\ -5\cdot9 \\ -6\cdot5 \\ -5\cdot7 \\ -2\cdot8 \\ -6\cdot4 \\ 10\cdot5 \\ -8\cdot4 \\ -6\cdot9 \\ -2\cdot8 \\ -6\cdot9 \\ -2\cdot8 \\ -6\cdot9 \\ -2\cdot8 \\ -6\cdot9 \\ -2\cdot9 \\ 10\cdot3 \\ 18\cdot2 \\ \end{array}$	$\begin{array}{c} -7.8 \\ S. \\ $

TABLE LI. - continued.

Gött.		Station.		Gött.		Station.	
Date.	Toronto.	Sitka.	Athabasca.	Date.	Toronto.	Sitka.	Athabasca Fort Simps.*
	FEBI	RUARY.	<u>. </u>	d.h.	M	ARCH.	
d. h. 8 2	5.5	-7'3	16.6	8 14	10'2	6.1	<u>'</u>
8 3	0.1	-9.2	4.5	8 19	-1.9	11.2	
84	-0.4	-9.5 -6.2	16'3 16'0 <i>d</i>	820 821	$-1.4 \\ -0.4$	12.6 14.1	_
85 922	-8.3 0.1	-6'2	1.2	8 22	-3.0	12.8	
10 12	11.2	-2.3	-1.1	8 23	-0.8	11.9	- 1
11 20	0.4 -2.3	-1.7 -1.3	28.7 17.4	9 0 9 1	0.6 0.1	11.2	
$\begin{array}{ccc} 11 & 21 \\ 15 & 5 \end{array}$	$-2^{1}3$ -1.1	-6.0	-0.6	917	3.2	17.5	_
16 7	1.7	0.0	15.2	10 22	-1.0	10.0	
18 20	0.1	-1.2 6.9	15.4 12.8	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3.7 10.0	24·1 5·1	
21 20 21 21	1°4 1°4	6.0	1.2	29 12	31.0	-12.5	*
22 0	1.3	. 6.5	-4.7	29 15	8.4	- 6°3	-
23 5	0.9	1.7	-17.6 1.4	$\begin{array}{c} 29 & 16 \\ 29 & 17 \end{array}$. 11°0 2°9	0'6 13'7	
26 2 26 3	2·4 2·4	6'3 5'7	12.5	29 17 29 18	-25.9	- 15 7	_
28 7	2.4	6.1	16.9	29 19	20.2	-7.9	
28 8	-1.7 -1.9	-17.1 1.2	7.8 -15.3	29 20 29 21	13.3 -104	-1.9 -2:2	
28 9 28 11	-7.9 -9.4	-13.1	-10.0	29 21 29 22	-104 9'4	-2.2 -3.7	
28 16	25.1	-2.2	-4'4	29 23	13'1	-1.5	-
28 17	3.2	-7.8	-20.2 -21.8	30 0 30 7	- 10°0 3°4	-10.0	
28 22 29 17	-1.0 0.7	4.6	25.6	30 15	8.2	6.3	
		MARCH.		3 3 18	- S .	11.4	-
0.10	s.	-12.6		$ \begin{array}{c} 31 & 18 \\ 31 & 23 \end{array} $	5.0 0.8	18·4 9·7	-
2 19 2 20	s. S.	-12.0	-	01 20		PRIL.	
2 21	S.	-10.9	-	1 .		-9.3	1 36.2
2 22 2 23	S. S.	-13.3 -12.7		1 0 1 4	-1.9 -1.7	-95	-11.1
2 23 3 0	s. S.	-12.2		16	-1.5	-7.2	10.4
3 1	S.	- 10.2	-	1 15	13.4	1.8	-3.8 -14.7
4 18 5 16	-4.1 3.3	9°9 10°0		$\begin{array}{rrr}1&20\\2&6\end{array}$	1·0 0·4	14.0 -6.9	8.7
5 17	5.2	22.7	-	2 16	6.9	-1.7	-5.7
5 23	-8.8	4.7	-	$ \begin{array}{c} 2 & 20 \\ 2 & 23 \end{array} $	1·1 -2·2	7°5 4°5	17.5 90.1 d
6.0 62	-10.4 -5.8	10°0 26°2		2 23 3 16	10.0	8.1	13 8
6 3	-7.1	13.3	-	3 22	-4.7	9.2	4.7
64	-8.7	7.6	-	4 0 4 16	-2.0 01	$4^{\cdot}4$ -7^{1}	35·4 -0·6
$\begin{array}{c} 6 & 17 \\ 6 & 18 \end{array}$	3·7 6·4	18.2		5 15	S.	-10.6	s.
6 19	9.2	19.3	-	5 16	S.	-14.2	S.
6 20	1.6	18.1	-	517 518	S. -5 [.] 6	-8.1 -13.2	S. S.
$\begin{array}{c} 6 & 22 \\ 6 & 23 \end{array}$	-0.4 -0.3	10.6		5 18	1.1	-10.2	s.
7 0	-0.0	9.9	-	520	1.7	- 8 [.] 5	S.
78	-3.3	11.6 0.0		$\begin{array}{c} 6 & 15 \\ 6 & 23 \end{array}$	1·1 S.	-69 -7.6	$-15^{\circ}3$ S.
7 11 7 15	'8'1 13'3	-1.6	=	8 7	2.1	1.0	-42.0
7 16	13.6	10.2	-	923	2.7	0.4	42.3d
7 18	-4.8 2.3	18°4 10°9		10 1 10 3	2.0 -0.7	-8'3 -14'2	+ 23 8 d + 11 7
721 810		1.8		10 21	1.4	-0.4	45°3 d
		•	•	-			

TABLE LI.—continued.

Gött.		Station.		Gött.		Station.	
Date.	Toronto.	Sitka.	Fort Simpson.	Date.	Toronio.	Sitka.	Fort Simpson.
d. h. 15 1 15 2 16 14 16 16 16 16 16 17 16 18 16 20 16 21 16 22 16 23 17 0 17 1 17 2 17 3 17 4 17 5	An 0.0 3.3 2.9 2.4 -1.0 3.0 8.4 10.0 23.3 31.0 23.3 51.0 23.7 -13.55 -11.7 -25.2 -15.4 -1.5.0	Sitka. 7:5 0:3 -7:4 -9:5 -7:2 -8:4 -2:3 -10:9 4:2 16:1 29:1 42:1 25:1 32:8 18:8 8:4 10:3 2:3		d. h. 1 18 1 23 2 0 2 1 2 2 2 18 3 2 3 3 4 7 16 7 18 7 19 7 23 8 13 8 16 10 16 13 18		Sitka. MAX. 7.6 -11.0 -10.7 -9.2 -8.9 6.9 -6.0 -6.6 -12.6 1.7 -2.8 -1.1 6.2 6.5 1.6 -0.2 8.6 -3.6	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} -5 \cdot 5 \cdot 8 \cdot 4 \cdot 5 \cdot 9 \cdot 2 \cdot 4 \cdot 9 \cdot 9 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 7 \cdot 3 \cdot 5 \cdot 4 \cdot 3 \cdot 1 \cdot 1 \cdot 4 \cdot 8 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 7 \cdot 3 \cdot 5 \cdot 4 \cdot 3 \cdot 1 \cdot 1 \cdot 1 \cdot 4 \cdot 8 \cdot 7 \cdot 0 \cdot 4 \cdot 9 \cdot 9 \cdot 3 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 7 \cdot 3 \cdot 5 \cdot 4 \cdot 3 \cdot 1 \cdot 1 \cdot 1 \cdot 4 \cdot 8 \cdot 7 \cdot 0 \cdot 4 \cdot 9 \cdot 9 \cdot 3 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 7 \cdot 3 \cdot 5 \cdot 4 \cdot 3 \cdot 1 \cdot 1 \cdot 1 \cdot 4 \cdot 8 \cdot 7 \cdot 0 \cdot 4 \cdot 9 \cdot 9 \cdot 3 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 7 \cdot 3 \cdot 5 \cdot 4 \cdot 3 \cdot 1 \cdot 1 \cdot 1 \cdot 4 \cdot 8 \cdot 7 \cdot 0 \cdot 4 \cdot 9 \cdot 9 \cdot 3 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 7 \cdot 3 \cdot 5 \cdot 4 \cdot 3 \cdot 1 \cdot 1 \cdot 1 \cdot 4 \cdot 8 \cdot 7 \cdot 0 \cdot 4 \cdot 9 \cdot 9 \cdot 3 \cdot 5 \cdot 7 \cdot 3 \cdot 5 \cdot 4 \cdot 3 \cdot 1 \cdot 1 \cdot 4 \cdot 5	$\begin{array}{c} -2^{\circ}8\\ -6^{\circ}0\\ -9^{\circ}2\\ -13^{\circ}2\\ -13^{\circ}2\\ -10^{\circ}9\\ -7^{\circ}3\\ -11^{\circ}3\\ -11^{\circ}3\\ -24^{\circ}6\\ 7^{\circ}7\\ -0^{\circ}2\\ 24^{\circ}6\\ 7^{\circ}7\\ -0^{\circ}2\\ 4^{\circ}5\\ -0^{\circ}6\\ 11^{\circ}7\\ 5^{\circ}0\\ 3^{\circ}5\\ 4^{\circ}9\\ 18^{\circ}2\\ 10^{\circ}1\\ 6^{\circ}7\\ 9^{\circ}1\\ 16^{\circ}7\\ 9^{\circ}0\\ 10^{\circ}3\end{array}$	$\begin{array}{c} 55 \cdot 9d \\ 55 \cdot 9d \\ + 60 \cdot 3d \\ - 8 \cdot 2 \\ 0 \cdot 6 \\ - 31 \cdot 7 \\ - 47 \cdot 1 \\ - 47 \cdot 5 \\ 3 \\ 116 \cdot 3 \\ 27 \cdot 5 \\ 22 \cdot 9d \\ 49 \\ 93 \\ 116 \cdot 3 \\ 27 \cdot 5 \\ 22 \cdot 9d \\ 49 \\ 93 \\ 116 \cdot 3 \\ 27 \cdot 5 \\ 22 \cdot 9d \\ 49 \\ 93 \\ 5 \cdot 4 \\ 8 \cdot 7 \\ 32 \cdot 9 \\ 33 \\ 7 \\ 4 \cdot 9d \\ 95 \cdot 5 \\ 4 \\ 26 \cdot 3d \\ - 5 \cdot 5 \\ - 42 \cdot 9 \\ 16 \cdot 6d \\ 65 \cdot 1d \end{array}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 5 \cdot 2 \\ 21 \cdot 8 \\ 3 \cdot 3 \\ -0 \cdot 9 \\ 3 \cdot 5 \\ -6 \cdot 8 \\ -6 \cdot 8 \\ -6 \cdot 8 \\ -5 \\ -6 \cdot 8 \\ -7 \\ -3 \\ -7 \\ -3 \\ -2 \\ 2 \cdot 3 \\ -2 \\ -7 \\ -3 \\ -7 \\ -5 \\ -8 \\ -7 \\ -5 \\ -7 \\ -5 \\ -8 \\ -7 \\ -5 \\ -7 \\ -8 \\ -7 \\ -5 \\ -7 \\ -5 \\ -8 \\ -5 \\ -6 \\ -7 \\ -1 \\ -5 \\ -8 \\ -5 \\ -6 \\ -7 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5$	$\begin{array}{c} -6 \cdot 9 \\ -3 \cdot 7 \\ 2 \cdot 8 \\ 7 \cdot 9 \\ 7 \cdot 9 \\ 7 \cdot 2 \\ 4 \cdot 6 \\ -8 \cdot 1 \\ -8 \cdot 4 \\ -6 \cdot 5 \\ -6 \cdot 1 \\ 12 \cdot 8 \\ 0 \cdot 3 \\ -8 \cdot 2 \\ -10 \cdot 6 \\ -22 \cdot 4 \\ -47 \cdot 1 \\ -61 \cdot 1 \\ -17 \cdot 3 \\ -39 \cdot 1 \\ 2 \cdot 8 \\ -4 \cdot 4 \\ -5 \cdot 8	$\begin{array}{c} -7.7 \\ -7.8 \\ -7$

TABLE LL.—continued.

It will be seen by the foregoing Table that instances in which the Declination is simultaneously affected, to the extent which is defined as a shock, at Lake Athabasca or Fort Simpson, and Toronto, are comparatively rare; still more so those in which it is so affected at the

same observation at Sitka also. Of the latter class we find but eleven instances in a list embracing 623 dates of observation, of which number 473 were common to the three stations. It is to be observed, however, as a defect of this mode of comparison, that the number of shocks is generally least where the prevalence of disturbance is greatest, for this circumstance occasions a high value of the mean irregular fluctuation, and the proportion of instances in which the deviation exceeds double that amount is not equally augmented ; thus the number of so-called shocks is much greater at Sitka than at Lake Athabasca or Fort Simpson, the value of the mean irregular fluctuation being so low at the former station that a temporary prevalence of easterly or westerly ranges without sensible disturbance, and due probably to a different cause than the movements we are particularly investigating, is sufficient to bring nearly all the readings of certain days into the list; of this we have several examples in November and The proportion of shocks to the whole number of observa-January. tions is 1 in 34 '4 at the two northern stations taken together, 1 in 26 '6 at Toronto, and 1 in 13 3 at Sitka. Referring again to the individual stations, it appears that out of a total number of 83 shocks at Lake Athabasca, 36 coincided with shocks at Sitka; out of 31 shocks at Fort Simpson, 14 coincided with shocks at Sitka; these numbers are in the proportion of 43 and 45 per cent. respectively, whereas the number of dates coincident with shocks at Toronto are only 17 in the former and 7 in the latter number, being in the proportion of 20 and 22 per cent. This difference in the degree of correspondence is further to be seen, on paying regard to the signs of the differences of the coincidences in date at Toronto and the northern stations, 16 have the contrary and 8 the same sign; of those at Sitka and the same stations, 14 have the contrary and 36 the same sign. The evidences of agreement in the movements at Toronto and at Sitka are somewhat greater, but not materially so, than those we have found at the latter station and the temporary ones. In an aggregate of 187 shocks at Toronto, only 61 are coincident with shocks at Sitka, being 32 per cent., and of this number those with like and unlike signs are nearly balanced, the numbers being 29 and 32 respectively. The limit assigned to shocks being arbitrary, we may consider the above list without reference to it, and solely as a selection of simultaneous deviations of the Declination Magnet, from its normal value at the three stations, under circumstances of apparent disturbance at one or more of them. Thus compared, it appears that the magnet was similarly affected, or deviated from its normal position for the same hour, in the same direction at all three stations, in 138 out of 473 instances, or 27 per cent. of the whole; the proportion is the same if we have regard to the sign of the absolute Declination, which

is easterly at the three northern stations, westerly at Toronto, and is not greater for movements under one sign than under the other, whether referred to absolute or relative value. The absolute Declination appears to have been increased or decreased simultaneously at all three stations in 140 instances out of the same number. The proportion of instances in which the movements were similar at any two of the stations was as follows:—

Toronto and Sitka, 288 out of 555 selected observations, or 52 per cent.

Toronto and Lake Athabasca, 217 out of 372 selected observations, or 58 per cent.

Toronto and Fort Simpson, 42 out of 109 selected observations, or 38 per cent.

Sitka and Lake Athabasca, 231 out of 370 selected observations, or 62 per cent.

Sitka and Fort Simpson, 75 out of 110 selected observations, or 68 per cent.

As the observations here selected as most favourable for this comparison form somewhat less than one eighth of the whole number at Toronto, and about the same at Athabasca and Fort Simpson, the inference must be that under ordinary circumstances the deviations of the Declination Magnet from its mean position for the hour of observation, at stations so distant as those compared, are not referable to any common cause, and that where apparent resemblance exists, it is entirely casual.

In extending this mode of comparison to the changes of Horizontal Force, it was found that in consequence of the low value of the mean irregular fluctuation of the element at Toronto during the months examined, the proportion of readings which differed from their mean by double that quantity was too large to furnish a real criterion of the state of disturbance prevailing.

The numbers were as follows :-

In October 1843, number of observations 432, shocks -77-🔆 "In November 1843, 🖞 624. 211,, " ,, In December 1843. 600, 181 ,, . 99 وو In January 1844, 647, 293 ~,, **"** •• In February 1844, (` · 600. 200 وو`` 99 In March 1844. . 624. 135 وو ` •• • • In April 1844, -600. · 98 ,, " · In May 1844. 646. 152وو وو ÷., ,,

To render the view complete, however, as regards the northern stations, a list of the shocks of the Horizontal Force at Lake Athabasca and Fort Simpson is subjoined. The differences are taken in the same manner as those given in disturbances, that is to say, each

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observation is first referred to the normal mean for that day, and the difference corrected for the mean diurnal change proper to the hour. The latter step has not been taken for the observations of April and May.

TABLE LII.

A List of Shochs of the Horizontal Force at Lake Athabasca and Fort Simpson, with the difference on each occasion from the mean for the hour, expressed in parts of the Horizontal Force, and the corresponding differences of Inclination; to which are added the differences of the former element from its mean, at Toronto and Sitha, at the same hours. The scale readings at Sitha have been reduced to the temperature of the mean of the month by means of the co-efficient $\frac{q}{h} = 7.0$, as stated in the "Annuaire Magnetique," §c. 1843, a value which makes q = 00038 in the English notation.

			Stat	tion.			Station.						
G	ött.	Lake Athabasca.				Gött.	Lake At	habasca.					
Da	ate.	Hor. Force.	Inclin.	Sitka.	Toronto.	Date.	Hor. Force.	Inclin.	Sitka.	Toronto.			
			Остове	R.		October.							
d. 15	h. 21	+ • 0151	4.4	0010	0008	d. h. 27 1*	0550	24.9	0055	- 0016			
15	23	0454	+29.8	- 0015	0013 -	30 22	0204	+14.7	+.0002	0010			
16	0*	- • • 0491	+30.6	0012	0014	. 30 23		+20.8	+.0008	0007			
17	1	- • 0364	+17.2	0020	0008	NOVEMBER.							
17	2*	- • 0463	+26.2	0031	0082	1 22	+.0122	+1.2	0002	0001			
17	20*	0361	+19.7	+.0008	0003	2 18*	0120	+1.8	+.0002	- 0015			
18	17	0206	+20.3	0008	0009	2 19*	- • 0129	+5.9	0024	-;0012			
19	22	0365	+20.3	.0000	0002	2 20*	0217	+11.4	0009	0019			
24	1*	0237	+10.5	+.0008	0008	2 21	0105	+11.8	0008	0011			
25	19*	0231	+9.2	0008	0006	2 22	- • 0139	+6.0	0009	0010			
25	20	0242	+12.3	0008	0004	2 23	- 0392	+22.0	.0009	0010			
25	21	0171	+6.6	0008	0002	3 0*	- 0345	+16.6	0015	0008			
26	0*	0374	+22.2	+.0015	0014	5 23*	- *0097	+9.5	0001	0017			
28	20*	- 0286	+6.0	+.0005	0005	6 0*	- 0218	+13.4	0005	0011			
-26	21	0191	6-2	0021	•0000	64	+.0115	1.5	+.0004	0011			
26	22*	0204	+7.4	0010	0005	65	+.0089	+1.2	+.0002	- '0015'			
27	0*	0265	+13.2	0002	0004	66	0083	-0.1	+.0008	001			

* A shock of the Declination at the same hour at one of the stations.

TABLE LII.—continued.

			Sta	tion.		Ι		Station.				
Ģ	iött.	Lake At	habasca.			G	lött.	Lake A	habasca.		1	
I	Date.	Hor. Force.	Inclin.	Sitka. Toronto.		Ι)ate.	Hor. Force.	Inclin.	Sitka.	Toronto.	
-			NOVEMBE	R.					DECEMBE	: R.		
d. 6	h. -9*	+.0082	-0-2	+.0018	0008	d. 28	h. 8*	0188	+9.2	0007	+.0100	
6	11	+.0083	-0-3	•0000	+.0003	28	4	·0100	-5.0	0007	+.0002	
8	22*	0148	+10.4	0011	0003	28	5	0102	-4.6	0008	0001	
8	23*	0257	+14.2	0021	-*0005	29	22	0277	+15.2	0008	+ 0005	
9	-1	+.0030	+5.8	•0000	0001			1	-	1	1 *	
9	22	- 0176	+10.2	+.0002	0005		•		JANUARY			
10	21*	0146	+6.9	+.0003	+.0010	4	16*	+.0195	-10.8	0008	0005	
10	22*	0074	+2.3	0016	+ .0008	4	17*	+.0173	-9.0	0013	.0000	
13	4*	- 0333	+21.4	+.0004	0033	4	18	+.0141	-6.0	0011		
13	·5*	0120	+6.5	0023	0022	4	19*	+ 0237	-12.2	0002	0014	
13	20	0083	+8.7	0012	0011	4	20*	+.0101	-4.6	0002	+.0012	
15	3	0083	+4.8	0002	0013	4	21*	- 0300	+26.7	0013	+.0013	
24	-1*	0240	+15.1	+.0002	+ .0014	4	23*	- 0585	+4.0	0010	+.0001	
29	1*	0088	+4.6	+.0002	·0000	5	1*	0221	+10.1	0016	+.0008	
			Į	I j	5	23*	- 0626	+29.9	- 0022	0004		
			DECEMBE			6	0*	- 0354	+20.3	0022	0001	
1	21*	- •0155	+8.3	+.0009	•0000	6	20*	-••0198	-1.6	0003	8.	
1	23*	- 0239	+3.4	0004	+.0001	24	17	0196	+18.3	+.0050	- '0025	
2	1*	0107	+6.3	0013	-'0001	24	20*	- 0246	+28.8	+.0005	0018	
2	2*	- 0279	+16.9	- 0028	0011	24	21*	- 0232	+23.1	+.0003	0055	
2	3*	- 0370	+20.2	0019	•0000	24	22*	- • 0191	+17.3	.0010	0008	
2	4*	0158	+4.8	0015	•0010	24	23*	- 0258	+24.1	- 0036	0002	
5	22	- '0239	12.4	•0000	- • 0007	25	0*	0218	+19.2	- • 0001	0011	
5	23	0128	+8.0	+.0001	- '0005	25	1*	0304	+29.0	-'0024	0008	
6	0	0093	+3.6	+.0003	0002	25	2*	0183	+15.8	+.0008	0006	
6	ľ	- '0128 .	+6.8	+.0002	0008			F	EBRUARY	•		
6	17	.0102	-3.2	0013	0011	1	0	- • 0260	+14.7	0021	0016	
6	18	+.0150	-4.8	0013	+.0003	1	1*	0450	+24.6	0018	0012	
8	10*	+.0124	-6.8	0017	0018	1	2*	0177	+7.6	0018	0013	
8	18*	0087	+2.3	- 0002	- • • • • • • • • • • • • • • • • • • •	1	19*	+.0132	-13.1	- 0024	• 0004	
10	21	0112	+4.1	•0000	+.0005	2	6*	- • 0255	+13.1	0061	- 0028	
19	22*	0145	+10.6	+ . 6002	+•0002	2	19	÷ •0189	+8.1	- • 0032	+.0013	
19	23*	0181	+11.7	+.0013	+*0004	2	20	+.0202	-5'5	- '0027	-:0604	
26	22*	0186	+12.1	+.0012	0009	2	21	+•0125	-2.4	0031	0011	
26	23*	- • 0271	+17:2	+.0002	+.0010	5	0*	- • 0497	+47.9	-·0003 `		
27	0	0113	+6.0	+.0001	+.0011	5	1	0208	+ 14.2	0)02	- 0012	
27	19	+.0088	-3.3	- • 0007	+.0006	5	4	- • 0114	-5.2	0015	- 0015	

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							tinuea.					
			Sta	tion.	,	1		Station.				
Gött. Date.			thabasca. impson.	}		Gött	. Fort S	impson.		1		
		Hor. Force.	Inclin.	Sitka.	Toronto.	•Date	Hor. Force.	Inclin.		Toronto.		
_		·····	FEBRUAR	Y.	<u> </u>	İ	<u> </u>	APRII	4			
d. 5	h. 16	+ .0149	-8'0	0013	0004	d. h. 19 23	- • 0278	1	+.0019	- 0006		
5	17*	+ .0223	-11.3	0019	+.0002	25 2	* - • 0455	+35.3	0023	+.0009		
5	18	+ .0152	-61	0010	+.0002	25 3	*0467	+44.3	+.0068	+.0020		
5	21	0392	+31.5	0019	0014	26 0	* - • 0638	+59.4	+ 0027	0022		
5	22	0178	+15.6	0023	0008	26 1	1	+35.4	+.0023	0023		
8	0,	0213	+14.2	-•3015	0009	26 4	• -•0185	+22.1	0013	0011		
8	5*	-: 0235	+12.1	0017	- 0028	26 5	0367	+26.4	- 0024	+.0015		
26	23	- 0216	+10.5	0003	+ 0018	26 18	• -•0144	+13.4	+ 0021	.0000		
			APRIL.			26 19	*0185	+12.9	+.0019	0010		
2	23*	04	+40.1	0067	0011	27 0	1	+20.4	+*0002	0008		
3	4	0166	+27.1	0029	0022	27 20	• - • 0229	+15.9	+.0008	8.		
3	5	0352	+23.0	0031	0024	29 1	0176	+14.3	+ .0006	+.0005		
6	17	+.0163	-7.1	0013	- 0024	29 ·2	• - • 0312	+29.3	0001	0002		
9	23*	0166	+15.2	0009	0002	29 3	+0209	+19.7	0002	+.0006		
10	21*	0435	+17.1	0003	+.0004	29 4	* -·0198	+15.8	0007	+ .0004		
15	1*	0380	+29.9	0006	+.0010	30 0	0308	+22.7	+ .0024	0005		
15	2*	0361	29.7	0005	+.0014	30 1	0221	+13.7	+ .0026	0002		
16	14*	+.0286	-20.2	+.0006	0009	30 14	0212	+14.2	+ .0037	0001		
16	15*	+ 0346	-25.5	0003	0012	30 15	+.0208	+14.1	+.0008	+ .0006		
16	16*	+ 0253	-16.2	0009	- 0004	30 21	· -·0468	+38.6	0019	+.0007		
16	18*	- 0173	+9.1	+.0047	0019	30 22	• - 0377	+29.1	+.0009	+ .0002		
16	21*	0332	+24.2	0067	0063	30 23	0175	+13.2	0040	+.0003		
16 .	22*	0329	+20.4	+.0021	·0000			MAY.				
16	23*	- 0188	+17.1	0038	- 0018	3 4'	- 0607	+49.2	+.0008	0019		
17	0*	- 0272	+21.1	0297	- • 0119	7 22*	- 0257	+20.8	0010	+.0081		
17	1*	0889	+86.6	0215	0136	93	0243	+26.8	0005	0006		
17	2*	0444	+38.9	0145	- 0074	94	0274	+24.7	+.0002	0001		
17	3*	0367	+33.3	- • 0238	0068	13 18	+ 0188	-16.7	+ .0005	0017		
17	4*	0292	+28.6	- '0256	- • 0049	22 1*	0319	+31.0	·0000	0004		
17	5*,	0415	+34.2	0082	- • 0027	22 2*	- 0369	+33.7	+.0002	+.0008		
17.	6*	0328	+23.9	- '0043	0008	22 14*	+ 0231	-18.9	+ 0002	0032		
17	10*	+ 0162	+13.0	0001	+.0017	22 23*		+36·3	+.0013	0022		
	11*	+ 0187	,+15.1	+ 0004	+ 0011	23 0*		+33.2	+.0050	- 0014		
	12*	+ .0222	+15.8	+.0033	.0000	23 1*		+22.5	+.0032	- 0015		
	13*	+.0252	+19.0	+ .0025	+ 0007	24 2*		+24.1	0008	+.0001		

TABLE LII.—continued.

§ The values at Fort Simpson in April and May are referred to the da'ly and not the hourly mean.

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It does not appear by the foregoing Table that the great and sudden changes to which the Inclination at Lake Athabasca and Fort Simpson was liable, extended in general even to Sitka, the nearest station. These changes were always accompanied by a proportionate change of the horizontal component, and, being generally positive, occasioned those great reductions of the last-named element which are contained in the list of shocks, and form the most conspicuous feature of almost every disturbance. We find that in 105out of the 170 observations here given, the value of the element had opposite signs at one or more of the stations at the same hour; of these, 74 are observations at Sitka. Of the instances in which the element appears to have been similarly affected. April 16th and 17th are the most decided, and the great reduction appears to have occurred earlier at Sitka on this occasion than at Fort Simpson. There are 106 of these dates at which the deviation of the Declination. from its mean, at one or more of the stations, amounted to a shock, and 64 at which the Horizontal Force alone exhibits the effect.

TERM DAYS AND MAGNETIC DISTURBANCES.

3

. Introduction.-The regular magnetical Term Days were observed at Lake Athabasca and Fort Simpson, and, in addition, extra observations were taken whenever the irregularity of the scale readings seemed to call for it, as well as upon some occasions when, from the presence of aurora or from some other cause, it was deemed advisable to commence them in anticipation of magnetic disturbance. During October, and for the first half of November 1843, the customary intervals of five minutes were adhered to; the Declinometer was read at 0^m, 5^m, 10^m, &c. Gött. time, the Bifilar at 2^m, 7^m, 12^m, &c., and the Inclinometer at 3^m, 8^m, 13^m, &c., after the hour; the great rapidity of the changes led afterwards to a general practice of reading the instruments one after the other in recurring succession, with an interval of only one minute between them; thus each element was observed every third minute. Upon Term Days, and a few other occasions, the five minute intervals were retained. The minute entered is, in every case, that of the Declinometer reading.

In computing the simultaneous variations of the three elements of Declination, Inclination, and Total Force, which are given for each observation, as well as those of the horizontal component, the mean diurnal curves given by the whole period of observation were employed, in preference to those of the individual months, for eliminating the regular changes, the latter curves being more or less irregular from the effects of disturbances. These curves correspond

in epoch to the middle of the period, or about the 23d December; but since the scale readings of each of the instruments show some progressive change, and those of the Bifilar and Inclinometer a considerable one; the numerical values of the hourly means, by these curves, are not correct for the observations at the beginning or end of the series, and are only correct approximately near the middle of it. In order, then, to deduce true differences, each day of extra observation has been taken as the centre of a group of five, six, or seven days, according to circumstances, and the means of all the readings of that group taken as the simultaneous or co-ordinate means of the three elements for the disturbance observations on the day in question. The difference between each scale reading and the mean thus found, for the same element is the whole deviation of the element from its normal value; to this being applied, with the contrary sign, the value of the ordinate of the mean curve for the same hour and minute, the sum is the measure of the irregular fluctuation shown by the observation, which, in the case of the Bifilar and Inclinometer, is expressed in terms of the Horizontal Force and Inclination, by means of the co-efficients given in preceding sections, and stated at the foot of each page. The scale divisions of the Declinometer, being minutes of arc. need no conversion.

The actual mode of proceeding was this; a table was formed for each element and for each month, containing twelve columns and twenty-four lines; in the first column were written the hourly means by the whole number of observations \pm the difference between their mean and the mean scale reading for the month; in the succeeding columns the hourly means were repeated + a proportional part of the change of the element from one hour to the next. By taking the difference between the actual readings and the appropriate mean thus found, we have the variation of the element from its normal value, affected by whatever difference there may be between the mean for the month and the true mean for the day of observation. which was sometimes considerable, owing to the progressive changes of scale reading before alluded to. To climinate this effect a constant correction was next applied to all the readings at each disturbance, being the difference between the mean of the month and the normal mean found as above related.

It must be remarked that the curves, which we have taken as types from 110 days of observation, are still sensibly affected by the irregular observations contained in that period, and consequently can be regarded only as approximations to that character; the degree to which they are affected may perhaps be judged of in some measure by comparing them with the curves given by 46 days selected as free from sensible disturbance, and is shown by the following Table:

TERM DAYS AND MAGNETIC DISTURBANCES.

TABLE LIII.

[Difference (x, -x) between the hourly ordinates (x) given by the whole period of observation at Lake Athabasca, and the ordinates (x), given by the curves of 46 days selected as free from disturbance.]

Beletieu as IIt	c mom un	Star Canoci						
Gött. time -	0	1	2.	8	4	5	6	7
Mean time •	16	17	18	19	20	21.	22	23
Whole period - Selected days -	, 5:83 3:15	, 8·23 3·81	, 5·84 3·55	, 5·56 3·81	, 8.00 8.60	, 3·70 3·64	, 1.83 2.85	-2·98 -1·11
x,-x	-2.68	-4.42	-2.59	-1·75	-0.30	-0.15	+1.02	+1.87
Whole period - Selected days -	•00522 •00117			•00083 •00091		- ·00019 - ·00082	- · 00042 - · 00131	- · 00019 - · 00124
	+•00405	+ .00312	-+ ·00084	+.00008	00056	00063	00089	• 00105
Whole poriod - Selected days -	+3·29 0·77	, +2.08 , 0.54	+0.97 0.25	, 0.06 , 0.05	-0.41 , -0.04	-0.29 -0.06	+0.63	, +0.02 0.67
x'',-x''	-2.252	-1.24	-0.2	+0.11	+0.32	+0.53	+0.62	+0.65
Gött. time -	8	9	10	11	12	13	14	15
Mcan time •	Noon	1	2	3	4	5	6	7
Whole period Selected days -	-3·93 -3·08	-4·89 -4·55	, -5·21 -3·95	, -4·19 -3·32	, -3·23 -2·37	-2.88 -1.86	, -1.80 -1.46	, -1·32 -0·88
. <i>x</i> ,- <i>x</i>	-0.82	, +0'34	, +1·26	, +0.87	+0.80	+1.02	+0.34	+0.44
Whole period • Selected days •	+ • 00039	+ • 00049	+ • 00165	+ • 00202 + • 00067	+ • 00218 + • 00122	+ • 00254 + • 00116	+ •00252 + •00123	+ ·00242 + ·00091
x,'-x'	+ .00056	+.00109	00130	00135	00090	00138	00129	- • 00151
	1				1	1	1	1
Whole period Selected days -	-0.05 0.29	, -0·30 , 0·30	, -0.46 , 0.10	-0.80 -0.33	-0.98 -0.55	-1·27 -0·63	/ -1·41 -0·84	-1·44 -0·61
	Gött, time - Mean time - Whole period - Selected days - x, -x Whole period - Selected days - x', -x' Whole period - Selected days - x'', -x'' Gött, time - Mean time - Mean time - Selected days - x'', -x'' Gött, time - Mean time - Selected days - x', -x''	Mean time 16 Whole period 5:83 Selected days 3:15 $x, -x$ -2:68 Whole period - Selected days - Selected days - $x', -x'$ +:00405 Whole period + $x', -x'$ +:00405 Whole period + $x'', -x''$ -2:52 Gött. time 8 Mcan time Noon Whole period - $x, -x$ -0:85 Whole period + $x, -x$ -0:85 Whole period +:00039 Selected days -:0:095	Gött, time 0 1 Mean time 16 17 Whole period 5:83 8:23 Selected days 3:15 3:81 $x, -x$ -2:68 -4:42 Whole period -00522 -00424 Selected days -00117 -00112 $x', -x'$ +:00405 +:00312 Whole period +3:29 +2:08 Selected days 0'77 0'54 $x'', -x''$ -2:52 -1:54 Gött. time 8 9 Mean time Noon 1 \begin{cases} Whole period -3:93 -4:89 Selected days -3:08 -4:55 $.x', -x'$ -0:85 +0:34 Whole period -3:93 -4:55 $.x', -x'$ -0:85 +0:34 Whole period +:00039 +:00049 Selected days -:00095 -:00060	Gött, time 0 1 2. Mean time 16 17 18 Whole period 5:83 8:23 5:84 Selected days 3:15 3:81 3:55 $x, -x$ -2:68 -4:42 -2:29 Whole period -00522 -00424 -00183 Selected days -'00117 -'00112 -'0099 $x', -x'$ +'0405 +'00312 +'00084 Whole period +'3:29 +'2'08 +'0'97 Selected days 0'77 0'54 0'25 $x'', -x''$ -2'52 -1'54 -0'72 Gött. time 8 9 10 Mcan time Noon 1 2 Whole period -'3'93 -4'89 -'5'21 .2', -0'85 +0'34 +1'26 Whole period +'0039 +'0049 +'00165 .2', -0'85 +0'34 +1'26 Whole period +'00039 +'00499 +'00165 .2', -0'85 -0'34 +1'26 <td>Gött, time 0 1 2 3 Mean time 16 17 18 19 Whole period 5:83 8:23 5:84 5:50 Selected days 3:15 3:81 3:55 3:61 $x, -x$ -2:68 -4:42 -2:29 -1:75 Whole period -00522 -00424 -00163 -00083 Selected days -00117 -00112 -00099 -00091 $x', -x'$ +00405 +00312 +00084 +00008 Whole period +3:29 +2:08 +0'97 -0'06 Selected days 0'77 0'54 0'25 0'05 $x'', -x''$ -2:52 -1'54 -0'72 +0'11 Gött. time 8 9 10 11 Mcan time Noon 1 2 3 $x', -x'$ -0'85 -1'3:4 -1'26 -1'19 Selected days -3'08 -4'89 -5'21 -4'19 Selected days -0'85 +0'34 +1'26 +0'87 <t< td=""><td>Gött, time 0 1 2. 3 4 Mean time 16 17 18 19 20 Whole poriod 5:83 8'23 5'84 5'56 3'00 Selected days 3'15 3'61 3'55 3'81 3'00 $x, -x$ -2'68 -4'42 -2'20 -1'75 -0'30 Whole period -00522 -00424 -'00183 -'00083 -'00010 Selected days -'0017 -'00112 -'00099 -'00091 -'00066 $x', -x'$ +'0405 +'00312 +'00934 +'00003 -'00056 Whole poriod +'3'29 +'2'08 +0'97 -0'06 -0'41 Selected days 0'77 0'54 0'25 0'05 -0'04 $x'', -x''$ -2'52 -1'54 -0'72 +0'11 +0'37 Gött. time 8 9 10 11 12 Mean time Noon 1 2 3 4 Whole period -'3'93 -4'*89 -5'-21 -4'19</td><td>Gött, time 0 1 2. 3 4 5 Mean time 10 17 18 19 20 21. Whole poriod 5:83 8:23 5:54 5:56 3:00 3:70 Selected days 3:15 3:61 3:55 3:61 3:60 3:64 $x, -x$ $-2:68$ $-4:42$ $-2:29$ $-1:75$ $-0:30$ $-0:12$ Whole poriod $-0:0522$ $-:00424$ $-:00183$ $-:00093$ $-:00010$ $-:00019$ Selected days $-:00117$ $-:00122$ $-:000991$ $-:00066$ $-:00092$ $x', -x'$ $+:00405$ $+:00312$ $+:00094$ $-:00095$ $-:00096$ $-:00063$ Whole poriod $+:3:29$ $+:2:08$ $+:0'97$ $-:0'06$ $-:0'41$ $-:0'29$ $-:0'06$ Selected days $0'77$ $0:54$ $0:25$ $0:05$ $-:0:04$ $-:0'28$ $x'', -x''$ $-2:52$ $-1:54$ $-0:72$ $+0:11$ $+0:37$ $+0:23$ Gött. time 8 9</td><td>Gött, time 0 1 2. 3 4 5 6 Mean time 16 17 18 19 20 21. 22 Whole poriod 5:83 8:23 $5:84$ $5:56$ $3:00$ $3:76$ $1:33$ Selected days 3:15 3:61 $3:55$ $3:61$ $3:60$ $3:76$ $1:33$ Whole poriod $-2:68$ $-4:42$ $-2:20$ $-1:75$ $-0:30$ $-0:12$ $+1:02$ Whole poriod $-0:0522$ $-0:0424$ $-0:0183$ $-0:00083$ $-0:0006$ $-0:0042$ Selected days $-0:0117$ $-0:0112$ $-0:0099$ $-0:0008$ $-0:0066$ $-0:0063$ $-0:0082$ Whole poriod $+3:20$ $+2:08$ $+0:07$ $-0:06$ $-0:41$ $-0:29$ $+0:033$ Selected days $0:77$ $0:54$ $0:25$ $0:05$ $-0:044$ $-0:29$ $+0:033$ Whole poriod $+3:29$ $+2:08$ $+0:72$ $+0:11$ $+0:37$ $+0:23$ $+0:05$ Gött. time 8</td></t<></td>	Gött, time 0 1 2 3 Mean time 16 17 18 19 Whole period 5:83 8:23 5:84 5:50 Selected days 3:15 3:81 3:55 3:61 $x, -x$ -2:68 -4:42 -2:29 -1:75 Whole period -00522 -00424 -00163 -00083 Selected days -00117 -00112 -00099 -00091 $x', -x'$ +00405 +00312 +00084 +00008 Whole period +3:29 +2:08 +0'97 -0'06 Selected days 0'77 0'54 0'25 0'05 $x'', -x''$ -2:52 -1'54 -0'72 +0'11 Gött. time 8 9 10 11 Mcan time Noon 1 2 3 $x', -x'$ -0'85 -1'3:4 -1'26 -1'19 Selected days -3'08 -4'89 -5'21 -4'19 Selected days -0'85 +0'34 +1'26 +0'87 <t< td=""><td>Gött, time 0 1 2. 3 4 Mean time 16 17 18 19 20 Whole poriod 5:83 8'23 5'84 5'56 3'00 Selected days 3'15 3'61 3'55 3'81 3'00 $x, -x$ -2'68 -4'42 -2'20 -1'75 -0'30 Whole period -00522 -00424 -'00183 -'00083 -'00010 Selected days -'0017 -'00112 -'00099 -'00091 -'00066 $x', -x'$ +'0405 +'00312 +'00934 +'00003 -'00056 Whole poriod +'3'29 +'2'08 +0'97 -0'06 -0'41 Selected days 0'77 0'54 0'25 0'05 -0'04 $x'', -x''$ -2'52 -1'54 -0'72 +0'11 +0'37 Gött. time 8 9 10 11 12 Mean time Noon 1 2 3 4 Whole period -'3'93 -4'*89 -5'-21 -4'19</td><td>Gött, time 0 1 2. 3 4 5 Mean time 10 17 18 19 20 21. Whole poriod 5:83 8:23 5:54 5:56 3:00 3:70 Selected days 3:15 3:61 3:55 3:61 3:60 3:64 $x, -x$ $-2:68$ $-4:42$ $-2:29$ $-1:75$ $-0:30$ $-0:12$ Whole poriod $-0:0522$ $-:00424$ $-:00183$ $-:00093$ $-:00010$ $-:00019$ Selected days $-:00117$ $-:00122$ $-:000991$ $-:00066$ $-:00092$ $x', -x'$ $+:00405$ $+:00312$ $+:00094$ $-:00095$ $-:00096$ $-:00063$ Whole poriod $+:3:29$ $+:2:08$ $+:0'97$ $-:0'06$ $-:0'41$ $-:0'29$ $-:0'06$ Selected days $0'77$ $0:54$ $0:25$ $0:05$ $-:0:04$ $-:0'28$ $x'', -x''$ $-2:52$ $-1:54$ $-0:72$ $+0:11$ $+0:37$ $+0:23$ Gött. time 8 9</td><td>Gött, time 0 1 2. 3 4 5 6 Mean time 16 17 18 19 20 21. 22 Whole poriod 5:83 8:23 $5:84$ $5:56$ $3:00$ $3:76$ $1:33$ Selected days 3:15 3:61 $3:55$ $3:61$ $3:60$ $3:76$ $1:33$ Whole poriod $-2:68$ $-4:42$ $-2:20$ $-1:75$ $-0:30$ $-0:12$ $+1:02$ Whole poriod $-0:0522$ $-0:0424$ $-0:0183$ $-0:00083$ $-0:0006$ $-0:0042$ Selected days $-0:0117$ $-0:0112$ $-0:0099$ $-0:0008$ $-0:0066$ $-0:0063$ $-0:0082$ Whole poriod $+3:20$ $+2:08$ $+0:07$ $-0:06$ $-0:41$ $-0:29$ $+0:033$ Selected days $0:77$ $0:54$ $0:25$ $0:05$ $-0:044$ $-0:29$ $+0:033$ Whole poriod $+3:29$ $+2:08$ $+0:72$ $+0:11$ $+0:37$ $+0:23$ $+0:05$ Gött. time 8</td></t<>	Gött, time 0 1 2. 3 4 Mean time 16 17 18 19 20 Whole poriod 5:83 8'23 5'84 5'56 3'00 Selected days 3'15 3'61 3'55 3'81 3'00 $x, -x$ -2'68 -4'42 -2'20 -1'75 -0'30 Whole period -00522 -00424 -'00183 -'00083 -'00010 Selected days -'0017 -'00112 -'00099 -'00091 -'00066 $x', -x'$ +'0405 +'00312 +'00934 +'00003 -'00056 Whole poriod +'3'29 +'2'08 +0'97 -0'06 -0'41 Selected days 0'77 0'54 0'25 0'05 -0'04 $x'', -x''$ -2'52 -1'54 -0'72 +0'11 +0'37 Gött. time 8 9 10 11 12 Mean time Noon 1 2 3 4 Whole period -'3'93 -4'*89 -5'-21 -4'19	Gött, time 0 1 2. 3 4 5 Mean time 10 17 18 19 20 21. Whole poriod 5:83 8:23 5:54 5:56 3:00 3:70 Selected days 3:15 3:61 3:55 3:61 3:60 3:64 $x, -x$ $-2:68$ $-4:42$ $-2:29$ $-1:75$ $-0:30$ $-0:12$ Whole poriod $-0:0522$ $-:00424$ $-:00183$ $-:00093$ $-:00010$ $-:00019$ Selected days $-:00117$ $-:00122$ $-:000991$ $-:00066$ $-:00092$ $x', -x'$ $+:00405$ $+:00312$ $+:00094$ $-:00095$ $-:00096$ $-:00063$ Whole poriod $+:3:29$ $+:2:08$ $+:0'97$ $-:0'06$ $-:0'41$ $-:0'29$ $-:0'06$ Selected days $0'77$ $0:54$ $0:25$ $0:05$ $-:0:04$ $-:0'28$ $x'', -x''$ $-2:52$ $-1:54$ $-0:72$ $+0:11$ $+0:37$ $+0:23$ Gött. time 8 9	Gött, time 0 1 2. 3 4 5 6 Mean time 16 17 18 19 20 21. 22 Whole poriod 5:83 8:23 $5:84$ $5:56$ $3:00$ $3:76$ $1:33$ Selected days 3:15 3:61 $3:55$ $3:61$ $3:60$ $3:76$ $1:33$ Whole poriod $-2:68$ $-4:42$ $-2:20$ $-1:75$ $-0:30$ $-0:12$ $+1:02$ Whole poriod $-0:0522$ $-0:0424$ $-0:0183$ $-0:00083$ $-0:0006$ $-0:0042$ Selected days $-0:0117$ $-0:0112$ $-0:0099$ $-0:0008$ $-0:0066$ $-0:0063$ $-0:0082$ Whole poriod $+3:20$ $+2:08$ $+0:07$ $-0:06$ $-0:41$ $-0:29$ $+0:033$ Selected days $0:77$ $0:54$ $0:25$ $0:05$ $-0:044$ $-0:29$ $+0:033$ Whole poriod $+3:29$ $+2:08$ $+0:72$ $+0:11$ $+0:37$ $+0:23$ $+0:05$ Gött. time 8

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, .	Gött. time -	16	17	18	19	20	21	22	28
	Mean time -	8	-9 -	• 10	11	12	13	14	15 -
Declination.	Whole period - Selected days -	-1·18 -0·83	-0.92 -0.78	-0.53 +0.49	-0.03 +0.12	+1.86 -0.91	+1.54	, -0.90 -0.39	+1.61 +1.16
Decl	<i>a,-a</i>	+0.35	+0.14	+0.25	+0.18	-2.77	-1.62	-1.29	-0.45
Bifilar.	Whole period - Selected days -	+•00243 +•00102	+•00219 +• 00 106	+ •00276 + • 0 0176	∓.•00228 +•00197	∔•00022 +•00121	- · 00206 - · 00038	-·00850 -·00116	- • 00513 - • 00137
н ,		-:00141	-:00118	- • 00100	- • 00029 .	+ .00148	+.00168	+ 00234	+ 00376
Inclinometer.	Whole period - Selected days -	-1·47 -0·65	-1·51 -0·95	-1.69 -0.89	-1.35	+0.06	+1.60	+2·23 +0·57	+3.86
Inclu	x;"-x"	+0.82	+0.26	+0.80	+0.89	-0.24	-1.24	-1.65	-2.40

TABLE LIII. - continued.

The differences of the Declination are in some instances referable to the mean for the same month, and not the mean for the same day; the correction applicable on this account is stated where such is the case, but rarely amounts to 1'.

It appears that at the hours most influenced by disturbances, namely, from about 9^{h} in the evening to 5^{h} in the morning, the simultaneous fluctuations of the three elements are generally less than they would be if referred to diurnal means uninfluenced by disturbances; but since the means actually employed are derived from corresponding observations, the error thus introduced enters proportionably into all of them, and leaves the values actually presented true relatively to one another.

The simultaneous fluctuations at Fort Simpson are measured from the true mean of each element for the day of observation, and include the regular diurnal changes, the period of observation having been so short, and attended by such constant magnetic disturbances that the mean curves deduced can scarcely be regarded as a true representation of the action of those forces which it is the object of the other mode of treatment to eliminate. It was found convenient also to refer the observations in October to the mean for the day, in consequence of the disconnexion of the Inclinometer readings from those of succeeding months.

TERM DAYS AND MAGNETIC DISTURBANCES.

The approximate changes of Total Force $\frac{\Delta \phi}{\phi}$, have been computed by the formula $\frac{\Delta \phi}{\phi} = \frac{\Delta X}{X} + \tan \theta \Delta \theta$: their accuracy necessarily depends upon that of the scale coefficients of the Bifilar and Induction Inclinometer; the former of these may be considered as sufficiently well determined at Fort Simpson to entitle the values assigned to the changes of the horizontal component to considerable confidence; at Lake Athabasca, where a less delicate method of adjustment was employed, the scale coefficient of the Bifilar may possibly be itself in error in the fifth decimal. The scale coefficient of the Induction Inclinometer at both stations is liable to whatever uncertainty attaches to the correction we have applied in a previous section for the defect of the method formerly employed of determining the coefficient p, in the formula $\frac{\Delta Y}{\overline{Y}} = p \left(\cos u \Delta u + \sin u \frac{\Delta X}{\overline{X}} \right)$ 13 by simply inverting the iron bar, and observing the angles of deflection in the direct and inverted position, when it was assumed مر⊮ شيو ا This method, as was there stated, appears that $p = \frac{2}{\sin u + \sin u'}$. to give a value invariably too low, to the deduced scale coefficient, and from a number of experiments the ratio 1'22 was adopted in which to augment it under all adjustments, and has been applied. It is evident, therefore, that in the face of these admissions, great precision cannot be claimed for the values assigned for the changes of Total Force; but, having carefully considered the subject and examined the results themselves, it appeared to me that, with due explanation, they were entitled to be included in this report. Very little appears to have been determined hitherto with respect to the irregular variations of the Total Force in any quarter; the present observations show at the least that this element does nevertheless undergo in high latitudes very considerable changes; and believing their value also to be here assigned with sufficient accuracy for many purposes, I offer them, as approximations only, but approximations deriving peculiar interest from the remote locality and high magnetic latitude in which the observations were made.

The following Table contains the values of $\tan \theta \Delta \theta$ for each 1''0 of $\Delta \theta$, at Lake Athabasca, and Fort Simpson.

TERM DAYS AND MAGNETIC DISTURBANCES.

TABLE LIV.

حنيب.	1	 I	1	1	1	1] .	}		1	}
Δ θ	Lake Athabas. 0=81 37.6	Fort Simpson. θ=81 52·8	~ ~~	Lake Athabas. $\theta = 81 37.6$	Fort Simpson. θ=81 52́·3	Δ <i>θ</i>	Lake Athabas. θ=81 37.6	Fort Simpson. θ=81 52•3		Lake Athabas. ∂=81 37.6	Fort Simpson. 9=81 52.3
			<u> </u>						<u> </u>		11
.,	••00197	·00204	' 26	•05135	,*05296	, 51	·10072	10389	76	·15010	15481
2	·00395	. 00407	27	•05332	•05500	52	.10270	·10592	77	·15207	·15685
. 3	•00592	·00611	28	•05880	·03704	53	•10467	·10796	78	•15405	•15889
.4	•00790	.00815	29	•05727	•05907	54	·10665	·11000	79	·15602	•16092
5	•00987	·01018	8 0	•05925	•06111	55	·10863	•11203	80	•15800	•16295
6	•01185	·01222	81	.06122	•06315	56	·11060	·11407	81	•15997	•16500
7	•01882	01426	82	•06320	•06518	57	·11257	·11611	82	•161	•16703
8	•01580	•01630	33	:06517	·06722	58	·11455	·11815	83	·16392	·16907
9	•01777	·01833	34	•06715	·06926	59	**11658	12018	84	•16590	•17111
10	•01975	·02037 ·	35	·06912	•07129	60	·11850	•12222	85	·16787	·17314
11	•02172	•02241	36	•07110	•07333	61	·12047	12426	86	·16985	·17518
12	•02370	·02444	37	•07307	•07537	62	·12245	•12629	87	·17182	•17722
13	·•02567	·02648	38	•07505	•07741	63	·12442	•12833	88	17380	•17926
14	•02765	·02852	89	:07702	·07944	64	•12640	•13037	89	•17577	·18129
15	02962	•03055	40	•07900	·08148	65	·12837	·13240	90	•17775	·18333
16	•03160	·03259	41	.08097	•08352	66	·13035	·13444	91	17972	·18537
17	•03357	·03463	42	·08295	•08555	67	•13232	·13648	92	·18170	18740
18	·03555	•03667	43	·08492	•08759	68	·13430	·13852	93	·18367	·18944
19	·03752	•03870	44	•08690	·08963	69	·13627	·14055	94	·18565	·19148
20	•03950	·04074	45	08887	·09166	70	·13825	·14259	95	·18762	•19351
21	•04147	·04278	46	•09085	•09370	71	·14022	·14463	96	·18960	·19555
22	·04345	·04481	47	·09282	•09574	72	•14222	•14666	97	19157	·19759
23	·04542	·04685	48	·09480	·09778	73	·14417	·14870	98	·19355	•19963
24	•04740	•04889	49	•09677	·09981	74	•14615	•15074	99	19552	·20166
25	•04937	•05093	50	·09875	•10185	75	·14812	•15278	100	19750	•20370

METEOROLOGICAL OBSERVATIONS.

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. At 124 METEOROLOGICAL OBSERVATIONS. THE meteorological observations at Lake Athabasca and Fort Simpson are confined to a register of the temperature of the air, and of the wind and weather; particular attention being paid to the frequent displays of the aurora borealis. Two portable barometers and two thermometers for hygrometric purposes, had formed part of the equipment of the expedition, but were unfortunately rendered unserviceable in the course of the previous journey.

The instrument referred to from the outset as the standard thermometer, was a spirit thermometer by Newman, one of several which had been sent into the Hudson's Bay territory sometime previously by the Royal Geographical Society, and was recommended by that circumstance, as well as by the character of its maker. The tube, however, was so far from being of uniform capacity, that its graduation proved to be many degrees in error at very low temperatures; fortunately, there was on the spot, in the possession of Mr. Colin Campbell, another spirit thermometer, by Dolland, an old instrument, and supposed to be the same which was registered by Mr. Keith in 1825-6*; this proved much the more accurate of the two, and was registered in addition to the other, from the 7th January to the 29th February 1844. These instruments stood as follows in melting snow:-

N (Newman) $33^{\circ}5$ correction $-1^{\circ}5$ D (Dollond) 31° 0 correction $+1^{\circ}$ 0

It was soon observed that the difference here shown between them increased regularly in descending the scale, and much uncertainty was felt as to which was the preferable authority, until an opportunity occurred of testing the thermometer Newman in freezing mercury, which was done as follows :-- On the 23d January a portion of mercury was exposed in the open air until it became solid, at the same time another portion was allowed to acquire a temperature very little removed from the freezing point, the solid mass being then added to the fluid, the bulb and about two inches of the stem of the instrument to be tested were immersed in the mixture. The experiment was made in a room having a temperature of 35° Fahrenheit, and the spirit of the thermometer remained steadily at -31° 0 on the scale as long as any of the frozen mercury remained solid. Assuming, then, the solidifying point of mercury to be $-40^{\circ}9$ + Fahrenheit, we have the very large correction of $+9^{\circ}$ 9, applicable

^{*} Franklin's second Journey to the Shores of the Polar Sea, Appendix II. † In adopting this datum instead of the more usual value -39° '5, I am guided by verbal-information from M. Regneault, that he has found by accurate experiments with the air thermometer, that the true freezing point of pure mercury is between -40° and -41° centigrade; the mean of these two values is equivalent to -40° '9 Fahrenheit. The mercury employed in the experiments at Lake Athabasca had been purified with nitric acid some time previously, but was dull from exposure and shaking in the constant tree it had been put to in the artificial horizon. use it had been put to in the artificial horizon.

to the scale reading, $\pm 31^{\circ}$ 0 on the thermometer N. It appears by the following comparisons that the thermometer D. read -37° 8 when N. read -31° 0, consequently the error of this instrument at the freezing point of mercury was $+3^{\circ}$ 1, or the correction at the scale reading -37° 8 was -3° 1.

Comparisons of Dollond's and Newman's thermometers at low temperatures:

	Number of	Mo	ean.		
Newman Reading.	Observation s.	Newman.	Dollond.	Difference.	
0 0		0	0	0	
	18	- 30' 40	-37.02	-6.621	
-31 to -32	12	-31.13	-37'89	-6.67 -6.81	
-32 to -33	7	-32.11	-39.14	-7.03	
-35 to -34	11	- 33 34	-40.23	-7.21	
-34 to -35	4	-34.15	-41.27	-7'65	
-35 to -36	9	-35.33	-43.10	-7.77	
-36 to -37	6	-36.50	-44.25	-8.05	
-37 to -38	2	-37.20	-44'70	-7.20	
-38 to -39	1	-38.60	-46.10	-7.20	

These results are confirmed by a number of entries in the meteorological register on the 22d, 23d, and 24th January 1844. A small quantity of mercury being at this time exposed beside the thermometers, it was found frozen at all readings below -32° 9 of Newman and $-39^{\circ}5$ of Dollond, with one exception as regards the latter instrument, namely, on January 23^d 6^h Göttingen, when it is noted that the mercury was thawing, N. reading - 32° 4, D. - 39° 6. There are nineteen hours of observation on the above days at which the fact of the mercury being solid was noted, but it appears from the register that the reading was below -31° by Newman, and therefore the temperature below the freezing point of mercury at forty-six hours of observation in that month; it did not reach it in December or February. Newman's thermometer is entered in the abstracts corrected by subtracting 1° 5 from each scale reading above 33° 5, and $1^{\circ}5+0$ 130 Δt° for each reading below 33° 5, where $\Delta t^{\circ} = (33^{\circ} 5 - \text{observed temperature})$. The coefficient 0.130 is the increase of the correction, which appeared to be uniform for each degree in descending the scale, as shown by the foregoing data. The mean temperature for each day subsequent to January 7th by hourly observations of Dollond has also been corrected independently by subtracting 1°°0 at each reading above 33°°0, and 1°°0- $0.0596 \Delta t^{\circ}$ at each reading below 33°. The non-agreement of the corrected means of the two thermometers, excepting near the two fixed points on the scale, probably shows that the supposition of a uniform rate of increase of the correction is not in accordance with the fact, for there was nothing in the position of the two instruments to account for one standing permanently about one degree higher

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than the other, but as neither thermometer was compared with any absolute standard, we appear to have no better resource than to take the mean where both were observed, which has accordingly been done in Table VI.

The position of the thermometer was on the north side of an external porch made to contain the transit instrument; they were attached to a bracket projecting a few inches from the wall, their bulbs about four feet above the soil; the readings were taken through the transit openings.

TABLE LV.

Mean Temperature of the Air at Lake Athabasca by Newman's thermometer corrected, also mean temperature for the winter quarter, comprising the months of December 1843, January and February 1844.

1843-44.		Midn.	1 л.м.	2.	3.	4.	5.	6.	7.	
October 16th to SI	lst	20.08	18·74	18·35	18·10	18·78	17·79	18·37	19·16	
November -	-	9.02	7.89	7.57	7.15	7.58	7.61	7.69	8-29	
December -	-	-1.16	-0.00	-0.19	-0.14	0.68	0.22	0.28	0.42	
January -	-	-22.82	-23.02	-23.56	-24.23	-24.45	-25.10	-25.10	-25.55	
February -	-	3.00	1.44	1.67	1.45	-0.08	-0.03	-0.48	-0.46	ĸ
Winter Quarter	-	-7.00	-7.21	-7:30	-7.64	-7.95	-8.19	-3.33	-8.28	
1843-44.		8.	9.	10.	11 л.м.	Noon.	1 P.M.	2.	3.	
October 16th to 3	lst	19·74	2°1•18	22.39	23.26	2Å·69	9,5·35	25.75	25.52	
November -	-	8.48	9 ·29	10.26	11.31	12.39	12.64	12.82	12.44	
December .	-	0.46	0.10	1.04	1.77	2.76	2.73	2.19	1.44	
January -	•	-25.81	-25.30	-23.77	-22.25	-21.52	-20.81	-20.93	-21'11	
February -	•	0.05	1.24	3.99	6.11	8.62	10.26	10.33	10.76	
Winter Quarter	-	-8.42	-7.89	-6.28	-4.79	-3.32	-2.61	-2.80	-2.97	
1843-44.		4.	5.	6.	7.	8.	9.	10.	11. р.м.	Mean.
October 16th to 3	1st	24.55	23.36	22.37	22·21	21.76	20.96	21.13	20.83	21 . 44
November -	-	11.60	11.04	10.62	10.15	9.93	9.60	9.39	8.95	9.76
December -	-	1.02	0.30	-0.32	-0.63	-0.90	-1.09	-0.91	-1.16	0.40
January -	•	-21.43	-21.09	-22.58	-21.61	-22.09	-22.30	-22.47	-22.51	-23.00*
February -	-	9.41	8.74	8.33	7.42	7.14	6.48	4.98	3.94	4.79*
Winter Quarter	-	-3.68	-4.22	-4.86	-4.94	-5.28	-5.64	-6.13	-0.28	-5.94

• See Table LX for the mean by both thermometers.

ĸ

Mr. C. Campbell, the resident officer of the Hudson's Bay Company, having kindly continued to record the temperature by Dollond's thermometer four times a day after my departure, until he left the station himself, we are enabled to add four months to the foregoing table :

TABLE LVI.

Month.	Sunrise.	9 A.M	3 р.м.	9 г.м.	Approx. Mean.	Corrected Mean.
1844 : March * - April May June Spring Quarter -	° - 2'42 27'82 39'14 47'20	o 1·13 † 35·48 46·74 57·17 28·91	9'13 42'50 50'31 58'83 35'03	o 2. 16 33 · 96 42 · 07 50 · 86 27 · 06	° 1.64 34.72 44.40 53.52 26.90	2·4 35·1 44·8 53·9

Mean Temperature at Lake Athabasca—continued.

* The first four days of March are wanting.

† 1° 02 by the 31 days, which are complete for this hour only.

The thermometer recorded by Mr. Campbell has been corrected for temperatures above 32°, by the uniform addition of 1°, and for lower temperatures by the scale already given. The approximate mean is that of the observations at 9 A.M. and 9 P.M., which in each of the other months at this station and at Fort Simpson is below the true mean; probably the correction $+0^{\circ}$ 8, derived from December, January, and February, will be nearly correct for March, and $+0^{\circ}$ 4, derived from April and May at Fort Simpson, nearly correct for April, May, and June at Lake Athabasca, giving the quantities in the last column.

TABLE LVII.

			{	[1	{			1
	Midn.	1 A.M.	2.	3,	4.	5.,	6.	7.	<u> </u>
April • •	9 27·24	° 26·15	o 24.87	° 20∙63	。 21·87	22.87	° 23•92	0 25·57	
May • •	38 •37	36.92	85.86	84.54	85.18	87.91	87.68	89.62	
Mean of 46 days	32.32	81.14	29.88	27.86	28*45	29.24	30.50	32.00	$\frac{4}{\Gamma^{*}}$
	8.	9.	10.	11.	Noon.	1 P.M.	2.	3. ,	
April	° 28·22	° 82·41	° 85.85	0 89·30	° 40.69	° 41.94	° 42°14	° 41.46	
May• •	42.07	44.91	48.07	51.44	51.49	52.55	52.92	52.78	
Mean of 46 days	34.54	\$8 ·12	41.48	44.84	45.62	47 • 57	47.06	46.63	
	4.	5.	6.	7.	8.	9.	10.	11.	Mean.
April	° 40.88	。 40.00	。 38·72	。 36·40	° 33·31	。 81·48	° 29·98	29·02	。 32·48
May* -	52.61	51.67	50.43	49.16	46'70	43.62	41 • 21	39.20	44.26†
Mean of 46 days	46.23	45 · 3 3	44.07	42.23	39.42	37.02	85.11	33.81	37.92

Mean Temperature of the Air at Fort Simpson, M'Kenzie's River, for April and May 1844.

* From 1st to 25th May.

+ Corrected to the mean of the complete month, at the same average daily increment of mean temperature (0° 30) the mean for May will be 45° 5.

The observations at Fort Simpson were taken 20^m after the hours named.

In the observations of Mr. Keith at Lake Athabasca in 1825-6, referred to above, the mean temperature is derived from the mean of the daily extremes; for the sake of comparison, a similar value has been formed for each month in the foregoing tables, and is subjoined, together with other approximations to mean values.

TABLE LVIII.

Month.	True Mean by Hourly Obser- vations.	Mean by Daily Ex- tremes.	6 A.M. 6 p.M.	7 A.M. 7 P.M.	8 A.M. 8 P.M.	9 A.M. 9 P.M.	10 а.м. 10 р.м.	11 A.M. 11 P.M.	6 л.м. 2 р.м. 10 р.м.	7 A.M. 3 P.M. 11 P.M.
October -	21.44	2 ^î ·11	20.37	20.68	20.75	21·07	21.76	22.04	21.75	21.84
November -	9.76	9.21	9.17	.9.22	9.21	9.44	9.82	10.13	9.97	9.89
December -	0'40	0.22	0.13	-0.10	-0.55	-0.44	0.08	0.30	0.65	0:23
January .	-23.00	-23.64	-23.84	-23.28	-23.95	-23.80	-23.12	-22.38	-22.83	-23.06
February .	4.79	3.60	8.95	3.48	3.25	4.01	4.48	5.02	4.84	5.02
WinterQuar-}	-5.94	-6.23	-6.29	-6.73	-6.82	-6.20	-6.32	-5.68	-5.72	-6.03
April	32.48	80.90	81.82	30.98	30.76	31.94	32.91	34.16	32.01	32.02
May • •	44.56	42.85	44 •05	44 4 0	44.38	41 2 6	44 64	45 4 7	43.94	43.97

Various approximations to the Mean Temperature.

It appears, by the foregoing Table, that the best approximation to a true mean, from October to February, is obtained by three equidistant observations, beginning with 6^{n} or 7^{h} A.M.; the mean by the daily extremes, that is to say, the highest and lowest hourly observations, is also a good approximation in October, November, and December, but considerably too low in the subsequent months; the mean by the homonymous hours from 6^{h} to 9^{h} inclusive, is decidedly too low, that of the succeeding homonymous hours 10^{h} and 11^{h} is, however, somewhat better. The same remark applies to the months of April and May; the differences from the true mean apparent in the latter are, however, considerably longer than those shown in the previous months, the mean diurnal curves of temperature having themselves a marked difference arising from the change of season.

The mean diurnal curve of temperature for the winter quarter at Lake Athabasca differs but little from that of the corresponding season at Toronto. The mean range is $5^{\circ} \cdot 92$ at the former, and $5^{\circ} \cdot 95$ at the latter station; the coldest hour is the same, $7^{\rm h}$ A.M., and the curve cuts the line of mean temperature in its morning ascent at pretty nearly the same time. By simple interpolation this epoch will be $9^{\rm h} \cdot 53^{\rm m}$ at Toronto, and $10^{\rm h} \cdot 21^{\rm m}$ at Lake Athabasca. There is a slight difference in the descending branch, which is prolonged above the mean to the latest hour at the more northern station, giving a temperature above the mean at eleven observation hours at Lake Athabasca, and at ten only at Toronto. The more rapid relative increase in the power of the sun with the advance of spring at the more northern station, is evinced by the large amount of the mean daily range at Fort Simpson in April and May, namely,

19°'71, while for the corresponding months at Toronto it is but 15° '76.

TABLE LIX.

Mean Temperature for December 1843, January and February 1844, at Toronto, also for April and May 1844, for comparison of diurnal curves with those given.

Mean Time 🔹	Midn.	1 A.M.	2,	3.	<u>4</u> .	5.	6.	7.	
Winter Quarter -	25.2	24.6	24.5	24.3	24.2	23.8	23°5	2 ⁸ ·8	£ .
April—May -	45.9	45*2	41.6	43*8	43.4	43*3	44*0	46.2	
Mean Time -	8.	9.	10.	11.	Noon.	1 P.M.	2.	3.	
Winter Quarter -	23°8	24.9	26° 1	27 [°] ·5	28.5	2 ⁹ ·1	29°5	29°5	,
April—May	48.9	51.3	53•2	54.9	56°5	58*4	58.8	59.0	
Mean Time	4.	5.	6.	7.	8.	9.	10.	11.	Mean.
Winter Quarter -	28 [°] .9	28.0	26.9	26°3	25°7	25.3	24.0	24.5	28.96
April—May -	58.2	58.7	56.4	53.0	50.0	48.2	47:4	46*8	50.28

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TABLE LX.—Highest, Lowest, and Mean Temperature observed on each day at Lake Athabasca and Fort Simpson, during the series of hourly observations. See the columns headed sumrise and 3 P.M. in the Abstracts following, for the Highest-and Lowest Temperature from March to June, at the former station, by Mr. Campbell's observations. .

1			i								<u> </u>							
	۲ م	Mean.		20·48	48.88	34.51	00.01	-00-0 1	35.48	41.51	45.38.	46.32	40.0 0	⁴ 5 4767	40,00	31-75	45.01	52.12
	May 1844.	Low.		î2.6	14.0	21.2	23.22	,	28.4	28.1	84.8	35.3	4.98	(8.82	1	2.12	0.18	9.48
MFSON		High.	. ,	<u>8</u> 7-0	0.88	48.3	8.12	1	43.5	53.3	9.49	56.5	56.5	18.8	i	45.5	8.99	4-89
FORT SIMFSON		Mean.		12°02	14.78	24.89	40.00	10 20	10.11	10 11	81.18	99.98	16-74	18-53	29-16	10.00	5.3	32-74
H	April 1844.	Low.		-2.8	°.8-	₽.0	λ 1.81	<u>ا</u> ک	(9.8	- <	1.6	14.9	0.9	0.2	14.0	20-47		19.3
	4	High.		·25.0	32.5	40.3	£5	1	I-41	١	45.0	45.1	22.8	29-4	38-2	9.88	1	43-5
ŀ	844.	Mean.		-12-10	-3.05	ļ	10 01	12-1-	88.4-	6-47	13-46	08.9		82.1-	-17-48	-13.10	18.9	16.91
	February 1844.	Low.		-18.3	8.6-	-13.77	1	4.18-	-23.4	3.1	6.2	-2.4	ĩ	-32.1)	8.08-	6.97-	-15.0	6.7
	Fe	High.		-1° 8.9	1.0	ł	8.4	₹.4	9.4	4.6	1.12	14.8	6.0I	I	-10.8	-2.2	4-4	32.5
	344.	Mean.		۱.	<u>99.9–</u>	-14.65	-6.45	99.61-	10-00	5 05 I	-30.46*	10.98-	-23.80	60.8-	-5.50		G2 77-	17.8-
	January 1844.	Low.		۱	1.41-	-25.0	-7.8	38-7	(0.68	Ĩ	1.05-	-39.8	-32.0	-26.8	-9.4I-	6.08-	<u> </u>	-20-9
A	, F	High.		<u>。</u>]	9.0-	-7-8	-5.3	-6.5	1	32.0	26-2	-32.8	-18.4	9.0-	-1.4	I.41-	1	•-11-
LAKE ATHABASCA.	1843.	Mean.		<u>₿</u> •41	01.1	A 10	7-52	4.71	21.34	19-1	21.88	44.01	II AT	10.0	90.1-	19.61-	76. 8	-4.22
KE ATF	December 1843.	Low.		-1.2	(1.8-	Ĩ	2.3	9.0	6.3	2.0	14-7	ĩ	-3.55	-3:3	-12.8	-24.9	6.87-	0.11-
I.A.	Õ	High.		13.4	23.6	1	12.2	15.3	35.3	16.7	31.4	22.0	I	8.4	6.4	-12.6	0.0	4-0
	1843.	Mean.		21.86	25-13	26-95	96.96	3	17.83	16.47	14.31	29.9	66.8	10.1	10 8	1.64	15.08	49.8
	November 1843.	Low.		14.6	20.5	23-8	ĩ	16 .6∫	13.4	14.6	2.4	-1.2	-11	ĩ	(8.9	8.9-	1.6	7. 8
	No	High.		29-4	32.7	9.08	29.3	1	24-7	1.61	20.2	0.01	9.6	8.4	1	8•0	0.6I	13.6
		High. Low. Mean.		•1	1	1	1	1	1	1	1	1	1	I	I	I	I	1
	October 1848.	Low.		۰۱	1	1	1	ł	1	1	1	!	1	1	1	1	I	1
, s	Octof	High.		01	۱	1	1	1	1	1	1	1	1	1	1	1	1	1
		Day.		н	63	~	4	a	9	2	æ	6	10	Π	12	13	14	15

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ľ · ·]		- i	*	~~~~	~															
	4	Mean.		59°12	28.27	19.44	4 9 1	65-17	44.65	40-36	19.19	55.66	1	1			1	1	1	44.56
	May 1844.	Low.		42.0	46.4	232.5)	ĩ	37-3	28.2	29-8	36.5	44-2	ĺ	1	1	1	1	1	١	
MPSON		High.		72.5	0.14	51-0	1	1.99	52-5	20.2	62-5	64.4	ł	I	1	I.	1	1	١	1
FORT SIMPSON.		Mean.		38.23	84.68	42.37	43.54	00110	8	40.16	32.82	82.19	52.41	42-07	90.07		44-51	% .98	1	32.48
μ.	April 1844.	Low.		27.1	27.5	32.4	31.3	31. 4∫	<u> </u>	28.2	1.43	25-9	32.5	36-2	28 .4)	ĩ	.29.3	12.9	I,	1
	V , V	High.		51.5	0.09	52.1	1.99	46-7	ł	40.8	- 37-4	8.88	0.89	0.02	1.02	١	20.2	51.3	1	ľ
	344.	Mean.		22°56	01.00	97 97	08.II	15.21	19.11	23.94	11.12	40.0	10 4 1	17-30	-0.68	7:48	5-78	1	1	5.22
	February 1844.	Low.		04 0	19.1.	-	3.0	-5'6	4.6-	9.TI	₽.0	ĩ	-9.2)	-10.3	0.8-	-2.5	6.9-	ł	1	-8.13
	Fet	High.		34.4	37.5	1	21.3	32.7	22-2	31.3	32.5	3.3	1	34.5	3 .3	4.9I	14.3	1	1	15°34
	H.	Mean.		-10.71	-23.37	98.88-	00.48-	00.40	-42.0) -30 32	-41.42	98.62-	-41.70	-37.37	-28.04	01.10	₩ 8	-4.10	-0.28	-18.81	-22.74
	January 1844.	Low.		-18.3	9.08-	-37.6	-39-7	ĩ	(0.35-	9.67-	-44-7	9.97-	-47-7	-38.7	\ {8.1}	- 5	-20.3	2.61-	6.37-	-32.12
	Jaı	High.		80 -12 -1	-18.4	-30.5	9.1%	-30.4	1	-35.3	2.98-	9.48-	-26.6	6.87-	0.01-	.1	14.6	14.6	-12-8	0.40 -15.16
ATHABASCA.	843.	Mean.		0	R	14.0	¥9.1-	-4-87	16-0	-9.25		16.0		-3.19	42-7	8.32	QZ.9-	10.10	8.13	0.40
	December 1843.	Low.		<u>ر</u>	<u> </u>	-6.5	0.11-	6.11	9.11-	-13.4	(6.1-	1	7	2.9	9.9-	6.9	6.11-	-35.3)	۔ کر	88.4-
LAKE	Dec	High.		•1	-3.2	8.1	8.0	8.9	12.4	-2.2	5.4	ł	1	-0.2	16 ·8	1.1I	₽. 1 -	ł	6.9-	9.02
	848.	Mean.		12°07	8:33	7.04	07.	98.9	78.9	89.9	4.40	69.8	90.1	70 T	16.2	2.38	7.18	12.2-	1	9.76
	November 1843.	Low.		°.8	4.8	3.1)	5	4.4	5.5	9.8-	1.9-	2.3	(0.0-	ĩ	2.0	4.7-	季.6	8.2	l	4.22
	Novei	High.		1 [°] -8	10.4	6.01	1	₽.8	8.6	- 0.0I	- 0.6	₽.9	4.1	1	6.6	12.3 -	20.3	- 8.0	1	14.68
				36.30	48.18	33.08	30-74	30.81		8.00	15.88	12.11	16.00	29.0-	71.4	,	کو.ou	22.45	20.26	21.47
	October 1843.	Low.		29.6	0.42	0.08	29-0	28.1	1	14.8	14.2	12.5	L.0	99.0- 9.4-	1.1-	2.4	1	₽.6 [14.6	14.87
	Octob	Tigh.		44°5	9.88	38.0	34.0	8.88	6.67	1	0.8I	20.2	23.2	9.9	9.2	1	22.5	24-3	25-7	27.35 14.87
		Day, High. Low. Mean.			11	18	19	20	21	53	8	24	25	26	27	នា	29	80	31	

TABLE LX.—continued.

* Mean of both thermometers, corrected, from 7th January to 29th February.

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The foregoing Tables show a remarkable prevalence of cold in January 1844 at Lake Athabasca; the mean temperature for that month differs by no less than 23° from that of December, the one being probably above, the other below, the normal mean temperature, and the mean-for the hours of 1^h, 2^h, and 3^h P.M. is 31° lower than that for the corresponding hours of February. A similar state of things prevailed at Toronto, where we have the mean temperature for December 1843, 30°'8, and for January 1844, 20°'7, difference 10°'1, the means for those months by the observations of twelve years being respectively 27° 0 and 24° 5, difference only 2° 5. We have also in the same month the extraordinary difference of 62°'3 of temperature in the course of four days, the thermometer having indicated -47°'7 Fahrenheit at 7 A.M. on the 25th, and +14° 6 at 2 A.M. on the 30th January; but this is not the whole range in the month, and is indeed exceeded by a change of 64°'9 between 3 P.M. on 22d March and sunrise on the 25th, when the temperatures observed were 42° 0 and -22° 9 respectively. For the purpose of comparing exactly the fluctuations of temperature at these northern stations with those of Toronto, the situation of which, on a peninsula formed by three of the great lakes, gives its climate somewhat of insular characteristics, I have taken the differences between the highest and lowest observation of each day, and found the mean value of the daily range thus shown, precisely as was done for the corresponding ranges of the magnetical elements, Tables I., IV., and XV. These values, and some other particulars in aid of this comparison, are contained in the next Table.

TABLE LXI.

		Mean da	aily Range.		Extre	nes in	each N	Ionth.		
1843-4.		Toronto.	Athabasca.		Toronto.		Atl	1abasca,	åc.	-
		Toronto.	Fort Simp.	Max.	Min.	Diff.	Max.	Min.	Diff.	ىرىلىدىن ئىلالاتىتى تىرىپى بەرىپىر
		0	o	o	0	0	•	0	0	
October	-	$\big\{ {}^{15\cdot9}_{15\cdot2}$	15.4	63·4 57·8	25·0 26·0	38·4 31·8	49.9	-7.6		The whole month. The 16th to the 31st
November	-	12.9	11.9	51.6	15.4	36.5	82.7	-9.4	42.1	
December	•	10.2	18.4	41.4	4'2	37.2	35.3	-35.3	70.6	
January		14.7	10.4	45.0	-6.0	51.0	14.6	-47.7	62.3	
February	•	15.5	25.4	47.6	1.5	46.4	37.2	-32.1	69.6	
March -	•	25.1		50.2	10.9	39.8				
April -	•	23 4	27.0	75.0	21.1	53.9	68.0	-3.3	71.3	
May •	•	22.9	23.3	78.0	29.3	48.7	72.5	12.6	59.9	

Comparison of Range of Temperature.

WINDS.

THE Direction of the Wind was entered by estimation at each hourly observation, and its force expressed in words. The number of winds from each half quadrant are given in the next Table, where the column North includes N. by W., N.N. by E., and N.N.E., and so on round the circle. The azimuths actually entered were magnetic. This arrangement was adopted to take advantage of the convenient guide furnished by the arrangement of the buildings in Fort Chipewyan, which all ran within half a point of north and south or east and west by compass. They have been converted into true directions, by subtracting two points from each, being the value of the magnetic declination less 5°, the amount of the deviation of the lines to the west of magnetic north. In similar circumstances it will be found preferable to establish a permanent guide of some simple nature to the true directions.

TABLE LXII.

*							At La	ake /	thal	basca	k.			AtFo	rtSin	pson.
Direct of the Wi		By	Hour	ly Ob	servat	ion.	B	y Fo vatio	ur O ns da	b. uly.	Winter	Spring	The whole	By Ob:	Houservat	rly tion.
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar	Apr.	May	June	Quarter.	Quarter.	Period.	Apr.	May	Total
N.	•	0	8	25	32	9	21	34	9	19	66	63	157	73	71	144
N.E.	-	68	92	83	90	126	26	17	28	29	299	n	559	5	6	11
E.	•	15	22	78	34	14	1	1	3	18	126	5	186	53	56	109
S.E.	•	9	54	33	10	8	2	7	1	0	51	10	124	150	154	304
s	•	1	36	39	7	2	0	8	4	9	48	12	106	42	41	83
s.w.	•	26	14	11	23	. 17	13	6	8	15	51	27	134	24	13	37
w.	•	84	8	33	106	7	6	9	6	5	146	21	214	20	6	26
N.W.	•	3	33	92	63	55	14	9	26	14	210	23	309	61	32	93
Winds	•	156	267	394	365	238	83	91	85	109	997	238	1,789	428	379	807
Calms	•	180	357	203	262	338	26	29	39	7	803	94	1,441	172	125	297

Number of Observations of the Wind from each Direction.

Allowing the usual value to each descriptive term (Toronto, vol. 1. xcii.) we have the total pressure from the several quarters, as follows:

TABLE LXIII.

Sums of the Pressures from each Quarter by estimation, in Pounds up	on
the Square Foot.	

Direc-					At Lal	ke Áth	abasc	a 1849	-4.				Toro Oct. to	
tion of Wind.	F	By Hou	rly Obs	ervatio	n.	By Four Observations daily. Quar-Quar-Quar-Period Oct. to								Total Pres-
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	ter.	ter.	June.	winus.	sure.
N.	<i>lbs.</i> 0°0	168. 25°3	lbs. 65°4	<i>lbs.</i> 16'7	<i>lbs.</i> 8'0		<i>lbs.</i> 46°3	165. 2.5	<i>lbs.</i> 58'1	<i>lbs.</i> 90'1	<i>lbs.</i> 63*5	<i>lbs.</i> 237*0	857	165. 274-5
N.E.	122.6	205.4	293.7	155 • 4	267 . 6	50.3	4.9	7.8	84.1	716.7	63.0	1199.8	220	154.8
Е.	51.0	81.2	293.2	80.0	31.9	3.0	0.2	0.6	51.6	405.1	4.1	583.3	520	485 • 4
S.E.	36.0	181.5	71.8	5.3	7.2	0.4	2.0	0.5	0.0	84.0	2.6	304.4	239	96.2
s.	1.2	181.0	171.5	21.0	7.0	0.0	5.9	1.1	18.9	199.5	7.0	407.9	456	247 4
S.W.	92.0	35.2	29.0	58.6	27.8	28.3	1.5	1.8	51'5	115.4	31.4	325.8	407	369 • 2
w.	126.9	36.2	30.4	64.9	38.0	9.6	2.1	1.3	18.2	133.3	13.0	827.9	426	440.4
N.W.	7.2	18.1	205.4	115.2	81.0	21.2	3.0	7.6	143.0	401.9	32.1	602.6	549	529.7
Sums	437.5	713.8	1160.4	517•4	468.5	127.8	65 • 9	23.0	425 • 4	2146.0	216.7	8938 •7	-	-

On comparing the results contained in the foregoing Tables with those of the corresponding period at Toronto, it is observable that the proportion of winds from the north-east is much greater at Lake Athabasca than at the more southern stations; at the former the great preponderance, whether we regard number or total pressure, is from that quarter; at Toronto, on the contrary, it is from the north-west. Resolving the total pressures in the four cardinal directions, and obtaining a general resultant, it appears that the following are the equivalents of all the winds at the two stations for the period under comparison:

TABLE LXIV.

	L	ake Athab	asca.		Toronto.	
The Wind.	Winter Quarter, 1843–4.	Spring Quarter 1844.	The whole Period.	Winter Quarter, 1843-4.	Spring Quarter 1844.	The whole period.
Mean Pressure -	<i>lbs.</i>	<i>lbs.</i>	lbs.	<i>lbs.</i>	<i>lbs.</i>	<i>lbs.</i>
	1.19	0`61	1`22	0*56	0°37	0' 46
Resultant Direction -	N. 41° E.	N. 4° W.	N. 43° E.	N. 51° W.	N. 10° E.	N 74° W
Corresponding or Re-	<i>lbs.</i>	lhs.	<i>lbs.</i>	<i>Ibs.</i>	<i>Ihs.</i>	<i>lbs.</i>
sultant Pressure - }	0°39	0° 28	0' 28	0*16	0`06	0°08

Thus it appears that the prevalent winds at Toronto and Lake Athabasca belong to different and nearly opposite systems; a northwesterly current preponderates in the lower latitudes $(43^{\circ} 49')$, a north-easterly current, inclined to the former at an angle of about 117° , prevails in the higher one $(58^{\circ} 43'.)$ The general fact of a prevalence of N.E. winds is stated in the Meterological Register by Mr. Keith for 1825–1826, which has been before referred to.

The Mean Force appears to be considerably higher at Lake Athabasca than at Toronto.

There is but little correspondence between the winds observed at Fort Simpson in April and May and those recorded at Fort Chinewyan at the same time; at the former station half of the total number of winds was from the east and south-east, at the latter the same proportion was from the north and north-east, but the period of comparison is too short for any conclusion to be drawn from the observations. A local phenomenon of interest was observed several times at Fort Simpson, in the rapid rise of the temperature of the air when the wind changed to the south-west from an easterly direction. It appeared as if the warmer air of the Pacific Ocean were transferred across the neighbouring ridges of the Rocky Mountains, with little loss of its temperature. Thus we have April 3^d 10^h, wind S.E., temperature 34° 5; 3d 11h, wind S.W., temperature 39° 5. Again, April 25d 5h, wind S.E., temperature 43° 5; 25d 6h, wind S.W., temperature 58° 0. Again, April 29d 5h, calm, temperature 39° 5; 29d 6h, wind S.W., temperature 48° 5. Lastly, May 8^d 8^h, wind S.E., temperature 53° 7; 8^d 9^h, wind S.W., temperature, 56°'7.

AURORA BOREALIS, WEATHER, &c.

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Owing to the unavoidable circumstance that only one observer could be on duty at a time during the night, whose attention was required by the magnetic disturbances, which accompanied most of the more active displays of the aurora borealis, the notices of that phenomenon are less full than could be wished, notwithstanding the great desire that was felt to do justice to so favourable an opportunity of studying it. The three magnetometers were commonly observed on these occasions in succession, with an interval of one minute between them; it was considered an object in general to miss a reading as seldom as possible; consequently, although the observation was usually an instantaneous act, as the magnets being suspended in heavy copper boxes were seldom in vibration, there was, notwithstanding, barely time for the observer to step out of doors after one of them, take a survey of the sky, and return to his place before the next, repeating the process if necessary, until the particulars required were collected. The same circumstance led to an abbreviated mode of description, which is to be regretted, but it

should be stated that the actual notes taken at the time have been carefully adhered to in the descriptions at the end of this chapter, with no other alteration or expansion than appeared absolutely necessary to make them intelligible. It must be added, that less stress was laid upon particular features and changes of aspect, or position, than would have been suggested by a better acquaintance, on my part, with what had been recommended in observations of the kind. Having been previously employed in the tropics, and passed but one winter in Canada, my attention had not been much given to the subject, nor was I provided with any such invaluable textbook for this class of observations as the report of M.M. Lottin, Bravais, and Martins, of the Commission du Nord, 1839, has since supplied to Arctic observers. A definite sense was attached from the first to each descriptive term employed, and I took pains that they should be used as much as possible alike by myself and assistant (Serjeant Henry.) Certain convenient signs or symbols were also fixed on to denote, without verbal description, particular forms of aurora, very much as those of Mr. Howard are used to denote forms of cloud. These were always used in the column of the register appropriated to remarks on the weather, but a place was also provided for more detailed descriptions. Some of the terms and distinctions, such as striated, serpentine, although suggested quite independently by the forms of aurora which presented themselves, I have since found more or less used by others, a satisfactory confirmation of their applicability.

In the descriptions which follow, then, the term streamer is confined to lines of light in rapid motion, appearing and reappearing suddenly and in any part of the heavens, but directed towards the zenith; they were frequently unconnected with any large body of stationary light. The term striæ, striated, refers to a peculiar appearance, sometimes seen in arches and even in detached masses and the larger streamers, an arrangement of the whole body of light in fine parallel lines, directed towards the zenith, and presenting the appearance of wool or cotton combed out: this was considered at the time to indicate a more active state of the electric forces than existed when it was wanting, - to be, in other words, a higher form of The terms beams, streaks, bands, were used to indidevelopment. cate long narrow portions of light, not sensibly in motion, the last being confined to those which crossed the magnetic meridian nearly at right angles. The term serpentine motion was employed to denote changes of outline different in character from the direct rectilineal motion of streamers, but resembling the changes of the folds of a curtain. Plates A. and B. of the admirably faithful Atlas of Auroras, published in connexion with the report above referred to, exhibit precisely the features described by the terms striated and serpentine ;

save that the vertical divisions are considerably more strongly marked than the writer is conscious of having seen them. The term *cirrous aurora* indicates light detached patches, scarcely distinguishable in form from cirrous clouds. Lastly, *auroral* haze denotes a luminous appearance, usually in the northern quarter, without definite form or boundary, and sometimes also the vanishing light of other descriptions of aurora. The reference (a) is given to this appearance in the abstracts as well as to the more definite forms.

The relative brilliancy is generally indicated by figures. Thus, 0.5 represents the faintest description of aurora; 1, faint aurora; 2, moderately bright aurora, and what in low latitudes would be considered bright; 3, decidedly bright; 4, the brightest and most perfect displays. Very few exhibitions were considered to come up to the last class; of these, the principal one was not observed at Lake Athabasca, but at the Painted-stone Portage near Lake Winnipeg, on the 7th August 1843. Much of the comparative brilliancy of the displays however depends on the absence of moonlight, a circumstance which was not sufficiently taken into account at the time. The dates of the changes of the moon are given in the register for reference. The elevation of arches was observed with a wooden quadrant and plummet. The directions given are magnetical, the declination being 28° E. More or less aurora was seen on 49 out of 116 nights of observation at Lake Athabasca. There was no night, properly speaking, at Fort Simpson after the 16th April, the latest date at which the sun sinks in that latitude as far as 18° below the horizon; nevertheless, the aurora was seen on twenty-four out of thirty nights of observation between the 1st April and the 6th May. After the last-named date, as the brightness of the twilight made it very difficult to distinguish between light cirrous clouds and patches of aurora, it did not receive much attention, and was not again seen up to the close of the observations on the 25th May; it is, however, quite possible that close attention would distinguish aurora occasionally, by its motion, to a much later date, as it has been seen in early evening and morning twilight in lower latitudes, and was undoubtedly seen at Toronto in full daylight, on the 29th September and 2d October 1851. It appears to have passed the zenith, when last described, on the 6th May, at about 13^h 15^m of local mean time, when the sun's centre was 9° 47' below the horizon, consequently, if its distance from the earth upon that occasion exceeded fifty geographical miles, it must have been within the sphere of the sun's rays. For want of corresponding observations elsewhere, there are no data for computing the height of any of the displays, but I avail myself of this opportunity of stating, that the impression conveyed to the senses upon many occasions was altogether opposed to the idea of the seat of the display being so distant as it seems to be in

lower latitudes. Those who have travelled in mountainous countries must have frequently observed the passage of clouds at a short distance above their heads, and remarked, that without the aid furnished by neighbouring peaks and rocks, there is the most convincing proof of the nearness of the cloud afforded by the manner of its motion, the sensible unfolding of masses of vapour, by the distinctness with which every detail of its form is seen. Precisely of the same nature is the evidence frequently given to the senses in high northern latitudes of the nearness of an aurora, and the universal belief of the fact among those who witness it perpetually, must be allowed to weigh somewhat in the same scale. This inference also is not irreconcileable with the results of actual measurement in Europe and the United States, if we suppose that the circumstances which favour this phenomenon occur nearer the earth in high than in moderate latitudes.

It is important to observe that every night on which aurora was recorded at Christiana in Norway, during the periods of observation under discussion, by M. Hansteen (Mem. de l'Acad. Royale de Bruxelles, tom. xx.) coincides with one of the dates of observation at Lake Athabasca or Fort Simpson; there are, however, but eight of the former and one of the latter, namely, October 24th, October 26th, December 8th, 1843, January 8th, January 16th, January 22d, February 17th, and April 17th, 1844. It would appear by the descriptions of M. Hansteen, that the phenomenon was generally more perfectly developed at the American than at the European station, although the latter is about 1° more to the north. There are no observations of aurora recorded at any of the Russian stations or Siberian stations, and but five at Sitka, all, except the last, noted as fuible ; the dates of these are October 15th, October 19th, 1843, and April 16th, 1844, all coinciding with northern observations, and March 7th and 28th, when no observations were made. Of the observations at Makerstour in the same periods, seven coincide with observations at our two stations, namely, October 16th, October 26th, November 2d, November 13th, April 5th, April 10th, April 17th. Of the remaining Makerstoun dates, twelve in number, observation was impossible from clouds on nine ; at two the brightness of the twilight equally prevented it; there is but one (when traces of aurora alone are recorded at Makerstoun,) upon which observation seems to have been possible, and no aurora occurred at Lake Athabasca; this date is January 5th. Such a result is the more remarkable, as the displays of the aurora at Lake Athabasca were probably of considerably less than average frequency and brilliancy. The winter of 1843-4, in the opinion of residents in that part of America, was remarkable for the absence of this phenomenon, as it was in lower latitudes.

				Number of Nights observed.	Aurora seen.	Observations impossible.
1850, November " December " January " February " March " April	-	-	-	24 31 31 28 31 30 175	11 19 20 21 19 19 109	11 9 7 7 11 10 55

The following list of Observations, made in 1850-1 by Mr. J. Anderson, C.F., at the same station, supports such an opinion.

Comparing similar periods, November to February; it appears in this case to have been seen on 89 per cent. of the nights when observation was possible. In the season of 1843-4, the proportion was 71 per cent.

The number of observations at Toronto from the 16th October 1843 to 28th February 1844 was also unusually small. It is only recorded at four hours of observation in that interval, namely, October 19^d 17^h, December 11^d 14^h, and January 24^d 17^h, and 18^h Göttingen. To these may be added October 20th, October 21st, and February 4th, from the reports of the Regents of the University of New York, and December 12th from the record of Mr. Herrick of Newhaven. The latter indefatigable observer, however, recorded suspicions of aurora on November 25th, 26th, 27th, December 10th, January 8th, 13th, and April 24th. The whole number of positive observations, however, in this period amounts to seven only, a number considerably below the average, which for Toronto alone, from 1840 to 1850 inclusive, is between eleven and twelve.

There are only four instances of aurora recorded at Lake Athabasca so soon after sunset or so shortly before sunrise as to come within the period of evening or morning twilight. On the 16th October it was visible at 6 A.M. in the east, very faint, and a portion almost imperceptible in the zenith; at this hour the sun was only 6° 44' below the horizon, and if the elevation of the aurora in the zenith exceeded twenty-four geographical miles it must have been within the sphere of the sun's rays. It was seen at the same hour on the 23d November as a faint light in the north-west, but at this time the sun was 16° 9' below the horizon. It was again observed at 6 A.M. on the 29th, the sun being at the time 17° 20' below the horizon. Lastly, it was seen at 6 P.M. on February 6th as a faint arch, the elevation of which is not recorded, and probably did not exceed 4° or 5°; the sun was at this time 11° 25' below the horizon.

There are also a few instances of its being seen very soon after twilight ended, or immediately before its commencement. The relative frequency of the phenomenon at different hours of the night is shown by the next Table.

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METEOROLOGICAL OBSERVATIONS.

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vations of Aurora in each month, and the number of entries of clouded,	An observation between two hours is included under the first of them; thus, an 7 h.
TABLE LXV.—Showing the Total Number of Observations of Aurord	partially clouded, and unclouded sky. An observation between two observation at 7 h. 30 m. is classed at 7 h.

1														_		
ల		Clear.	1	1	-	14	18	18	16	41	8	2	19	l	1	9
April 1 to May	Sky.	Partly Clouded.	1	1	8	4	4	63	9	ŝ	67	Ħ	14	I	I	53
il 1 to		.bobuolO	1	1	30	83	24	26	24	24	24	15	13	I	I	203
Apr	ON N	οſ Δ.	1	1	4	2	5	10	8	10	4	•	•	I	I	11
	Sum of the esti-	mared Bril- liancy.	0.1	9.0T	18.0	16.0	18-0	24.0	39.0	40.0	0.8I	0.97	22.0	16.0	2.2	1.5
		Olear.	8	44	42	39	40	38	41	42	43	42	41	41	39	525
	Sky.	Partly Clouded.	13	п	18	18	18	11	23	13	15	14	10	18	13	201
Total.		Clonded.	20	19	56	59	53	61	52	61	83	69	65	57	64	782
	No.	of A.	1	æ	10	10	13	13	23	26	11	18	13	12	တ	166
		Clear.	co	6	¢,	10	10	10	Ħ	12	Ц	10	80	10	œ	121
ary.	Sky.	Partly Clouded.	4	67	5	4	4	က	4	1	0	1	1	4	47	87
February.		Clouded.	18	14	Ц	Ħ	Ħ	12	10	12	14	14	16	п	13	167
	No.	of A.	н,	67 ;	es	es	63	63	4	9	4	c 3	-	67	•	8
		Clear.	10	14	12	п	14	п	12	10	Ħ	Ц	13	Ц	13	153
ary.	Sky.	Partly Clouded.	•3	67	ະ	63	63	ŝ	es	4	Q		63	4	-	87
January.		Clouded.	13	10	п	13	10	12	п	13	10	12	п	ц	12	148
	No.	Å.	0	ŝ	es	4	4	5	7	4	9	9	9	ŝ	•	11
		Clear.	ę	7	80	ŝ	Ð	4	4	9	9	4	5	14	မ	52
December.	Sky.	Clouded.	4	3	ŝ	4	9	9	10	ŝ	5 2	~	9	2	4	Ľ
Decen		.bobuolO	15	15	14	13	14	15	н	17	14	14	14	13	15	181
	No.	Å.	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	6												
		Clear.	10	80	6	1	9	7	œ	6	6	ш	80	6	ø	109
nber.	Sky.	Clouded.	н	0	67	e9	ŝ	တ	4	67	61	0	г	c1	61	28
November.		.Douded.	15	15	15	16	11	16	14	15	15	15	11	15	16	201
	No.	A.	0	-	63	-		n	5	ß	-		Ō	67	61	8
		Clear.	4	9	4	9	20	9	9	20	9	9	5	4	4	69
ber.	Sky.	Partly Clouded,		ч	ю	CI	ŝ	63	63	-	~	~	•	e7	61	28
October.		Clouded.	6	~	<u>م</u>	9	9	9	9	ø	20	10	~	~	80	85
	No.	A.	0	67	¢7	63	ß	4	4	8	ъ	4	\$	4	-	8
	Hours	Mean Time.	e	~	œ	8	10	Ħ	Midn.	13	14	15	16	41	18	Total
						-						_		_		

All the hours contained in the foregoing Table may be considered. as hours of darkness, except 6 A.M. and 6 P.M. for a short period at the beginning and end of the series, and this will be compensated by the longer absence of daylight in mid-winter. The sun rose at Lake Athabasca on the 16th October at 6^h 43^m A.M., and set at 4^h 49^m; morning twilight began at 4^h 6^m, and evening twilight ended at 7^h 22^m; all of mean time. On the 28th February the sun rose at 7^h 6^m, and set at 5^h 19^m; morning twilight began at 4^h 31^m, and evening twilight ended at 7^h 54^m. Hence, if the development of auroral light have no relation to the hour of the night, in other words, no diurnal law, we should expect to find the observations nearly equally distributed throughout that period. It is at once. apparent that such is not the case; the number under the several hours increases from 6 P.M. to midnight; there is a great excess at midnight and 1 A.M., after which the numbers diminish down to 6 л.м. The result is the same, if instead of counting the number, we allow weight according to the relative brilliancy of the displays. using the scale already explained; but as the necessary observations were not made on the spot to determine, with any precision, the integral value of the auroral light developed from hour to hour, any estimate founded upon that scale is necessarily vague. However, taking the numbers as they stand, and supplying them by estimation from the descriptions, where they are wanting, they sufficiently confirm the present conclusion. The totals for each hour are added in the last column of the Table for Lake Athabasca.

There is a great difference in the total number of observations recorded in the different months, indicating a less average duration, as well as a minimum of frequency, at the winter solstice. Allowing that the aurora might have been seen upon half the occasions when it is entered as partly clouded, the proportion of observation hours in which it was actually seen, bears the per-centage shown in the following Table, to the number of favourable hours:

		Total Number of Nights.	Aurora seen.		Observations impossible.		Per-centage of Hours of Observations to favourable Hours.		
1843–4. In October November December January February April - May 1 to 6		16 26 25 26 25 25 25 6	9 10 5 15 10 21 3	" "	7 1 13 12 10 11 7 1	Nights. "' " " " "	0 · 52 · 0 · 24 0 · 08 0 · 30 0 · 24 0 · 29	0'266	

Thus it appears that aurora was visible, in the winter of 1843-4, at Lake Athabasca, at about one fourth of all the hours of observation when it was possible to see it. On April 18, at Fort Simpson, which is the mean date of auroral observations, the sun rises at 4^{h} 34^{m} A.M., and sets at 7^{h} 26^{m} P.M., App. T.; and from 8 P.M. to 4 A.M. inclusive, have been taken as the limits of darkness for the whole period.

It may deserve remark that the month of December, when it was least frequent, was a remarkably mild one, and January an unusually cold one.

If the region in which the auroral development takes place be entirely beyond the limits of the atmosphere, as is commonly supposed, it is difficult to conceive any direct connexion between the aurora and the state of that medium, but this question may perhaps be regarded as not finally settled, and it may be worth while to examine the accompanying meteorological features. The first which will be noticed on referring to the meteorological register, is the apparent connexion between the occurrences of aurora and a state of calm. It appears by Table LXII., that the proportion of hours . entered as calms, to those of sensible winds, is 1,340 to 1,420 or 94 per cent., whereas the entries accompanying aurora are as follows:

Hourly Observations of Aurora.	Lake Athabasca.	Fort Simpson.	Total.
With High Winds	21	5	26
With Light Winds	38	10	48
With Calm	97	36	133

Showing a great preponderance under calm. In order to ascertain whether this could be due to a greater average freedom from cloud under such circumstances, separate abstracts have been formed of the proportion of clear sky accompanying entries of calm and wind. The result is, that the sky was on the average clearer in calm weather than during winds, but in a materially less proportion than is required to account fully for the excess of aurora under calms. The average of clear sky for the thirteen hours included in Table LXV. is—

> Under winds, 0'354 Under calms, 0'459

With respect to prevailing winds, it will be noticed, in the same way, that a much larger proportion of the accompanying winds contain easting than westing, and if we admit that the state of the atmosphere may have something to do with the phenomenon, it would follow that the conditions favourable to it, at Lake Athabasca, are derived rather from the side of the Atlantic, or from Hudson's Bay, than from the warmer side of the Pacific.

TABLE LXVI.

General Statement of the prevailing Winds accompanying Aurora at Lake Athabasca.

	Date. The Six Hor		preceding urs.	Accompany	ying Au	ora.	The Six succeeding Hours			
Me	an Tim	e. Prevailing Wind.	Descrip . tion.	Prevailing Wind.	1	rip-	Prevailing Wind.	1		
Oct	1843:									
,,	• •		Calm. Calm.	. —	Cal			Calm.		
		-		-	Cal	m.	E.N.E.	Light. Fresh.		
**	20 25		Calm.		Cal	m. -	$\begin{cases} S. by E. \\ E. N.E. \end{cases}$	Light. Fresh.		
"	25 26	W.N.W.	High.	<u></u>	Cali			Calm.		
"			Calm.	{ S.S.E.	Calı Fres		E.S.E.	Calm.		
"	28 	E.N.E.	Light.		Calı			Light. servation.		
"	31 {	S.E.	High. V. High.	- S.E.	V. Hi	gh.	E.S.E. W.N.W.	} High.		
Nov.	. 1	S. by W.	Fresh.	E.N.E.	Mod	.	E.N.E.	High.		
"	2	S.S.E.	Light.	s	Caln	1.	S.S.E. S.S.E.	{ -		
,,	9		Calm.] S.S.E.	High Calm		S.S.W.	High.		
"	13		Calm.		Calm	1	E.N.E.	Calm.		
,,	17		Calm.	8-1-14	Calm	11	S.S.E.	Light.		
**	22	s. s. w.	Calm. Light.		Calm	. h	E.N.E. {	Calm. Fresh.		
"	27		Calm.	N.E.	Fresh Calm		. T. W. F. J	Light.		
,,	28		Calm.	W.S.W.	Light	· .	•	Calm.		
. ."	29		Calm,	s.s.w.	High. Calm.			Calm.		
Dec.	9 13	E.S.E.	Calm.		Calm.		No obser	Fresh.		
"	15	S.	Light.	E.S.E. c	Light.	,	E.S.E.	Light.		
"	1		Light.		Calm.	R	S by E. N.N.W.	Fresh. Light.		
"	$22\{ $	S.S.E. E.N.E.	High. Fresh.	E.	High.	Ì	ד. ך	High.		
,,	26 {	S.S.E.	Calm. V. Light.		Calm.		E.N.E J S.E.			
184 Jan.		Í	-	N.E. ן				V. Light.		
Jan.	8	N.E.	Light.	E.N.E. }	Light.		E N.E.	Light.		
,,	9	w.s.w. {	V. Light.		Calm.		· -	Calm.		
**	15 {	S.S.W. W.N.W.	V. Light. Fresh.	w. {	V. Light Fresh.	. v	$\left. \left. \begin{array}{c} W. N. W. \\ W. by W. \end{array} \right\}$	Fresh.		
"	16	N.W. {	$\left. \begin{array}{c} Mod. \\ High. \end{array} \right\}$	N.W.	Mod.	1	N.N.W. {	Fresh.		
"	17	W.N.W. {	Light. } Fresh. }	N.N.W.	Mod.	1 -	N.N.E. N.	High. High.		
"	18	N.	Light.	w.n.w. }	Light.	ľν	V.N.W.	Light. Light		
	19		Calm.	····· · · · · · · · · · · · · · · · ·	Calm.	'		Light. Calm.		
	21 22	No observa N. N. E.	tion. Light.		Calm.			Calm. Calm.		
	24	_	Calm.	_	Calm. Calm.	t	_	Calm.		
,, ,	26 {	W. N.W.	High.	W.N.W.	Light.	h	-	Calm.		
	4 , 1		Calm,		Calm,	ſ	-	Calm.		

D	Date.			Accompanying	g Aurora.	The Six succeeding Hours.			
Mean	Time.	Prevailing Wind.	Descrip- tion.	Prevailing Wind.	Descrip- tion.	Prevailing Wind.	Descrip- tion.		
18 Jan, " " Feb. " " " " " " "	144: 28 30 31 5 7 11 12 13 15 16 17 20 21 26	W. N. W. N. N. W. No observ E. N. E. W.S. W. { N. N. W. N. E. W. N. W.	Light. Calm. Calm. Calm. Fresh. Mod. Mod. High.		Calm. Calm. Light. Calm. Calm. Calm. Calm. Mod. High. Calm. Calm. Mod. Calm. Calm.		Calm. Calm. Light. Fresh. Calm. Calm. V. Light. Calm. V. Light. Calm. Light. High. Mod. Calm. Calm. Calm.		
"	28	^I	Mod. Calm.	- L	Calın.				

TABLE LXVIL --- continued.

It is to be regretted that the observations are deficient as regards the azimuth of arches, and other displays, or their relation to the magnetic meridian; this particular is always too vaguely expressed, and frequently not noted at all. Careful observations of the point of convergence of streamers in the few instances in which they formed a corona, was also overlooked, which however arose chiefly from an exaggerated expectation of something better defined and more regular than ever presented itself.

The most frequent form of the auroral development was the simple arch ;* these arches in many instances underwent changes and assumed other forms, but probably in almost every instance the first definite form assumed was of this class. If we classify the entries at

^{*} Mr. Roderick Campbell, an officer in the service of the Hudson's Bay Company, kept, at my request, a meteorological register at Frances Lake, on the west side of the Rocky Mountains, situated about latitude 61° 30', longitude 129° W., from November 1844 to April 1846. This register comprises 13 months of observations of Aurora Borealis, exclusive of the Midsummer half year, when it could not be distinguished. It was seen on 66 evenings of that period, and is described as an arch in 41 of the entries; it possibly, also, had the same form on some of the nine occasions on which it is not described. There are only five dates on this list coinciding with observations at Toronto, and six more on which coincident observations are found in the Regent's Reports.

the several hours without regard to the subsequent changes, it appears that the numbers are as follow:

Nature of Display.	Before Midnight,	At Midnight.	After Midnight.	Total.
Undefined light, usually in the north A simple arch - Arch striated Arch combined with streamers Arch co-existing with transverse bands, which in most cases are probably the	3 34 2 4	3 7 2	19 26 2 3	25 67 4 9
remains of earlier arches, advanced to near the zenith Streamers alone, or principally Detached patches alone, or principally Transverse bands alone, or principally	2 3 1 2 51	4 6 1 23	8 8 12 6 79	5 15 19 9

TABLE LXVIII.

This classification rests on rather an arbitrary division, the descriptions not being sufficiently full to enable it to be made satisfactorily, but may serve as an approximation. On comparing it with the register at Toronto, it appears that the more definite forms of aurora occur in much the greater proportional number at the Northern station; a proof, if the more northern region is the nearer to the seat of the display, that the same object cannot be seen at both stations. Thus, we have at Toronto in $8\frac{1}{2}$ years of two-hourly and one hourly observations (January 1840 to June 1848 inclusive), the following number of entries:

TABLE	LXIX.

Nature of Display.	Before Midnight.	At Midnight.	After Midnight.	Total.
Undefined auroral light An arch Arch combined with streamers Other combinations, forming the finer displays	147 35 64 37	61 11 11 13	116 27 22 32	324 73 97 82
	283	96	197	576

The arches at Lake Athabasca form rather the largest proportion at the early hours of the night; the less definable forms, on the contrary, and those which the phenomenon assumes when the display approaches its conclusion, are more numerous in the latter part o. the night, all tending to show, as already inferred from the numbers in Table LXV., that the luminous display essentially belongs to the night, and that the presence of daylight is not the only reason why it is so very rarely seen when the sun is above the horizon.

A peculiarity may be noticed in the references to the state of the sky accompanying Table LXV., that there are comparatively a small number of entries under the head of "Partially clouded." It may be added, that there are comparatively few observations in the notices which follow, of the definite forms of clouds, the most usual state was a light uniform cloud or haze, covering the entire sky; this prevailed particularly for two or three hours about sunrise and sunset. The sum total of clear sky is considerably less from 6 to 9 AM., and again from 2 to 5 P.M., than at any other hours. It does not appear, however, that this was the case to a greater extent on the mornings following or the afternoons preceding aurora than on other days, but the reverse. Thus, we have the mean proportion of clouded sky for four hours (6 to 9 A.M.) on mornings following aurora, 0'52, and on the remaining mornings, 0'78. Again, for four hours (2 to 5 P.M.) on afternoons preceding aurora, it is 0.61, and on the remaining afternoon's 0'76. The aurora, therefore, would not appear from these observations, either to result from or to tend to produce, circumstances akin to those which produce common cloud, a view which has been sometimes taken. The sums total of clear. sky at the different hours are as follows :---

Midnight	51.2	Noon	41.1
1 А.М.	48.1	1 р.м.	41.2
2 "	48.1	2. "	34.5
3,,	47°5	3,,	33.2
4 "	44'8	4 "	29'4
5 ,,	50 4	5,,	27.6
6,,	45'0	6,,	37.9
7,,	33.7	7 "	48.7
8,,	27.2	8,,	49.7
9,,	24'7	9 "	47.4
10 "	40.5	10 "	47 4
11 ,,	42.9	11 ,,	46.9

With regard to the much disputed question of sound, neither the writer nor his assistant Serjeant Henry, were ever positive of hearing any, but the latter thought he did so upon one or two occasions. The result of inquiries upon the subject was, that opinions were nearly equally divided among the educated residents in the country; a small majority of those the writer consulted, agreed that a sound sometimes accompanied the phenomenon, but among the uneducated and native inhabitants, whose acuteness of sense is probably much supe-

rior to that of the other class, a belief in the sound is almost universal, and many individuals assured the writer they had heard it. Similar testimony has been borne very positively by the assistants at the observatory at Toronto, upon one or two occasions of great display.

CONNEXION OF AURORA WITH MAGNETIC DISTURBANCES.

A LITTLE experience in North America, whether in Canada or in the more northern regions, suffices to correct the impression that every display of aurora, however inconsiderable or distant, is attended by sensible magnetic disturbance. So far as the magnetometers, observed at short intervals, can be taken as a criterion, that is far from being the case, nor does it appear to be so by the more perfect test of photographic registration, as far as it has been applied at To this it may be added that the hours at which aurora Toronto. is most prevalent are midnight and 1 A.M. at Lake Athabasca and Fort Simpson (Table LXV.), whereas the period of greatest mean disturbance at both stations is 3 to 5 A.M.; it is also midnight at Toronto, where the period of greatest mean disturbance is 9 or 10 P.M.; if, therefore, the development of aurora has any immediate relation to the disturbance of the magnetic elements, the latter must precede the former in one region, and follow it in the other, a law which does not appear probable. On the other hand it is unquestionable that the more brilliant displays are almost always attended by magnetic disturbances, as are many of the more moderate ones; exceptions in the first class are very rare, but the writer believes that some can be established; the general conclusion must, however, be that an intimate relation exists between these distinct phenomena, although not that of cause and effect. The general practice of the observers was to read the instruments at intervals of a few minutes, during every aurora; if either of the magnets differed decidedly from its usual position, or was observed to be in vibration, readings were taken as on term days, or more usually they were read in succession, with an interval of one minute only between the observations, each being read, therefore, every third minute. If no sign of disturbance was observed, the remark "no disturbance" was made in the register, but the actual positions at the moments of observation were not thought important, and were not recorded ; this omission is to be regretted, since it reduces the amount of proof of the absence of disturbance, which has to be established.

The following are the dates of these entries of "no disturbance;" the character of the aurora on each occasion will be seen by consulting the descriptions appended:

,'	D.	н.	́н. ́	· •	•	D.	H.		D.	H.
October ;	. 27	21	22 Gött.		January	19	16	to	20	1 Gött.
33	28	18	19		,,	20	19	,,	20	brilliant.
**	S 1	18			"	21	21	32	24	,
November	17	19		1	33	22	21		22	
**	22	20			"	26	17		•	
**	27	20		1	February	12	18	39	20	
19	29	19	21		,, -	15	20	.,	21	
January	9,	16				16	17			brilliant.
,,	17	20		1	**	27	1			
										N

The following list contains the dates of the more brilliant and the longest displays of aurora, the number of hours at which they were recorded, and the order or relative place of each day among the other days of the same month, in respect to its "mean irregular fluctuation" of two elements (p. 74), together with the values of those quantities:

	No.	Order.		Days		No.	Or	Days		
Date.	of Hours.	Dec. F y	Η. F. F ψ	in Month.	Date.	of Hours	Dec. F ψ	Η. F. F ψ	in Month.	
1843-4 : October 16 ,, 17 ,, 26 November 2 ,, 13 ,, 29 December 26 January 16 ,, 19	9 9 10 5 4 6 3 4 9	3 4 6 2 5 13 12 19 16	2 1' 6 1 9 5 16 8	14 " 26 " 25 26 "	1844: January 20 "22 "26 February 5 "12 "16 "21 "28	7 4 6 4 4 5 4 5 5 5	25 7 4 6 9 21 7 11 2	18 10 5 9 1 9 13 12	26 ,, ,, ,, 24 ,, ,, ,, ,, ,, ,, ,, ,, ,, ,	

TABLE LXX.

By conforming to Göttingen time, the night is divided at 4 A.M. at Lake Athabasca, but as four-fiths of the observations of aurora fall before that hour, its influence on the daily mean irregular fluctuation should be strongly marked in the dates given. It appears that among these days there are several which take a low place in the order of relative disturbance, so far as the quantity referred to is a criterion. Upon the whole, the mean irregular fluctuation of Declination for fifty Göttingen days on which aurora is recorded, is 6'.65, and for the remaining sixty-five days is 7'.10; it is 13.28 scale divisions of the Bifilar, upon forty-nine days of observation with that instrument, when aurora was seen, and 13.38 div. on the remaining sixty-five days, thus being actually less with both instruments on the first than on the second class. The means for the month of January, on which the proportion of auroras to hours of observation (p. 145) was 0'30, are Declination 3''90, Bifilar 18'66 div.; and in December, when the former quantity is only 0'08, the latter are 7''32 of Declination and 11'99 div. of the Bifilar, the Bifilar here exhibiting a diminished disturbance, but on the

other hand the Declination, as in the other comparison, a greater degree of it.

Although, however, it can be shown that there are instances of aurora, to all appearance unattended by magnetic disturbance, it is remarkable that magnetic disturbances unattended by aurora are very rare; there is but one decided example of it under circumstances of the sky which would have allowed the latter phenomenon to be observed, if it existed; there are also one or two instances in which the disturbance was not observed to commence until some time later than the appearance of aurora, but in every other instance either the sky was clouded or aurora was seen. There appear to be but five instances in which an entire cloudless night passed, without aurora being seen at any time, namely, November 27th, December 20th, January 2d, January 5th, and February 19th. There are also seven half-nights terminating at or commencing from midnight, and some shorter periods, to which the same remark applies, but on only one complete instance of this nature was there any magnetic disturbance observed, namely, January 5th. So far, therefore, as a conclusion can be drawn from such limited data, it would appear that these phenomena are so related, that while the amount of electrical excitement necessary to produce aurora borealis, does not necessarily produce any sensible disturbance of the magnetic elements, yet the latter is almost necessarily attended by the former.

The extra observations on account of disturbance, taken up to the period at which the twilight prevented aurora from being distinguished, are classified with reference to this circumstance in the following list.

[The range of Declination and Horizontal Force is added on each occasion, taking one division of the Bifilar scale = '0003412 X at Lake Athabasca.]

	,1,2,0,9,100000				
		Citté Mimo	Range.	ΔX	
Date.	Mean Time.	Gött. Time.	Declination. Bifilar	$\frac{\Delta X}{X}$	
1843. October -	D. п. п. 15 13 to 21	D. H. * 15 21 to 3+	°' 2 35 5 214 3	•0731	Mem. The differences of Ho- rizontal Force are from the readings, uncorrected for
	16 17 to 19	17 1 to 3	1 3.2 203.0	•0692	`temperature changes.
	17 9 to 13	17 17 to 21	1 36.4 135.4	•0461	
	25 11 to 19	25 19 to 3+	2 7.4 233.8	•0798	
	26 12 to 18	•		•0546	
		+ Indicate	s the following Got	tingen day	· ·

TABLE LXXI.

I.-Magnetic Disturbances during which Aurora was visible.

. []			<i>.</i>	—Magnet	ic Disturba	nces—c	ontinued	L
		· · · · ·			Rang	е.	AT	· · ·
Date.	Mea	n Time.	Gö	tt. Time.	Declination.	Bifiar.	$\frac{\Delta X}{X}$	
1843. November		н. н. 08 to 17	D. 2	н. 16 to 1+	° / 2 17'2	197.0	•0672	
	5	15 to 17	5	23 to 1+	0 41 2	85.2	•0290	
-	9 :	14 to 16	9	22 to 0	0 15 2	91.7	·0310	Aurora was visible at mid- night, but none during the observations here referred
•	18 :	12 to 15	13	20 to 23	1 11'6	91.7	·0310	to.
	29 :	13 to 14	29	21 to 22	0 22.0	20.0	·0068	
December -	26 :	13 to 18	26	21 to 2+	0 42.0	134.0	·0457	
1844. January -	8 :	12 to 14	8	20 to 22	0 20.2	73•4	•0249	This occasion, although in- troduced here, extra obser- vations having been taken from 1 to 2 A.M., is perhaps an instance of aurora un- attended by disturbance of the magnetic elements.
	19 1	13 to 14	19	21 to 22	0 22 0	55.2	·0188	1
	24 ar	nd 25			2 15.8	190.5	·0648	Term day.
	26 1	14 to 15	26	22 to 23	0 31.2	26.2	·0089	
February -	5	8 to 15	5	16 to 23	1 05 [.] 0	195.8	•0669	The principal disturbance occurred between mid- night and 15h., but no aurora appeared after 9h. although it remained cloudless.
	16 1	13 to 14	16	21 to 22	0 19.0	33.0	·0113	See remark to January 8th.
	26 1	15 to 16	26	23 to 0	0 11 2	68.0	•0232	Aurora became visible at 17h; it was clouded during the observations.
	28 1	l6 to 17	29	01 to 1	0 20.8	-	-	Clouded during the obser- vations. See remark to January 8th.
				At	Mackenzie's	River.		
	21	13 to 22	2	22 to 6+	3 18 4	140.0	·0845	Aurora was seen from 8 P.M. to midnight. This dis- turbance began after it was quite over.
April -	6	9 to 11	6	18 to 20	0 44 0	61.2	•0195	an quire of the
	91	l2 to 16	9	21 to 1+	1 17.6	75.4	·0240	
	10	9 to 14	10	18 to 23	1 26.2	162.0	>:0515*	
		l2 to 18	14	21 to 3+	2 16.2	199.0	•0564	
		10 to 12	15	19 to 21	0 40.6	78.2	.0221	
		5 to 22		14 to 7+	8 10.0	570.0	> 1613*	
		l3 to 14	19	22 to 23	0 45 4	76.1	•0215	man to the test
	24		07	-	3 46.0	270.0	•0767	Term day, April 24 and 25.
		1 to 18	25	20 to 2+	2 20.4	289.0	·0818	Generally clouded, but au- roral light visible.
Mor		12 to 20	28 0	21 to 5+	1 58.5	139.0	•0473 •0197	
May .		10 to 14 12 to 24	2 5	19 to 23 12 to 14	0 59·8 1 16 5	66.1 108.1	•0187 •0306	Aurora was not visible after this date.
		anna a shina an an an an an an an an an an an an a			he scale on f			

* Beyond the scale on the negative side.

, ,)

		Mean		0.	Out to		Ra	nge.	ΔX		
Date.		Time.		Gött. Time.			10.	Declination.	Horizontal Force.	$\frac{\Delta X}{X}$	
1843. December	8	п. 10 tc	н. 12	D. 8	п. 18		н. 20	° / 	49'2	•0168	It was unclouded during only a portion of this dis- turbance, which amount- ed but to a magnetic
33	19	12 to	18	19	20	to	2+	0 34 0+	128.8	•0440	shock. It was clouded during the greater part of this dis- turbance also, and only became clear at 16h.
33	29	13 to	16	29	21	to	0	1 07.3	126.9	•0433	Perfectly unclouded dur- ing the last 2 hours only.
1844. January	5	15 to	19	5	23	to	3+	1 04.0	234.0	•0798	The only complete instance of unclouded sky during a disturbance, and no aurora seen.
February	5	12 to	• 15	5	20	to	23	0 59.8	229.5	•0783	There was aurora visible down to 9h. as noted above, but none was seen later, although the sky remained unclouded.

II.—Magnetical Disturbance with a clear sky, but no Aurora visible.

	Mean Time.			Range.		۵X	
Date.	Mean Tim	. G	ött. Time.	Declination.	Horizontal Force.	$\frac{\Delta X}{X}$	_
1843. October -	D. D. 18 and 19	D.	н. п.	o / 124	70.2	•0241	Term day.
	19 10 to 1	19	18 to 0+	0 54.0	184.8	•0630	Snow.
	23 17 to 1	24	1 to 3	0 29.2	80.0	·0273	
	29 18 to 2) 30	2 to 4	1 25.0	77.3	•0264	
	30 13 to 2	30	21 to 4+	1 24.0	213.0	•0727	
November	8 9 to 1	7 8	17 to 1+	1 21.0	124.0	·0424	Cessation from 20h. to 23h. Gott. Snow.
	10 12 to 1	10	20 to 22	0 17.8	83*4	·0285	2511. GOIL, SHOW.
	12 19 to 2	2 13	3 to 6	0 30.8	101 · 1	·0342	Daylight.
	13 12 to 1	5 13	20 to 23	1 11.6	91.0	·0310	
	14 11 to 1	2 14	19 to 20	0 50.6	34-3	•0117	
	16 9 to 1	1 10	17 to 18	0 37 .0	12.9	•0044	Snowing.
	23 16 to 1	3 24	0 to 2 *	0 19.8	78.6	•0268	
December -	1 13 to 2	1	21 to 4+	2 40 2	136.5	•0466	
	5 14 to 1) [22 to 3+	0 57.6	113.6	•0388	
	19			-		-	See List II.
	27 10 to 1	2 27	18 to 20	0 19.4	19.3	•0066	Snowing towards the close.
	27 18 to 5) 28	2 to 4	1 17 .4	85.8	•0293	Snowing.
10/4	29 —			-	-	-	Sce List II.
1844. January -	4 8 to :	ə 4	16 to 3+	1 26.0	292.5	·0998	
	5 0 to	L E	8 to 9	0 15 2	41.2	•0141	Daylight, an unusual hour for disturbance.

1 1	111Magnetic Disturbance-continued.								
	Mean Time.		Gött, Time.		Rat	1g0.	<u>ΔX</u> X		
Date.					Declination.	Horizontal Force.		· · · ·	
1844. January -	р. 16	н. н. 16 to 17	17	н. н. 0 to 1	° / 0 7·2	37.5	•0128	The Bifilar Magnet unusual vibration.	
	81	16 to 20	Feb.	0 to 4	1 12.7	128.0	•0437	ι.	
February -	1	11 to 13	1	19 to 21	2 07.2	113.2	•0387		
•	1	22 to 24	2	6 to 8	0 52.0	63.0	·0215	Daylight. Snow.	
	2	9 to 13	1	17 to 21	0 40.6	49.4	•0169		
	4	0 to 18	5	0 to 2	1 58.4	229.5	•0783		
	6	10 to 12	6	18 to 20	0 45 4	39.4	•0134		
	7	20 to 22	8	4 to 6	0 20.0	58.0	•0198		
		•		At F	'ort Simpson.			•	
April -	26	8 to 18	26	17 to 2+	1 58 5	172.3	·0488		
	29	15 to 17	80	0 to 2	1 36.4	209 5	•0593		
	30	5 to 16	30	14 to 1+	2 15 2	288.8	·0806		

III.-Magnetic Disturbance-continued.

TABLE LXXII.

ABSTRACT FROM THE METEOROLOGICAL JOURNAL.

[The entries are given in full when Aurora was visible, but otherwise are given for 3 A.M., 9 A.M., 3 P.M., and 9 P.M. alone. The Göttingen time of particular appearances is retained, for convenience of reference to the Magnetical Observations.]

Da	te.	Win	nd.	Temp.	
Gött. Time.			Force.	Newman corrected.	Weather.
Octobe D. H. 15 21 22 23	er 1843. D. H. 15 13 14 15		Calm. Calm. Calm.	0 	Unclouded. Faint aurora, in bands from W. to E. Unclouded. Faint diffused aurora both N. and S. of the zenith, and in motion. Obser- vations for disturbance began. Unclouded. Aurora brighter, and gathered to a corona near the zenith. Most westerly position of the Declinometer at 23 ^h 5 ^m (-15 %) most distorly position at 23 ^h 5 ^m
16 0	16	-	Calm.	31.0	(-1° 2'.6); most existerly position at 23 ^h 50 ^m (+1° 19'.7); range, 2° 38'.5. Two parallel arches of aurora in the N.; brightest at the extremities, E. and W., and striated. Lowest reading of the Horizontal
1	17	-	Calm.	31.1	Force at $0^h 5^m$ ($-068 X$.) Unclouded. Brightest portion of aurora to the S. of the zenith; faint auroral bands in the E. Highest reading of the Horizontal Force at $1^h 20^m$ ($+015 X$.)
2	18 21	-	Calm. Calm.	30·4 33·9	Partially clouded with light cirro-cumuli and cirri. Very faint aurora still visible in the E. Cirrous haze in the atmosphere.
Ð	1 21	. –	l Carm.	1 00 0	I OILLOUD HERE IN THE WALLOUDINGLOW

AT LAKE ATHABASCA.

. ...ť

* The actual difference between the highest and lowest readings during a period of disturbance is here called the range of scale. The deviation E and W., or + and -, are measured from the mean scale reading for the same hour and minute; thus their sum may be greater or less than the difference of scale reading, by the amount of the mean diurnal change in the interval between them.

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Abstract from the Meteorological Journal-continued.

	Da	ate.	1	nd.	Temp.	gical Journal-continuea.
	ött. me.	Mean Time.	Direction.	Force.	Newman corrected.	Weather.
(Octob	er 1843.				
D. 16		D. н. 16 3	-	Calm.	43·8	Overcast with cirrous haze; a few clear spaces
	17	9	_	Calm.	37.5	to the S.E. Unclouded since 6 ^h .
	18	10		Calm.	35.4	Unclouded. Bright arch of aurora (3) in
	19	11		Calm.	84.2	the N. Unclouded. A broad arch or band of aurora (4) extending across the zenith; a brighter
	20	12		Calm.	83.2	arch (3) to the N. A very faint arch of aurora (5) in the N.
	21	13	-	Calm.	81.7	Unclouded. A faint auroral arch extending from N.E. to N.W., brightest at the extre- mities. A few faint detached patches in the
	22	14	-	Calm.	30.5	N.W. Arch less distinct. A broad band of aurora (5)
	23	15	-	Calm.	29.6	to the S. of the zenith. Appearance of aurora nearly the same as
17	0	16	-	Calm.	27.0	before. Auroral arch much brighter than before, at its
	1	17	-	Calm.	28.1	N.W. extremity. Unclouded. Faint arches or bands across the meridian in the zenith. Observations for disturbance began; at 1 ^h 35 ^m most easterly position of the Declinometer (+0° 46' 6); at 1 ^h 45 ^m lowest value of Horizontal Force (- '062 X); at 2 ^h 40 ^m most westerly position (-0° 15'5), range 63'2; a 2 ^h 55 ^m highest value of Horizontal Force (+ '005 X).
	5	21	N.N.E.	Fresh.	32.6	Hazy. Wind rising with gusts.
	11	17 3	N.N.E.	V. light.	83.2	Overcast and hazy.
	15 .	7	N.	Light.	32.4	Unclouded since 6 ^h . At 15 th a faint auroral arch (4), elevation 12°, extending from N.E. to N.W.
	16	8	N.N.E.	Mod.	32.1	Arch stationary. Appearance of aurora little changed.
	17	9	N.N.E.	Mod.	31.2	The same as before. Observations for distur- bance commenced. At 17 ^h 55 ^m most easterly
	18	10	N.N.E.	Mod.	31.2	position of the Declinometer (+0° 39' 9). Arch slightly risen, alt. 17°, and broader. Highest reading of Horizontal Force at 18 th 55 th .
	19	11	N.N.E.	Mod.	32.1	Arch rising; at 19 ^h 16 ^m it extended across the zenith from E. to W., at 19 ^h 23 ^m began to break up into waves in quick motion, but receded from the zenith to the N. Most westerly position of Declinometer at 19 ^h 30 ^m (+0° 57''), range 1° 36' 4.
	20	12	N.N.E.	Light.	32.0	(+6° 57'7), range 1° 50° 4. Detached masses of aurora, resembling cirrous clouds (4) in the zenith, and to the S. and E., which disappeared before 20° 40°. No aurora at the two following hours. Lowest reading of Horizontal Force at 20° 15°.
	23	15	-	Calm.	32.0	Faint cirrous aurora visible.
18	5	21	N.E. by E.	High.	83.7	Wind in gusts. Cir-stratus in the S.E.; re- mainder clear.
	11	18 3	N.E. by E.	Fresh.	36.6	Nearly overcast. Cir-cumulus in the S.E. Term day. Most easterly position of the Declino- meter at 15 ^h 40 ^m (+19'5); at 10 ^h wind
	17	9	N.N.E.	Fresh.	31.8	fallen. Overcast since 13^{h} ; wind high, and in gusts. Most westerly position of the Declinometer at $16^{h} 35^{m} (-4' 34)$, range, $1^{\circ} 2' 4$.
	23	15	-	Calm.	30.0	A few stars visible near the zenith. Remainder overcast.
19	5	21	-	Calm.	31.8	Dull and overcast. A sprinkling of snow at 16 ^h and 17 ^h .
	11	19 3	-	Calm.	32.7	Fine snow mixed with rain since 9 ^h ; continued with intervals until past 13 ^h . Considerable disturbance throughout the term observa- tions, with manifest correspondence in some of the principal movements at Lake Atha- basca, Toronto, and Greenwich.

	Abstract from	the Meteorological	Journal-continued.
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	Da	te.	<u> </u>	Wi	nd.	Temp.	
Gð Tir	jtt. ne.		an ne.	Direction.	Force.	Newman corrected.	Weather.
р.		er 184 D. 19	3. н. 9	-	Calm.	° 30°4	Completely overcast. Observations for disturbance 18 ^h to 19 ^h , and again 21 ^h to 0 ^h . Most easterly position of the Declinometer at 19 ^h (+0° 23° 0); most westerly position at 21 ^h 30 ^m ($-24''4$); range, 0° 47'.6. The following entry occurs in the Meteorological Register at Toronto, at 17 ^h Gött:" Light cirri and haze "generally over the sky, faint auroral light "in the north; faint streamers." Aurora was seen at three stations in the State of New York on the same evening (Regent's
20	23 5		15 21	_	Calm. Calm.	29·0 30·4	Reports.) Snowing lightly since 21 ^h . Overcast.
20	11	20	3	N.N.E.	Light.	32.7	Overcast, with cir-cumulus.
	17	20		11.11.E.	Ligno.	1	Clear and unclouded.
	21		9 13	_	Calm.	31.6 29.0	Unclouded. A faint auroral arch (4) at an ele- vation of 13°. Aurora was also seen at two stations in the State of New York on the
	23		15	-	Calm.	29.1	same evening (ib.) Calm and unclouded.
21	5	01	21	N.N.E.	V. light.	31.7	Partially clouded. Fleecy cir-cumuli, with clear spaces.
	11	21	3	S.W.byS.	Fresh.	47.5	Completely clouded. Wind fresh and gusty.
	17 Sun	day. 22	9	s.s.w.	High.	41'5	Dense masses of cir-cumuli to east and zenith, and round horizon; remainder clear.
22	23	22	15	S.W. by S	V. high.	14.8	Blowing a gale. Sky completely overcast.
23	5		21	W.S.W.	V. light.	16.0	Wind fell at 2 ^h . Snowing lightly since 3 ^h .
	11	23	3	S.S.W.	Light.	18.0	Fair, with cirrous clouds. Ceased snowing before 7 ^h .
	17		9	w.s.w.	Light.	16.1	before 7 ^b . Thickly overcast, and very dark.
	23		15		Calm.	14.8	Dull; calm; a few stars visible; mostly
24	5		21	-	Calm.	17.1	clouded. Overcast since 0 ^h . A few particles of snow at 4 ^h . Extra observations for disturbance, 1 ^h to 3 ^h . A minimum of Horizontal Force at 1 ^h 15 ^m (-027 X). A maximum of Declination at 1 ^h 25 ^m (+0° 35' 1).
	11	24	3	-	Calm.	19.2	at 12 ^h .
	17		9		Calm.	1616	A bank of stratus to east. Remainder un- clouded.
	23		15	W.S.W.	High.	17.5	Overcast. Wind high and squally.
25	5		21	W.S.W.	Fresh.	21.7	Overcast, beginning to snow lightly. Masses of fog on the lake. Clouds very low. Cir-cumuli.
	11	25	3	W.S.W.	Fresh.	21.2	
	17		9	w.s.w.	Fresh.	8.2	Densely overcast. Observations for disturb- ance began at 19 ^h . At 19 ^h 5 ^m most easterly position of Declinometer $(+1^{\circ} 47'^{\circ} 6)$.
	21		13		Calm.	4.9	Unclouded. Sky cleared since 20 ^h . An auroral arch (3, 4,) at an elevation of 5°, rising rapidly; at 21 ^h 13 ^m elevation 35°, At 21 ^h 28 ^m aurora in the zenith, and portions to the S.; brightness (2, 3), the brightest portion to the W., but dispersed and broken up. At 21 ^h 33 ^m it appeared as a broad faint arch, 45° above the southern horizon, but dispersed and brighter (3, 2,) to the W.; portions to the E. had a striated appearance. The most westerly position of the Declinometer at $21^h 35^m (-0^o 19' 8)$; range, $2^o 7' 4$. At $21^h 46^m$ it had nearly disappeared, but a fresh display, of an irregular flexuous form, brightness (3), was rising in the N.
	22		14		Calm.	3.3	Unclouded. Aurora arch (4) to N. and (5) to S. of zenith; elevation not recorded. At 2^{2h} 5 ^m the highest value of Horizontal Force (+ 015 X). At 22^{h} 30 ^m aurora faint and sta- tionary. Inclinometer thrown into a small arc of vibration, not usual with this magnet.

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Abstract from the Meteorological Journal-continued.

	Da	te.	Wi	nd.	′ Temp.	****
Gö Tir		Mean Time,	Direction.	Force.	Newman corrected.	Weather.
0 D. 25	octobo H. 23	er 1843. D. H. 25 15		Calm.	° 0.1	A faint striated arch of aurora (4); elevation 16° from southern horizon. Another in the N. (5); elevation 20°. At 23 ^h 10 ^m brilliant annular bands (3, 4,) with streamers, and striated to S. and W. At 23 ^h 15 ^m aurora in the form of a thin flexuous ring, striated, in moderate motion, passing from S. to N., and E. of the zenith. At 23 ^h 25 ^m aurora much
26	0	16	-	Calm.	-2.2	fainter, and more diffused; Declinometer more disturbed. Easterly movements, and lowest value of Horizontal Force (~ 075 X). Unclouded. Aurors very bright (2, 3,) forming an imperfect circle, striated at 0 ⁴ 25 ^m . Fainter and more diffused, in detached flexuous por- tions, striated. At 0 ⁴ 40 ^m aurora fainter, like
•	1	17	-	Calm.	-5*8	cirrous clouds, detached round horizon. Mag- nets returning to their mean positions. Unclouded. Aurora fainter (4), patches re- sembling cirrous clouds, and stationary; 1 ^h 30 ^m scarcely perceptible; 1 ^h 45 ^m aurora
	5	21		Calm.	-0.1	at an end. Lightly overcast, with cirrous clouds.
	11	26 3	_	Calm.	6.2	Lightly overcast, with cirrous clouds and haze.
	15	7	-	Calm.	-4.7	Unclouded. At 15 ^h 30 ^m a faint auroral arch at
	16	8	-	Calm.	-6.0	elevation 15°, from N.E. to N.W. Unclouded. Arch rising gradually, and be- coming brighter; elevation 18°. A second arch, nuch fainter, at elevation 13°.
	17	9	-	Calm.	-5.1	Unclouded. A faint auroral arch (5), elevation
	18	10	-	Calm.	2.2	5°, to E. of N. A faint auroral arch (5), at an elevation of 37° Lightly overcast to the S.; remainder of the sky clear.
	19	11	E.S.E.	Fresh.	0.6	Unclouded. A faint auroral arch (5); eleva-
	20	12	E.S.E. E.S.E.	Fresh.	0.5	unclouded. Aurora in heavy masses of mode- rate brightness, (3, 4,) in little motion. Long streamers, extending to the zenith. Obser- servations of disturbance commenced. At 20^{6} 40 ⁶⁰ two long beams, nearly stationary, alt. 54° and 60°; brightest (2, 4,) to westward of the zenith. Flexuous masses and uncon- nected streamers in N.N.W. and N.E. As yet little disturbance.
	21		E.G.E.	F TODI.		Unclouded. Aurora faint (4); diffused like thin vapour in the zonith, with moderate rapid motion to the E. Streamers somewhat brighter (3) in the N. Faint streamers and flexuous masses to the E. and N.W.
	22	14	E.S.E.	Fresh.	-0.1	Becoming clouded. Aurora very faint (5); streamers scarcely perceptible; at 22 ^h 30 ^m no aurora visible. The greatest value of the Horizontal Force (-'028 X) occurred at
27	0	16	-	Calm.	0.0	23 ^h 30 ^m . Unclouded. A fresh display of aurora, rising rapidly from the northern horizon, and ex- tending itself from an alt of 20 ^o N. to 40 ^o S. At 0 ^h 30 ^m considerable disturbance. Bright aurora (3, 4,) in flexuous masses, to S. and S.E. of the zenith. An arch (3), at elevation 36 ^o , extending from N.E. to N.W.
	1	17	_	Calm.	0*2	Lightly clouded to S. and E. Patches of aurora of various brightness (3, 5). At 1^{h} 5 ^m tho easterly extreme of the Declination (+34'0); the lowest range of Horizontal Force (-'058 X), about 10 ^m carlier. At this time a large dense mass of aurora passing the zenith, where it became faint, in flexuous streaks, without perceptible motion. At 2 ^h no aurora.
•	5	21	E.N.E.	Light.	1.5	Clear and unclouded. Light easterly wind.
	11	27 3	N.N.E.	Fresh,	9.2	Lightly overcast with uniform haze.
	17	9	N.N.E.	Fresh.	5.7	Partly overcast. Snowing lightly.

Abstract fr	om the Meteor	rological Journal	-continued.
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Ļ	Da	te.		Wind.		Temp.	
Gð Ti	tt. ne.	Mean Time.		Direction.	Force.	Newman corrected.	Weather.
D. 27)ctob H. 21	er 184 D. 27	3. н. 13	N.N.E.	Fresh.	° 0'4	Lightly clouded in the S. A faint aurora in the N. Observations for disturbance since 20 ^h ,
	22		14	N.N.E.	Fresh.	0.1	Most westerly position of Declinometer at $20^{h} 45^{m}$ (0° 6° 3). Unclouded. A faint aurora, diffusing itself from a point at an elevation of 32° .
	23		15	N.N.E.	- '	-0.1	Unclouded. No aurora visible. Horizontal Force greatest at 23 ^h 30 ^m , least at 0 ^h 55 ^m ; most easterly position of Declinometer (+0° 38'2) at 1 ^h 5 ^m ; range 0° 54'0.
28	5		21	N.N.E.	Fresh.	~0'1	Unclouded, but has been generally hazy.
	11	28	3	N.N.E.	Light.	8.0	Unclouded, clear since 5h; but soon after
	17		9	N.N.E.	Tight	9'1	slightly overcast.
	11	•	9	TA'TA'E?'	Light.	91	Unclouded since 14 ^h , save a few cirrous and stratus to S.W. at 16 ^h .
	18		10	N.N.E.	Light.	7.8	A considerable quantity of faint cirrous aurora floating about, with an arch of moderate brightness (4, 5,) and striated to the N.W., but no disturbance.
	19		11	-	Not ob- served.	6.9	Aurora (4) diffusing itself from a point in the W., with a striated appearance, and as before, in detached patches elsewhere.
	20		12	· ~	**	5.2	Faint aurora (5). Unclouded.
29	Sun 23	day. 1 29	15	-	Calm.	22.5	Uniformly overcast. Disturbance observations
					2 4		began at 2 ^h . Easterly extreme of the Declino- meter at 2 ^h 0 ^m (+1° 9' 7). Horizontal Force lowest at 2 ^h 5 ^m (- '008 X); greatest at 3 ^h 55 ^m (+ '016 X).
80	5	{	21	-	Calm.	23.8	Uniformly overcast. Extra observations ended at 4 ^h .
	11	30	8	-	Calm.	23.8	Uniformly overcast. A few particles of snow at 7^{h} and 9^{h} .
	17 23		9 15		Calm.	21.6 19.6	Uniformly overcast. Thickly overcast. Observations for disturbance began at 21^{h} ; most westerly position of the Declinometer Magnet at 22^{h} 5 ^m (-0° 30' 3); most easterly position at 00 10 ^m ($+0^{\circ}$ 49' 2); range, 1° 24' 0. Lowest range of Horizontal Force at 22 ^h 20 ^m (-047 X); highest at 2^{h} 20 ^m ($+'$ 922 X).
81	5	1	21		Calm.	22.8	Thickly overcast.
	11	81	3	N.N.E.	Mod.	24.3	Still overcast.
	17	1	9	E.	Very high	16.9	Wind changed since 16 ^h from N.N.E. to E.S.E.
	18		10	E.N.E.	Fresh.	16.0	Sky clearing since 14 ³ . Unclouded. A brilliant aurora (3), the light diverging from a focus in the E., extending to the zenith; flexuous, with streamers. At $18^{h} 15^{m}$ it hal become diffused and faint (4, 5). No disturbance.
	23	1	15	W.S.W.	High.	14.6	Wind high and squally. Sky partially covered.
1	Nove 5	inber	21	w.s.w.	Mod.	17.9	Clouded. Wind moderated since 3^{h} . A little snow at 4^{h} .
	11	1 1	8	N.E. by E.	Light.	29.0	
	17 21 23		9 13 15	S.E. by S. N.N.E. N.N.E.	Fresh. Mod. Mod.	21.7 22.5 21.5	Overcast thick. Wind changed to E. at 6 ⁿ . Partially clear. Wind in gusts. Unclouded. A faint arch of aurora. Clear; no aurora visible; clouded over from the E. soon after.
2	5 11 16	2	21 3 8	E.S.E. E.S.E.	High. Light. Calm.	$22.9 \\ 30.2 \\ 23.8$	Lightly overcast. Wind in gusts. Sky nearly clear since 6 ⁴ . A faint auroral arch (5) from N.E. to N.N.W.; clevation 28 ² . Magnets disturbed, but not
	17	n en	9	[Calm.	23.3	much change of position. Greatest value of Horizontal Force (+ 008 X) at 16^{5} 15^{50} . A faint but broad band or arch of aurora (4, 5,) covering the heavens, from alt. 46° to the zenith; 17^{h} 15^{m} , aurora more brilliant, the arch breaking up, and masses in motion. 17^{h} 30^{m} , the preceding display at an end; a fresh arch (4), elevation, 10° in the N.E. Most westerly position of the Declinometer (- 1° 23° 9) at 17^{h} 30^{m} . 17^{h} 40^{m} , the arch risen to 30° , and beginning to break up; 18^{h} , no aurora.

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METEOROLOGICAL.	OBSERVATIONS

Abstract from the Meteorological Journal-continued.

Di	ate.	Wind.		Temp.	gitat 9 ottilai—continaeu.
Gött. Time.	Mean Time.	Direction.	Force.	Newman corrected.	Weather.
Novemb D. H. 2 21	Der 1843. D. H. 2 13	E.S.E.	High.	° 24·7	Overcast, with dense cirro-cumuli; cleared soon after. At 21h 30 ^m a bright mass of aurora in the N. at elevation 15°. At 21h 45 ^m aurora much fainter (4, 5), and diminishing in ex- tent. At 21h 55 ^m no longer visible.
22	14	E.S.E.	High.	25.7	tent. At 21 ^h 55 ^m no longer visible. No aurora. At 22 ^h 40 ^m a faint (5) annular mass in the N.E.
23	15	E.S.E.	High.	25•5	In the N.E. Clear. A faint arch (5) in the N. At $23^{\rm h} 15^{\rm m}$ aurora appearing as if it issued, in a stream, from a source in the N., expanding as it ex- tended nearly horizontally to the N.E. at alt. 32° , in outline like the tail of a fox. At $23^{\rm h} 30^{\rm m}$ a dense but faint mass (5) moving from N.E. to N.W.; most easterly position of the De- clinometer Magnet (+0° 40') at $23^{\rm h} 30^{\rm m}$; range, $2^{\circ} 14' \cdot 2$. Lowest range of Horizontal Force (-•052 X), a little carlier. The dis- turbance observations were discontinued at $1^{\rm h}$.
35	21	E.S.E.	Mod.	23.8	Densely overcast since 0^{h} . Light snow at 4^{h} 5^{h} , and 6^{h} .
11 17 23 4 5 11 17	$\begin{bmatrix} 3 & 3 \\ 9 \\ 15 \\ 21 \\ 4 & 3 \\ 9 \end{bmatrix}$	E.S.E. 	Fresh. Fresh. Calm. Calm. Calm.	30°6 27°7 27°6 27°7 25°3	Overcast; docasional sprinkling of snow. Uniformly overcast, with dense cirro-cumuli. Observation omitted. Overcast, with light haze or fog. No change. No change from 3 ^h to the end of the day at 20 ^h .
5 28	day. 5 15	-	Calm.	16.6	Unclouded, but no appearance of aurora; Magnets slightly disturbed at 23^h 30^m . A sudden change of moderate extent in all the readings; at the same time aurora visible in streamers in the N.E. and N.W., but faint (4). At 24^h no aurora, but considerable disturb- ance. An easterly extreme of the Declinometer Magnet at 24^h (+0° 41''9), and lowest range of Horizontal Lorge (- '022 X).
65 11	21 6 3	-	Calm. Calm.	15·9 24·1	Gradually clouding over since 6 ^h ; now com-
17 23 7 5 11 17 23 8 5 11 17	9 15 21 7 3 9 15 21 8 3 9		Calm. Calm. Calm. Calm. Calm. Calm. Calm. Calm.	17:1 17:9 16:1 15:3 16:4 19:1 19:5 15:6 10:0	 pletely overcast. Uniformity overcast since 17^h. No change. A thick fog at 1^h. No change. A little snow at 9^h and 10^h. No change. A little snow at 9^h and 10^h. No change. No change. No change. Light snow, with intervals, since 14^h; light No, wind 18^h to 20^h; considerable magnetic shock between 18^h and 19^h; most easterly poosition of Declinometer (+0° 58'9) at 18^h; most westerly (-0'12'6) at 18^h 40^m; range 1° 11'4. Lowest Horizontal Force at 18^h 43^m (-'015 X).
23 95	15 21	=	Calm. Calm.	7·2 7·6	Overcast. A few particles of snow at 4 ^h , and
11 17 20	9 3 9 12	=	Calm. Calm. Calm.	8·9 4·7 -0·1	again at 9 ^h . Overcast. Partially clear. Cirro-cumuli. Unclouded since 18 ^h . At 20 ^h 15 ^m a bright auroral arch (3) extending from N.W. to N.E., elevation 28°, gathering to focus at the W. extremity. It varied but little until 20 ^h 50 ^m , when it rapidly disappeared. Lowest value of Horizontal Force (- 027 X) at 22 ^h 10 ^m ; most easterly position of Declinometer (only
23	15	-	Calm.	-1.5	+72'2) at 22 ^h 15 ^m . Unclouded. No aurora since 20 ^h 50 ^m . Extra observations were commenced at 22 ^h , on account of a somewhat low range of Hori- zontal Force, as shown above. The range of Declination was very trilling.
10 5	21	-	Calm.	1.0	Unclouded since 20 ^h , with a short interval of 0 ^h of cirro-cumuli.
11	10 3	I	Calm.	9.6 M	Unclouded. No change.

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	Da	ıte.		Wind.		Temp.	
Gö Tin	Gött. Mear Fime. Time		ean me.	Direction. Force.		Newman corrected.	Weather.
N D. 10	ovem H. 17	ber 18	343. H. 9	,	Calm.	° 5'5	Thickly clouded, with cirro-cumuli gathering
	23		15	_	Calm.	3.5	since 16 ^h . Overcast, and mostly so since 17 ^h . Slight dis- turbance 21 ^h to 22 ^h . Minimum of Horizontal Force ($-$ 030 X) at 21 ^h 10 ^m ; range of Declina- tion 17' 8.
11	5 11 17	11	21 3 9	W.N.W. W.N.W. W.N.W.	Light. Light. Light.	5·5 6·8 6·8	Overcast, with dense cirro-cumuli. Lightly overcast, with cirro-strati. Snowing, with intervals, from 14 ^h to the end of the day at 20 ^h .
12 13	Sun 23 5	day. 12	15 21	N.N.E. N.N.E.	Mod. Mod.	-6.8 0.6	Thickly overcast. Gusts of wind. Clouded. Beginning to snow, and continued to do so until 10 ^h . Slight disturbance, 4 ^h to 6 ^h . Minimum of Horizontal Force (- '05 X) at
	11	13	8	- ,	Calm.	6.2	4 ^h 8 ^m ; range of Declination 0 ^o 25' 9. A bank of strata in the S., rising from which, as it appeared, in a vertical direction, was a portion of a rainbow; remainder of the
	15		7	—	Calm.	1.6	neavens ciear. Unclouded. A faint arch of aurora, at an elevation of 13° in the N. At 15 ^h 30 ^m the arch brighter (3), and extending from N.E. to N.W., elevation 18°, and gathering to a focus
	16		8	-	Calm.	0'8	at the W. end. Unclouded. Bright auroral band (3), extend- ing from N.W. to N.E., of irregular or ser- pentine form towards the N.W. extremity, enlarging and becoming brighter at the opposite extremity, elevation 16°; at 16 th 15 th , the band contracting in width and sinking towards the horizon, but retaining its
	17 19		9 11	-	Calm. Calm.	-0.2 -1.0	the band contracting in width and sinking towards the horizon, but retaining its brilliancy. Unclouded. No aurora visible. Unclouded. Re-appearing, an arch (4), eleva- tion 10°; commenced observation for dis- turbance at 20 ^h .
	20		12		Calm.	2.3	Unclouded. Detached vertical patches of aurora, having a striated appearance at different altitudes, and a faint band (4, 5) across the meridian in the zenith. Imme- diately afterwards a large circular ring (3, 4) in motion; considerable disturbance of an unusual character as regards the Declination, being chiefly to the westward. Most westerly position (-1° 15'.2), and minimum of Hori- zontal Force ($-$ 031 X) at 20 ^h 16 ^m . At 20 ^h 20 ^m it clouded over. The magnetic changes were
	23		15	N.N.E.	Light.	8.0	trifling after 21^{h} . Thickly overcast, with the same wind, since 20^{h} . Most casterly position of the Declinometer $(+0^{\circ}2'9)$, at $22^{h} 85^{m}$, range $1^{\circ} 11'6$. Overcast, Wind began to rise soon after.
74	5 11	14	21 3	E. by N. S.E. by S.	Fresh. Fresh.	11·2 17·9	but a violent gale and snow-storm from S.S.E.
	17		9	E.S.E.	V. light.	18.6	at 7 ^h , 8 ^h , and 9 ^h . Overcast. At present nearly calm, but a furious gale from S.S.E. has prevailed, with occasional intermission, since ^B Gott. Slight disturbance 19 ^h to 20 ^h . A maximum of Hori- zontal Force (+ :008 X) at 19 ^h 3 ^{4m} . A vesterly
15	23 5		15 21	=	Calm. Calm.	10·0 6·0	extreme of Declination $(-32' \cdot 4)$ at $19^{h} 43^{m}$. Thickly overcast. Unclouded. A few particles of snow falling. Unclouded at 1^{h} , 2^{h} , and 3^{h} .
16	11 17 23 5 11 17	15 16	3 9 15 21 3 9	E.N.E. E.S.W.	Calm. Calm. Light. Calm. Calm. Light.	$8.0 \\ 10.4 \\ 11.4 \\ 15.1 \\ 12.3 \\ 9.1$	Overcast. Overcast. Snow at 14 ^h , with light E. wind. Overcast. Light E. wind since 21 ^h . Overcast. Began to snow soon after. Cirro-cumuli, with a few clear spaces. Overcast. Snowing lightly since 13 ^h , with a clear interval at 16 ^h . A slight disturbance prevailed from 18 ^h to 19 ^h , marked by Hori- zontal Force above the Mean (greatest value
17	$\frac{23}{5}$		15 21	s.s.w.	Light. Calm.	10°2 8°0	+ '009 at 18 ^h 4 ^m); range of Declination 0' 37'. Snowing lightly from 22 ^h to 1 ^h . Overcast.

Abstract from the Meteorological Journal-continued.

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-	Da	te.		Wind.		Temp.	
Gö Tir	tt. ae.	Me Tin		Direction.	Force.	Newman corrected.	Weather.
No D.	vemt	er 184 D,	из. н.			0	
17	n	17	3	-	Calm.	10.0	Unclouded, save a few strati, and cirro-strata near horizon.
	17 19		9 11	=	Calm. Calm.	8·2 6·0	Unclouded since 14 ^h . A faint arch of aurora in the N., at elevation 22°, first observed at 18 ^h 30 ^m , and not changed since.
18	$23 \\ 5 \\ 11$	18	$ \begin{array}{c} 15 \\ 21 \\ 3 \end{array} $		Calm. Calm. Light.	5·7 4·8 8·7	Unclouded. No trace of aurora since 19 ^h . Unclouded; lightly overcast with cirrous haze. Again unclouded since 6 ^h . Light N.E. wind began at 8 ^h .
	17 Sun	dav	9	N.N.E.	Mod.	9.9	Clouded at 13 ^h ; since clear. Wind increasing since 14 ^h .
19 20	23 5 11 14	19 20	15 21 3 6	N.N.E.	Calm. Calm. Calm. Light.	7.0 7.6 8.4 5.8	Thickly overcast. Thickly overcast. Began to snow at 4 ^h . Still snowing. Unclouded. A light snow was falling from a
	17		9	N.N.E.	Mod.	4'7	perfectly clear sky, the stars being visible in every part of it, with bittle haze. The same at 7 ^h , but the quantity less, and the stars more hazy. Overcast, and snowing lightly.
67	23		15	,	Calm.	6·3 7·3	Overcast.
21	11 11	21	21 8	N.N.E.	Calm. Light.	7.8	Overcast. Snowing since 1 ^h . Ceased snowing at 8 ^h , but now resumed.
	17 23		9 15	·	Calm. Calm.	6'0 5'5	Thickly overcast. Thickly overcast. Snowing from 19 ^h to 22 ^h .
22	5 11	22	21 3	=	Calm. Calm.	6·9 9·7	Thickly overcast. Overcast.
	17		9	- 1	Calm.	4.8	A few stars visible to the N.W. near the zenith.
	20		12	-	Calm.	0.6	Light air from S. at 14 ^h , 15 ^h , and 16 ^h . Unclouded. A bright arch of aurora (3) ex- tending from N.N.E. to N.W. at elevation 32°, first observed at 10 ^h 20 ^m .
	21		13	N.E.	Fresh.	-1.5	Unclouded. A very faint auroral light in the N.
23	23 1		15 17	N.E. N.E.	Fresh. Fresh.	-3.6 -5.7	Unclouded. Unclouded. A faint arch of aurora (5) at elevation 15°.
•	2		18	N.E. by E.	Fresh.	-3.2	Faint auroral light (5) in the N.W. Sky nearly overcast.
	5 11	23	21 3	N.N.E. N.N.E.	Light.	0.2	Overcast since 3 ^h .
	11 17	20	9	M.M.E.	Light. Calm.	6.7 8.1	The same. Overcast. Wind freshened at 13 ^h , but since
	23		15	W.N.W.	Fresh.	5.1	fallen off to a calm. Overcast. A few particles of snow at 22 ^h , with N.E. wind. Slight disturbance 0 ^h to 2 ^h . Mini- mum of Horizontal Force at 1 ^h (-024 X). Most easterly position of Declination (+16'5)
24	5		21	W.N.W.	V. Light.	3.5	at 1 ^h 7 ^m . Overcast. Wind high and squally at 0 ^h , 1 ^h , 2 ^h .
	11	24	8	W.N.W.	Light.	3.8	Still overcast. Magnetic term day, which was wholly free from disturbance, commenced at 10 ⁵ .
	17 23	1	9 15	W.N.W. W.N.W.	Light. Light.	3.0 3.8	No change. No change.
25	5	1	21	E.S.E.	Light.	0.9	Overcast, with cirro-cumuli.
	11 17	25	3 9	=	Calm. Calm.	1·2 1·3	Unclouded since 9 ^h . Partially clear. So continued, with wind from N.E. to the end of the day at 20 ^h .
26	23	iday. 26	15	E.S.E.	V. high.	2.9	Unclouded, with a strong gale from S.E., since
27	5		21	S.S.E.	Light.	4.2	wind fell at 3 ^h . Still unclouded.
	11 17 20	27	3 9 12	S.S.E.	Light. Calm. Calm.	9·7 8·0 5·1	Overcast, with light haze. Unclouded since 12 ^h . Unclouded. At 20 ^h 30 ^m faint masses of aurora.
28	23 5	1	$\frac{15}{21}$	1 =	Calm. Calm.	2.0 -2.3	of irregular form to the E. of N. Continues unclouded, and so on to 3 ^h . Lightly overcast, with haze.
40	11	28	3	=	Calm.	3.6	Unclouded since 6 ^h .
	17 19	1	9 11	1 =	Calm. Calm.	0.4	Unclouded. No change. Unclouded. An irregular striated arch of
	20		12	-	Calm.	3.2	aurora (4) at an elevation of 30°. Unclouded. Floating patches of fain aurora
	20 21	1		s.s.w.	1	7.9	(4.)
	41	ı	13	(13,13, W .	l Light.	м 2	Unclouded. A faint auroral light in the N.

Abstract from the Meteorological Journal-continued.

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Date.				Wind.			
	ла ——			······		Temp.	Weather.
Gö Tin	tt. ao.	. Mean Time.		Direction.	Force.	Newman corrected.	
November 1843.			43.			0	
р. 28 29	н. 23 1	D. 28	н. 15 17	S.S.W. S.S.W.	High. Fresh.	12·3 17·9	Wind in gusts. Unclouded. Faint streaks of aurora (5) near
	2		18	S .	High.	20.3	the zenith. Unclouded. Patches of aurora faint (5), but striated in the N.W.
	5		21	-	Calm.	14.8	Unclouded, as it has been, with little inter- mission, for three days. Unclouded. The same.
	11 17 19	29	3 9 11	=	Calm. Calm. Calm.	11.0 0.6 -3.5	
	20 21		12 13	=	Calm. Calm.	-4.7 -6.5	Unclouded. A faint auroral arch (5) from N.E. to N.W. at elevation 37°, gathering to a focus at the N.W. extremity. Unclouded. Aurora visible, but very faint. Unclouded. Aurora visible, but very faint. Unclouded. A. W. extremity. Extra obser- vations were taken from 21 ^a to 22 ^b , showing the propertie demonstra to be yany slightly
80	23 5 11	30	15 23 3	N.N.E.	Calm. Fresh. Mod.	-9.4 -4.7 0.3	the magnetic elements to be very slightly disturbed. Unclouded. A faint arch (5) in the north. Overcast, with cirrus haze. Overcast, with cirro-cumuli and haze. Wind high, 6 ^h to 10 ^h .
Doo	17 23		9 15	N.N.E. N.	High. High.	-1.5 -1.5	Generally clear since 15 ^h . Beginning to snow, and continued to do so till 3 ^h .
Dec. 1	5	Dec.	21	N.E.	High.	6.4	Overcast. Thick fog at ^{4h} .
	$ \begin{array}{c} 11 \\ 17 \\ 23 \end{array} $	1	8 9 15	N.E. N.E. by E.	Mod. Mod. Calm.	5·3 8·9 13·4	Overcast. A few stars beginning to appear. Lightly overcast. A great disturbance first observed at 21 ^h . Most westerly reading of Declinometer (-1° 34'5) at 22 ^h 15 ^m . Most easterly reading (+1° 1'5) at 3 ^h 27 ^m . Range 2° 40'. Lowest value of Horizontal Force 4' 2010 Viet of Norm
2	5		21	N.W.byW	High.	7.8	A most violent gale from N.W. at 2 ^h ; since abated. Disturbance observations discon-
	11 17	2	3 9	w. s.	Light. Fresh.	0.6 -2.5	tinued at 5 ^h . Snowing lightly since 8 ^h . An halo of diameter 40° round the moon. The same at 20 ^h , with two indistinct para selence. The thermometer reached 21° 7′ this morning.
3	Sur 23	 nday. 8	15	S.E. by S.	V. high.	2.5	Overcast. A violent gale since commencement of observations at 21 ^h .
4	5	1	21	S.E. by S.	High.	3.0	Overcast. Wind at intervals still violent, and
	11	4	8	-	Calm.	8.9	so down to 7^{h} . Cirro-strata and strata generally diffused, but clear from 6^{h} to 9^{h} .
5	17 23 5		9 15 21	N.W.	Calm. Mod. Calm.	7.8 6.2 3.9	Lightly overcast. A few cirro-strati, otherwise clear. A few light cirro-cumuli overhead, otherwise
	11 17 28	5	8 9 15	E.S.E. E.S.E.	Calm. Mod. High.	3*2 4*1 15*3	clear. Overcast. Snowing, which soon ceased. Wind in gusts. Lightly overcast. Considerable disturbance, 22 ^h to 3 ^s . A minimum of Horizontal Force (-031 X) at 22 ^h 19 ^m , attended by a westerly range of Destination, and followed by the most we welly reading of the Declino- meter (-0° 24'4) at 22 ^h 25 ^m , a circumstance
6	5		21	S.E.	High.	27.0	which was unusual. Most easterly position $(+0^{\circ} 26'4)$, at $0^{h} 7^{m}$, range $0^{\circ} 55'.6$. <i>A heavy shower of rain fell at</i> 6^{h} ; it continued to rain until 11 ^h . The temperature at the surface has only twice been as high as 32° since the 23d October; at 9^{h} and 10^{h} Gött.
	11	6	3	w.	Mod.	33.2	on the 2d November. Dense cirro-cumuli moving rapidly along the S.
	17 23		9 15	N.W. N.W.	High. High,	14.6 6.3	horizon from the S.W. Wind high all day, violent at 22 ^h . Snow at 15 ^h . Light snow at intervals; a few stars visible, but hazy. Sleet falling.
7	5 11 17 23	7	21 8 9 15	N.E. E.N.E.	Calm. Calm. Light. V. light.	$ \begin{array}{r} -2.0 \\ 7.7 \\ 13.2 \\ 16.7 \end{array} $	Unclouded since 1 ^h . Thickly overcast. Mostly cirro-cumuli since 9 ^h . Beginning to snow, mixed with rain. Snow coming to an end.

Abstract from the Meteorological Journal-continued.

Sunday. 10

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S.E. S.E.

W.N.W.

N.E.

N.N.E. W.SW. N.W.

W.N.W.

N.E.

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Calm.

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High.

V. light.

Calm.

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Calm.

Light.

Light.

Light.

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Fresh. Light. High.

Light.

V. light

Light. Calm.

Light. Calm.

Calm

Fresh.

Calm.

Light.

Light. Mod. Calm. Light. Calm.

High.

-3.3

-1.2

-3.3

0'3

6'5

4.4

1.8

-5.7

-12.8

-19.8

-18.3

-24.9

-22.9

22.3

-20.5

-16.5

 $-6.0 \\ -2.6 \\ -4.7 \\ -4.7 \\ -4.7$

-1'3 -1.3-6.3-9.2-6.8-9.5

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-6.0

4.8

	Abstract from the Meteorological Journal—continued.										
	Da	ıte.		Wi	nd.	Temp.					
Gö Tir			Mean Time. Direction.		Force.	Newman corrected.	Weather.				
De D. 8			N.N.E.	Light.	° 15·1	Covered with cirrus haze. A bank of clouds					
	11	8	8	s.s.w.	Light.	28*4	round the horizon. Overcast, but mostly clear since 5 ^h .				
	17		9	W.S.W.	Light.	20.7	Again overcast, but unclouded from 13^{h} to 16^{h} . A marked magnetic shock at 18^{h} . Most easterly reading of Declinometer at that hour $(+0^{o} 47' 4)$. Most westerly position at $19^{h} 7.2^{m}$ $(-0^{o} 11' 3)$ range $0^{o} 58' 7$.				
	23		15	W.S.W.	Light.	19•8	Nearly overcast, with cirro-cumuli and strati.				
9	5		21		Calm.	19.6	Overcast, with cirro-cumuli and strati.				
	11	9	3	W.N.W.	Light.	13.0	Hazy cirri and strati round the horizon.				
	17		9	-	Calm.	8.1	Unclouded since 13 ^h . After the close of the observations at 20 ^h , a brilliant auror a was witnessed and described by Serjeant Henry; at				

the witnessed and described by Serjeant Henry; at 20^h 22^m it appeared in a stream, extending across the zenith in a S.W. direction from a point in the opposite quarter, at an elevation of 54^p, like steam escaping from a tube, nar-row, very brilliant (2), and of a light but decided green tint. Magnets disturbed at 20^h 27^m. It broke up into bands crossing the meridian, in the zenith, but equally brilliant. At 20^h 30^m the bands divided into waves, which dispensed with rapid motion, and soon after disappeared. at after disappeared.

Overcast. Sleet at 22^h.

- Dull and overcast, with occasional sleet since 23h

²⁵⁵.
²⁶⁶.
Snowing. Wind abated, and it began to snow at 3h.

Snowing, without intermission. Snowing, but lightly, and so down to 19^h. Occasional snow. A few stars visible S, of the zenith.

Unclouded since 2h.

- Unclouded, but hazy. Unclouded since 11^h.
- Unclouded. A faint arch of aurora (5) at eleva-tion 30°. Unclouded. The same at elevation 35°. Unclouded. The same in operceptible change. Beginning to cloud over, having been clear for 24 bours

24 hours.

24 nours. Overcast, with close packed cirro-cumuli. Partially clear. Began soon after to snow. Clear overhead, otherwise clouded. Nearly covered with cirri and cirro-strati. A few clear spaces.

Idw crear spaces. Light cirra and cirro-cumuli. Unclouded since 13³. An arch of aurora (4) at an elevation of 15⁹. Overcast since 22^h. Snowing fast at 0^h.

Overcast.

Overcast. Without break since 22^h. Cleared up at 15^h. Partially clouded again, and so on to the end of the observations at 20^h.

Heavy clouds round the horizon, but clear overhead Beginning to snow lightly.

Beginning to snow lightly. Ceased snowing since 10^h. Continually overcast. Sleet at 18^h. Overcast. Snowing lightly. Overcast. Wind since 2^h. Lightly overcast. Clear at 1^h. Overcast. High N.E. wind prevailing since 14^h. Began to snow at 18^h.

Date.		Wind.		Temp.			
Göt Tin	it. ie.	Me Tir	an ne.	Direction.	Force.	Newman. corrected.	Weather.
D.	cemi H. 23	per 18 D. 19	н.	N.E. by E.	High.	°.3	Wind abated a little. Ceased snowing at 22 ^h . Beginning to clear. A considerable disturb- ance was first observed at 20 ^h . Most easterly position of the Declinometer $(+0^{\circ} 32' \cdot 4)$ at $20^{h} 0^{m}$; the most westerly $(-0^{\circ} 4' \cdot 4)$ at $22^{h} 36^{m}$, range $0^{\circ} 34'$. Minimum of Horizontal Force
20	5 11	20	21 3	W. by S. W.	Light. V. light	1·1 -5·9	Lightly clouded, but generally unclouded since 0 ^h . Unclouded since 6 ^h . Magnetic term day, which was wholly free from disturbance, commenc-
	17 23 5		9 15 21	N.N.E. N.N.E.	Calm. High. Fresh.	$\begin{array}{c} -10.0 \\ -11.4 \\ -9.1 \end{array}$	ing at 10 ^h . Partially clouded to S.E. Unclouded since 18 ^h . Cirro-strata towards the horizon; remainder clear.
22	11 17 23 5 11 17 21	21 22	3 9 15 21 8 9 13	N.N.E. N.N.E. N.W. W.S.W. E.S.E. N.E.	High. Light. Light. Calm. Fresh. High.	$ \begin{array}{c c} 0.2 \\ 12.4 \\ 2.1 \\ -9.2 \\ -12.2 \\ -13.4 \\ -7.1 \end{array} $	Overcast. Wind abating. Still overcast. Partially clear, and so throughout the night. Overcast. Again overcast, but unclouded from 7 ^h to 10 ^h . Unclouded since 13 ^h . Nearly clear. An arch of aurora (5) at elevation 35°.
23	23 5 11	23	15 21 3	N.E. N.N.E. N.N.E.	High. Fresh. Fresh.	-5.9 -0.1 1.2	Recently clouded over. Thickly overcast since 23 ^h . Overcast again, but partially clear from 8 ^h to
Ch) 25 26	17 Sun- ristn 23 5 11 17 21 22 22	day. as D: 25	9 ay. 15 21 9 13 13	N.N.E. W. by N. W.S.W. —	Fresh. Fresh. V. light. Calm. Calm. Calm.	2.7 -0.4 -3.5 -3.2 -4.5 -4.7 -6.1	10 ^h . Overcast. It fell calm at 19 ^h . Snowing lightly since 21 ^h . Snowing without intermission all the morning. Ceased snowing at 8 ^h , but still overcast. Beginning to clear up. Unclouded. A faint arch of aurora () visible but a few minutes before. At 20 ^h 54 ^m two brilliant curtains of light (), of irregular outline, were observed, place not recorded; they disappeared in a few minutes. At 21 ^h 20 ^m aurora again became brilliant (), in irregular bands or arches, parallel, striated, most bril- liant in the N.E., and much diffused in that quarter. At 21 ^h 45 ^m the aurora was very brilliant () and dense near the horizon, but faint in the zenith. Unclouded. The aurora very faint, and gene- rally diffused. The most westerly position of the Declinometer (-0^{c} 10) was at 22 ^h 30 ^m it had passed altogether to the S., and was hardly perceptible; the most casterly position of the Declinometer ($+0^{c}$ 28' 9) was at this time.
27	23 0		15	-	Calm.	-5'6	Minimum of Horizontal Force - 035 X, at 23h 27m. Unclouded Faint surger generally diffused
	5 11 17 23 5	27	21 3 9 15 21	E.S.E. E.N.E.	Mod. V. light. Calm. Calm.	2·3 8·0 13·2 16·8 16·2	At 0^{4} 43 ^m faint bands and streamers crossing the meridian from E. to W., and reaching the zenith. Disturbance inconsiderable, but tending to an increase of Horizontal Force, which gave a maximum (+ \cdot 007 X) at 1 ^h 24 ^m . Unclouded, Unclouded, and almost calm, since 6 ^h . Gradually clouding over since 13 ^h . Extra ob- servations were taken from 13 ^h to 20 ^h for a disturbance, anticipated from the high value of the Horizontal Force. The range of Decli- nation was 0° 19°4. Maximum of Horizontal Force (+ \cdot 012 X) at 18 ^h 33 ^m . Snowing fast. Occasional light air from N.W. A marked magnetic shock at 3 ^h . Declination reading (+0° 49°5); most westerly reading at 3 ^h 15 ^m (-0° 12 ^h); most westerly reading at 3 ^h 15 ^m (-0° 12 ^h); most westerly reading at 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading dt 3 ^h 15 ^m (-0° 12 ^h); most westerly reading

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Abstract from the Meteorological Journal--continued.

Da	.te.	Wi	nd.	Temp.	
Gött. Time.	Mean Time.	Direction.	Force.	Newman. corrected.	Weather.
D. H. 28 11 17 23 29 5 11 17 23 29 5 11 17 23 30 5 11 17 23 11 17 23 11 17 23 11 17 23 11 17 23 23 5 11 17 23 23 23 5 11 17 23 23 23 23 23 23 23 23 23 23	21 20 21 20 30 30 30 30 30 30 30 30 30 3		Calm. Calm. Calm. Fresh. Light. Calm. Calm. V. light. Light.	$\begin{array}{c} \circ \\ 11.7 \\ 0.3 \\ -5.8 \\ -6.3 \\ -2.4 \\ -6.9 \\ -11.9 \\ \end{array}$	Ceased snowing. Began again to snow at 14 ^h . Overcast, but ceased snowing at 19 ^h . Overcast, snowing at intervals. Thick, without decided fog. Stars occasionally visible; but thick, with occa- sional snow. Unclouded, and so generally to 4 ^h . Considerable disturbance from 21 ^h to 0 ^h . Most westerly reading of Declination (0° 54' 8) at 21 ^h 18 ^m . A minimum of Horizontal Force (-040 X) at 21 ^h 48 ^m . Most easterly (+0° 10'6) at 22 ^h 18 ^m . Range of Declination, 1° 7'.3. A maximum of Horizontal Force (+'006 X) occurred at 22 ^h 33 ^m . Unclouded from 6 ^h to 9 ^h . At present overcast. Unclouded from 6 ^h to 9 ^h . At present overcast.
Sund	iay.				

Abstract from th	e Meteorological	Journal—continued.
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	Date.			Wi	nd.	Tempe	rature.	
Gött Time		Mean Time		Direction.	Force.	Newman corrected.	Dollond as observed.	Weather.
D. H New Y	New Year's Day.			 E.N.E.		° —	° —	No observations, Overcast.
1 2	- I	11	15 21	E.N.E. E.S.E.	Fresh.	-6.2 -0.8		Overcast. Overcast, with cirro-strati.
2 (5		я З	E.S.E. E.S.E.	Light.	-0'8	-	Unclouded, but hazy.
1		-	3 9	19.19.19.	Calm.	-3 3	_	Unclouded since 11 ^h .
2			ฮ อั		Calm.	-17.1	_	Still calm and unclouded.
	5				Calm.	-23.4	_	Overcast with a light haze.
10	~ I		3		Calm.	-13.0		Overcast.
1	-	-	9	_	Calm.	-9.3		Overcast.
28	•		5		Calm.	-7.3		Overcast.
4	· •	-	n		Calm.	-6.2		Overcast.
1	1	4	3	_	Calm.	-5.8	- and	Still overcast. A fall of snow from
17			9	_	Calm.	-6.9	-	^{8h} to 10 ^h . Overcast. A great magnetic dis- turbance began to be observed at 16 ^h , and continued, with some intermission, to 5 ^d 3 ^h . It com- menced with a range of Horizontal Force above the mean, highest value (+ 021 X) at 16 ^h 30 ^m . Most westerly reading of the Declino- meter (0° 40') at 21 ^h . Lowest va- lue of Horizontal Force (- 063 X) at 23 ^h 3 ^m . Most easterly read- ing (+1 ^o 6' 4) at 0 ^h 57 ^m . Range, 1° 56'.
29 5 6 11	5	2	5 1 3	W.N.W. W. by S.	Calm. V. light. Fresh.	-5.5 -10.3 -18.2	=	Showing slightly from 21 ^h to 23 ^h . Snowing slightly since 3 ^h . Snowing, but a streak of clear sky in the E.S.E. A slight magnetic
12	7		9	w.s.w.	V. light.	-25.2	-	shock at 8 ^h Gótt. Hazy.

• The Scale Readings of Dollond's thermometer are added, to the end of the abstract, as a check upon the true temperature deduced from the Scale Readings of Newman's. Dollond stood at 3-37.8 in freezing mercury. (p. 126.)

I	Date.	Wi	nd.	Tempe	rature.	
Gött. Time.	Mean Time.	Direction.	Force.	Newman corrected.	Dollond as observed.	Weather.
Janu. D. H. 5 23	D. H. 5 15	-	Calm.	-36.7	<u> </u>	Unclouded, but hazy. Great mag- notic disturbance, especially of the Horizontal Force, from 6 ⁴ 23 ^h to 6 ^d 3 ^h . Most westerly reading of the Declinometer (-0° 18'7) at 2 ^h , attended by the lowest value of the Horizontal Force (-'063 X). The most easterly (+0° 42'7) at 23 ^h 48 ^m ; range, 1° 4'.
6 5 11 17	6 3 9	S.S.W. S.S.W. N.N.E.	Light. V. light. V. light.	-37.5 -34.6 -37.6	 	Unclouded. Unclouded. Unclouded to the end of the obser- servations at 20 ^h .
Su 7 23 8 5 11 15	nday. 15 21 8 3 9	N.E. N.N.E. N. by W. N.	Fresh. Fresh. Fresh. Light.	-32.0 -32.0 -29.3 -28.6	-28.2 -28.1 -25.3 -25.0	Hazy. Halo round the moon at 22 ^h . Overcast. Partially so since 1 ^h . Unclouded. A faint auroral arch (), at an elevation of 10° extend- ing from N.B. to N.W. At 15 ^h 20 ^m the arch was much brighter, gathering to a focus at the N.W. end, and rising gradually. At 15 ^h 28 ^m it broke up into dense masses, which gradually disap- peared. At 16 ^h no aurora; a slight degree of disturbance was ob- served. Most easterly reading of the Declination (+0° 22'9) at 15 ^h 42 ^m , accompanied by the high
17 20	9 12	N.N.E. N.N.E.	Light. Light.	-29·5 -30·4	-26·0 -27·3	10 ⁴ 42 ²⁰ , accompanied by the high- est value of the Horizontal Force $(+\cdot007 \text{ X})$. Unclouded. Unclouded. A faint arch of aurora (5), at an elevation of 40°. A slight renewal of disturbance observed. Most westerly reading of the De- clination $(-0^\circ 14' \cdot 6)$ at 20 ^h 33 ^m ; total range, 0° 38'. Lowest value of Horizontal Force $(-\cdot018 \text{ X})$ at 20° 30 ^m .
23 9 5 11 16	15 21 9 3 8	N.N.E. 	Light. Calm. Calm. Calm.	$ \begin{array}{r} -40.1 \\ -39.8 \\ -35.3 \\ -34.4 \end{array} $	$ \begin{array}{c} -36.6 \\ -38.0 \\ -32.1 \\ -31.1 \end{array} $	20 ⁿ 30 ^m , Unclouded. Unclouded. Unclouded. A faint arch of aurora, at an eleva- tion of 13°, extending from N.E. to N.W.
17	9	-	Calm.	-34.7	-31.3	A faint arch (), at elevation 10°, generally covered with light cirro- strati.
23	15	-	Calm.	-32.8	-29.9	Generally covered with light cirro-
$ \begin{array}{ccc} 10 & 5 \\ 11 & 17 \\ 23 \\ 11 & 5 \end{array} $	$egin{array}{ccc} 21 \\ 10 & 3 \\ 9 \\ 15 \\ 21 \end{array}$	E.S.E. N.E. 	V. light. V. light. Calm. V. light. Light.	$ \begin{array}{r} -26.5 \\ -24.1 \\ -22.6 \\ -24.3 \\ -11.4 \\ \end{array} $	$ \begin{array}{r} -23.6 \\ -21.0 \\ -18.5 \\ -21.2 \\ -9.5 \\ \end{array} $	Lightly overcast. Almost unclouded. Completely overcast. Lightly overcast. Lightly overcast.
11 17 23	11 3 9 15	W.S.W. W.S.W. W.S.W. W.S.W.	Light. Light. V. light. V. light.	$ \begin{array}{c c} -6.9 \\ -1.3 \\ -2.6 \\ -6.0 \end{array} $	$ \begin{array}{c c} -4.2 \\ -0.5 \\ -1.1 \\ -3.8 \end{array} $	Overcast. Snowing since 2 ^h . Overcast. Partially clear at intervals. Snowing since 3 ^h .
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	W.S.W. W.S.W. W.S.W. 	V. light. Calm. Light. Light. Calm. Calm.	$ \begin{array}{c} -2.8 \\ -4.7 \\ -17.6 \\ -21.8 \\ -20.2 \\ -30.9 \end{array} $	$ \begin{array}{r} -3.3 \\ -0.6 \\ -2.9 \\ -14.4 \\ -19.8 \\ -17.0 \\ -28.3 \end{array} $	Snowing sagain slightly. Overcast. Snow 13 ^h to 15 ^h . Overcast. Light cirrus haze. Unclouded at the close of the obser- vations at 20 ^h .
Su 14 23 15 5 11 17	nday. 15 21 15 3 9		Calm. Calm. Fresh. Fresh.	$\left \begin{array}{c} -20.7 \\ -16.9 \\ -0.7 \\ -5.8 \end{array}\right $	$\begin{array}{c} -17.3 \\ -14.9 \\ -1.0 \\ -7.7 \end{array}$	Unclouded since 21 ^h . Beginning to be lightly overcast. Overcast. Overcast. Strong gale since 11 ^h ; highest at 12 ^h and 13 ^h .
23	· 15	w.s.w.	Mod.	-0.1	-1.8	Nearly unclouded. Snowing at 19 ^h and 20 ^h , then cleared up.

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Abstract from the Meteorological Journal-continued.

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Abstract from the Meteorological Journal-continued.

	D	ate.		Wi	nd.	1	rature.	
G Ti	ött. me.	M	lean ime.	Direction.	Force.	Newman corrected.	Dollond as observed.	Weather.
J D. 16		ry 184 D 15	н.	w.s.w.	V. light.	° -5.8	° -3·8	A faint arch of aurora (), at eleva- tion of 30°.
	1		17	w.s.w.	Fresh.	-8.0	-6.0	Unclouded. A faint auroral light n the N.
	5		21	W. by S.	Light.	-13.3	-10.2	Overcast, with dense cirro-cumuli.
	11	16	3	W. by S.	Fresh.	-10.6	-8.1	Overcast.
	17	1	9	W.	High.	-10.3	-8.0	Overcast, began to clear soon after.
	20	ļ	12	W.N.W.	Light.	-13.8	-11.5	Faint detached patches of auroral
	21		13	W.N.W.	Fresh.	-17.1	-13.6	light. Partially clear. A faint auroral ight
	23		15	W.N.W.	Fresh.	-18.3	-14'8	in the N. Overcast. A slight degree of dis- turbance at 0 ^h ; range of Declina- tion, 19'8.
17	5	1	21	W.N.W.	Light.	-23.9	-20.9	Overcast.
	11	17	8	W.N.W.	Light.	-22.4	-19.1	Overcast. Snow at 7 ^b .
	17		9	W.S.W.	Light.	-25'2	-21.6	Unclouded since 15 ^h .
	21	1	13	W.N.W.	Mod.	-27.8	-25.0	Unclouded. An arch of aurora (), crossing the zenith since 20 ^b 45 ^m .
	22		14	W.N.W.	Mod.	-29.7	-27.0	Unclouded. Aurora as before, but
18	23 0	1	$\begin{array}{c} 15 \\ 16 \end{array}$	W.N.W. W.N.W.	High. High.	-30'6 -32'5	-28.0 -29.0	fainter (); no perceptible motion. Unclouded. No aurora. Unclouded. A faint arch of aurora (), at elevation 30°.
	5 11	18	21 3	N.W. N.W.	Mod. Light.	$-37.2 \\ -33.6$	-33.0 -30.3	Overcast since 3 ^h . Again overcast, but unclouded from
	17 18 20		9 10 12	N.W. N.W. W.S.W.	Light. Light. Light.	32·9 34·0 34·1	-30.0 -31.2 -31.2	6 th to 9 th . Unclouded, mostly so since 13 th . Unclouded. A faint arch of aurora. Unclouded; hzzv. At 20 th 45 th an arch or band across the zenith from W.N.W. to E.S.E., not in motion. No distubutors.
19	23 5 11 15	19	15 21 3 7	w.s.w. w.s.w.	Light. V. light. Calm. Calm.	-36'3 -38'4 -34'4 -34'6	$-33^{\circ}2$ $-36^{\circ}2$ $-31^{\circ}3$ $-31^{\circ}5$	motion. No disturbance. Unclouded. Still unclouded, but hazy. Unclouded. Unclouded. Faint arch of aurora, at
	16 17 20		8 9 12		Calm. Calm. Calm.	-35 ·9 -37·4 -38·6	-32.5 -34.1 -36.0	elevation of 10°. Unclouded. Aurora, without change. Unclouded. Aurora, without change. Unclouded. Arch of aurora, at elevation 20°. There have been occasional faint arches and floating
	21		13	-	Calm.	-38.6	-35.2	patches of aurora from time to time since 10^{h} , but no disturbance of the magnets. Unclouded. Faint aurora, diffused generally; brighter portions, of irregular form (), in the N. A minimum of Horizontal Force (010 X) at 21^{h} ; range of Decli- nation from 21^{h} to 22^{h} , or $22'0$; most easterly position (+28'4) at 21^{h} 12^{m} .
	23		15	-	Calm.	-38.3	-35.3	Unclouded. No aurora at this time, but occasional faint arches and patches of light from 21 ^h to 20 ^d 1 ^h .
20	5		21	-	Calm.	-38.3	-35.1	Lightly overcast since 4 ^h ; unclouded down to that hour.
	11 17	20	3	N.N.E.	Light. Light.	-32.2	-28.4 -30.9	Unclouded again since 6 ^h . Still unclouded.
	19		11	N.N.E.	Light.	-34.0	-30.9	An arch of aurora, elevation 25°, brightest to the E. (); detached bands or arches. No disturbance.
	20		12	N.N.E.	Light.	-34.7	-31.2	bands or arches. No disturbance. Arch a little fainter (), elevation 26°; striated brilliant detached streamers and patches of light (), chiefly in the N.E.
21	Sun 21	18y. 21	13	- 1	Calm.	-38.4	-35.8	Detached beams or streamers of
	22		14	_	Calm.	-42.0	-39.0	aurora. Unclouded. Aurora as before.
	23		15	-	Calm.	-40.9	-39.1	Unclouded.

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Da	ate.		wi	nd.	Tempe	erature.	
Gött. Time.	Me Tir		Directica.	Force.	Newman corrected.	Dollond as observed.	Weather.
Janua D. H. 22 0	y 1844 D. 21	н. 16	-	Calm.	-39°6	-37.2	Unclouded. From 21 ^h to 0 ^h a suc- cession of faint arches and de- tached patches of light with bright streamers (), sometimes near the zenith, but no disturbance ob- served. Exposed some mercury, found it partly frozen at 0 ^h 30 ^m .
5		21	-	Calm.	-46.5	-44.0	Hazy. The mercury had been solid since 1 ^h .
11	22	8	N.N.W.	Light.	-37.9	-33.9	Still unclouded, but soon after clouded lightly over.
17	1	9	N.N.W.	Light.	-39.7	-36.9	Unclouded again since 13 ^h .
20		12	-	Calm.	-42.2	-39.0	Unclouded. Faint aurora in patches.
21		13	-	Calm.	-43.6	-40.5	Faint aurora in the N. at 21 ^h 30 ^m . A great quantity of detached cirrous aurora in different parts of the sky, moderately bright, and not in motion. No disturbance.
22		14		Calm.	-43*2	-40.0	Unclouded. Two dense but faint masses of aurora in the N.E. and N.W. Patches of aurora, striated, diffused at various altitudes to the N. round the zenith. No disturb- ance. At 22 ^h 15 ^m no aurora in sight.
23		15		Calm.	43 · 9	-41.1	Unclouded. No aurora visible. At 23 ^h 30 ^m an arch of aurora extend- ing from N.W. by W. to N. At the western extremity, apparently turned upon itself so as to form a hook, very brilliant; the elevation of the hook was 27°, of the centre 30°, of the N. end 26°. At 23 ^h 40 ^m the arch broke up into striated masses, of moderate brightness, generally diffused from N.W. to N.E., and disappeared gradually. The Declinometer and Bifilar showed a slight degree of disturb- ance by the vibration of their magnets, but without change of
23 5		21	-	Calm.	-43.3	-40.0	Unclouded. Hazy since 0 ^h , and mer- cury frozen. At 6 ^h the mercury was observed to be partly melted.
11	23	3	-	Calm.	-34.2	-31.1	Lightly overcast, with occasional sprinkling of snow.
17		9	-	Calm.	-39.9	-36.4	Hazy, but unclouded since 14 ^h .
23		15	-	Calm.	-39.8	-36.9	Unclouded. Hazy.
24 5		21	W.N.W.	V. light.	-40.6	-37.6	Overcast, with uniform dense haze.
11	1	3		Calm.		-36.0	Hazy. Magnetic term day began at 10 ^h .
15		7	_	Calm.	-43:4	-40.0	Unclouded. No aurora visible. At $15^{h} 30^{m}$ a faint auroral haze in the N. near the horizon. Greatest value of the Horizontal Force about this time. At $15^{h} 45^{m}$ a mass of aurora in the N.W., another in the N.E. both rising vertically to an elevation of 11°, then extend- ing irregularly to an elevation of about 32°, and thence uniting in an arch at an elevation of 60°, from which arch four conspicuous streamers, in violent motion, rose towards the zenith. Brilliancy (2) to (4.)

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Da	te.	Wi	nd.	Tempe	rature.		
Gött. Time.	Mean Time.	Direction.	Force.	Newman corrected.	Dollond as observed.	Weather.	
Januar D. H. 24 16	y 1844. D. H. 24 8		Calm.	~ 44*0	~40`8	Unclouded. A heavy and brilliant arch near the zenith (), form rather irregular. Width about 5° , and nearly motionless. At 16 ^h 15 ^m aurora in the zenith, diverging from points on the E. and W. sides, not in straight beams, but with a wavy or serpentine outline, and breaking up into narrow streaks. At 16 ^h 30 ^m a brilliant narrow band, very irregular in outline at about 15 ^o beyond the zenith to the S. Faint detached masses both to the N. and S. of it, at 16 ^h 45 ^m . The arch was 55 ^o beyond the zenith, or 35 ^o above the southern horizon, and fainter. There was a little very faint aurors in the N.	
17	9	-	Calm.	-41.5	-41.9	Unclouded. Another arch () approaching the zenith, at present 30° from it, broad and diffused. At 17^{h} 15^{m} faint detached patches of great extent in the N.E. and N.W. near the horizon, also some detached patches of no regular shape, and streamers. At 17^{h} 30^{m} no aurora was visible, save a faint luminous haze near the horizon. Auroral light was observed at Toronto at 17^{h} , but the sky was co- vered with clouds all night. Aurora was also seen at North Salem, N.Y. (Regent's Reports), but the hour is not named.	
21	13	-	Calm.	-41.3	-41.7	Unclouded. Hazy. The most west- erly position of the Declinometer $(-0^{\circ} 44'5)$ was at $20^{\circ} 25^{\circ}$. At $21^{h} 30^{\circ}$ wast quantities of faint cirrus aurora () in various parts of the sky, without motion. At $21^{h} 45^{\circ}$ no aurora was visible.	
22	14	-	Calm.	-46.6	-44'0	Partially clouded. No aurora visible. At 22 ^h 40 ^m a faint mass of aurora () moving slowly from the N.E. along the eastern horizon (eleva- tion not recorded) gathering to a focus a' the N.E. extremity. The lowest value of the Horizontal Force at this time.	
23	15		Calm.	-46.2	-44'1	Unclouded. A large dense mass of aurora (2) S.E. by S. at elevation 10°. It suddenly broke up into a num- iter of patches, which were scat- tered at various elevations, and all disappeared before 23 ^h 15 ^m .	
25 0	16		Calm.	-47.0	-44.4	Unclouded. Hazy. No aurora visible. The most casterly position of the Declinometer ($+2^{\circ}$ 10' 1), at 0 ^h 15 ^m , range 3° 4'8. At 0 ^h 45 ^m a faint luminous haze was distinguishable S. of the zenith. The mercury was observed to be solid from 15 ^h to this hour. No more aurora was seen, but the magnetic disturbance lasted until about 5 ^h . In that portion which occurred from 15 ^h to 19 ^h a tolerably decided correspondence may be distinguished in the movements at Lake Athabasca, and those at Toronto and Greenwich; at the latter stations the greatest degree of disturbance occurred at this time.	

D. H. D. H. D. H. Here D. H. D. H. Here				1		T		rnal—continued.	
Construct Item Direction Force. Newman Tase January 1844. D. H. D. D.			W:	ind.	Tempe	rature.			
D. H. D. H. D. H. D. H. 2. 24 21 - Calm. -43.7 -41.2 Hass, but unchaded. 11 25 3 N.N.E. Mod. -40.2 -36.4 Lightly overcast. Vind. bit the disturbance is at Toronto and at Greenv to about the same time. Viz. 93 11 25 3 N.N.E. Mod. -40.2 -36.4 Lightly overcast. Vind. high and in gr since 12.9 23 15 E.N.E. Fresh. -20.6 -22.7 Overcast. Wind still high and in gr since 12.9 26 5 21 - Calm. -24.0 -29.0 -29.7 20 12 W.S.W. Light. -35.7 -32.6 Unclouded since 7.A faint arc arc arc of mole since 12.9 20 12 W.S.W. Light. -35.7 -32.6 Unclouded since 7.4 faint arc arc arc of mole since 12.9 21 14 - Calm. -37.7 -36.2 Unclouded since 7.4 faint arc arc arc of mole since 12.9 22 26 14 - Calm. -3					Direction	Force.		88	
5 24 21 — Caim. $-43\cdot7$ $-41\cdot2$ Hoshit and a fulle, viz. 73 11 25 3 N.N.E. Mod. $-40\cdot2$ $-36\cdot4$ Lightly overcast. Lightly overcast. 17 9 E.N.E. Fresh. $-23\cdot3$ Overcast. Wind high and in grastic 12%. 26 5 21 — Caim. $-22\cdot7$ Still overcast. Wind still high and in grastic 12%. 11 3 W.S.W. Light. $-22\cdot9$ Overcast. Wind still high and in grastic 12%. 20 12 W.S.W. Light. $-36\cdot7$ $-32\cdot3$ Unclouded. Detached stream arrow extending from N.W. 21 W.S.W. Light. $-37\cdot8$ $-35\cdot2$ Unclouded. Detached stream brightness from N.V. N. D. 22 26 14 — Caim. $-37\cdot8$ $-35\cdot2$ Unclouded. For an algeb 96'9'1. N.W. N. B. 23 15 — Caim. $-38\cdot7$ $-36\cdot2$ Unclouded. Partial 22b' 97. N.W. N. D. 24 11 27 3 N.N.E. </td <td>D.</td> <td>Janua H.</td> <td></td> <td></td> <td></td> <td></td> <td>•</td> <td>٥</td> <td>The movements from 21^h to 2^h, which are the most considerable at LakeAthabasca, have no decided counterpart at Toronto or Green- wich, but the disturbance lasted at Toronto and at Greenwich (more decide-21) at the former than at the latter station), down</td>	D.	Janua H.					•	٥	The movements from 21 ^h to 2 ^h , which are the most considerable at LakeAthabasca, have no decided counterpart at Toronto or Green- wich, but the disturbance lasted at Toronto and at Greenwich (more decide-21) at the former than at the latter station), down
17 9 E.N.E. High. -31's -28's Overcast. Wind high and in g since 12 ^h . 23 15 E.N.E. Fresh. -20'6 -23'3 Overcast. Wind high and in g since 12 ^h . 26 5 21 - Calm. -26'0 -22'7 Still overcast. Wind fallen since 11 3 W.S.W. Light. -32'9 -29'3 Unclouded since 7 ^h . A faint arc 20 12 W.S.W. Light. -35'7 -32'6 Unclouded. Detached stream streams and actor of 10'. 22 26 14 - Calm. -37'8 -35'2 Unclouded. Faint and each of 20' of 10'. 23 15 - Calm. -38'7 -36'2 Unclouded. Faint and 23' 0'' 31'. Weestery. 24 5 23 - Calm. -38'7 -36'2 Unclouded. Faint arc 25 23 - Calm. -38'6 -35'4 Lightly overcast faine aver 11 27 3 N.N.E. Fresh. -13'8 <td></td> <td></td> <td>1</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td>Hazy, but unclouded.</td>			1		-				Hazy, but unclouded.
23 15 E.N.E. Fresh. -26'6 -23'7 Sino 12b, '''' dight ling' 26 5 21 - Calm. -26'6 -22'7 Sillo vercast. Wind still high squally, but abaced a little. 11 3 W.S.W. Light. -32'9 -22'3 Unclouded since 7b. A faint arc i arc of model 17 9 W.S.W. Light. -35'7 -32'6 Unclouded since 7b. A faint arc i arc of model 20 12 W.S.W. Light. -35'7 -32'6 Unclouded. Stream arc i of model 22 26 14 - Calm. -37'8 -35'2 Unclouded. Force slightly 23 15 - Calm. -37'8 -35'2 Unclouded. Force slightly 24 16 - Calm. -38'7 -36'2 Unclouded. Force slightly 25 23 - Calm. -38'6 -35'4 Lightly overcast since 4 ^h . 11 27 3 N.N.E. Fresh. -28'0 -24'8 Wind newly risen. Still overcast of the of of the observations. 27 5 21			25		1				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			1	9	E.N.E.	High.	-31.8	-28.4	
20 0 21 Calm. -22'0 -22'1 Shill overcast. Wind fallen since 11 3 W.S.W. Light. -24'0 -22'1 Overcast. Overcast. 17 9 W.S.W. Light. -32'9 -29'3 Unclouded. since 7 ^h . A faint arc aurore extending from N.to N.E. 20 12 W.S.W. Light. -35'7 -32'6 Unclouded. Detached stream and part of an arch of mode brightness from N.to N.E. 22 26 14 - Calm. -37'8 -35'2 Unclouded. Faint and searcely brightness form. N.to N.E. 23 15 - Calm. -38'7 -36'2 Unclouded. Faint and searcely bright at 22' 9", n. convolutione 22' and 25'0'8'.1. 24 - Calm. -38'6 -35'4 Unclouded. Faint and searcely bright at 22' 9", n. convolutione 22' and 25'0'8'.1. 27 5 23 - Calm. -38'6 -35'4 Light's at 22' 9", n. convolutione 22' 1. Light's at 22' 9", n. Light's at 22' 9", n. Light's at 22' 1.					E.N.E.	1	-26.6		Overcast. Wind still high and
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	26				-				Still overcast. Wind fallen since 2^{h} .
20 12 W.S.W. Light. $-35 \cdot 7$ $-32 \cdot 6$ 22 26 14 $-$ Calm. $-37 \cdot 8$ $-32 \cdot 6$ 22 26 14 $-$ Calm. $-37 \cdot 8$ $-35 \cdot 2$ Unclouded. Detached stream and part of an arch of model stream of the other other of the other other of the other other of the other other of the other other of the other other of the other other of the other oth						-			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				-					Unclouded. Detached streamers,
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		22	26	14	-	Calm.	-37.8	-35*2	brightness from N. to N.E. Unclouded. Faint and scarcely dis- tinguishable streamers and arches. Horizontal Force slightly dis- turbed. Range of Declination between 22 ^a and 23 ^a 0 ^o 31 ^c . Most westerly (-14 ^c 4) at 22 ^b 9 ^a ; most easterly (+16 ^c 1) at 22 ^b 51 ^m . Low- est value of Horizontal Force
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		29		15	-	Calm.	-38'7	-36-2	Unclouded. Faint luminous or au- roral haze, which continued visible down to 1 ^h , without assuming any
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	27	5		23	-	Calm.	-38'6	-35.4	Lightly overcast since 4 ^h .
Sunday. 23 23 25 - Calm. -14*8 -12*0 Light in the N. Light in the N. 29 5 21 N.N.E. Light. -17*3 -14*6 Light in the N. Sky recently cleared. 11 29 13 N.E. Light. -5*4 -3*1 Overcast again since 9 ^b . 17 9 N.N.E. Fresh. 1*3 3*0 Snowing thickly since 15 ^b , and so to 20 ^b . 23 15 E.N.E. Light. 14*6 15*0 Light/y overcast, with cirro-cum Snow again at 0 ^b . 30 5 21 W.S.W. Light. 5*1 6*3 Snowing thickly. Snowing since 15 ^b , and so to 20 ^b . 11 30 3 W.S.W. Light. 5*1 6*3 Snowing thickly. Snowing since 15 ^b . 11 30 3 W.S.W. Light. 2*7 4*7 Overcast. Sinowing since 15 ^b . 18 10 Calm. -8*0 -5*9 Overcast. Sky cleared. and slight aurora () described.) 21 13 <t< td=""><td></td><td></td><td>27</td><td></td><td></td><td></td><td>-28.0</td><td></td><td>Wind newly risen. Still overcast.</td></t<>			27				-28.0		Wind newly risen. Still overcast.
29 5 21 N.N.E. Light. $-17^{\circ}3$ $-14^{\circ}6$ Sky recently cleared. 11 29 13 N.E. Light. $-5^{\circ}4$ $-3^{\circ}1$ Overcast again since 9 ^h . 17 9 N.N.E. Fresh. 1'3 3'0 Snowing thickly since 15 ^h , and so to 20 ^h . 23 15 E.N.E. Light. 14'6 15'0 Lightly overcast, with cirrocum Snow again at 0 ^h . 30 5 21 W.S.W. Light. 5'1 6'3 Snowing thickly. Snowing since Snow again at 0 ^h . 11 30 3 W.S.W. Light. 2'7 4'7 Overcast. 13 10 Calm. $-8^{\circ}0$ $-5^{\circ}9$ Overcast. 21 13 Calm. $-6^{\circ}0$ $-8^{\circ}6$ Sky cleared, and slight aurora () described. 23 15 Calm. $-19^{\circ}5$ $-16^{\circ}2$ Partially clear. 23 15 Calm. $-19^{\circ}5$ $-16^{\circ}2$ Partially clear. 31 00 16 <td< td=""><td></td><td></td><td>10.00</td><td>9</td><td>N.N.E.</td><td>V. light.</td><td>-13.8</td><td>-10.9</td><td>High wind generally since 11^h. At 18^h a little snow. Overcast to the end of the observations.</td></td<>			10.00	9	N.N.E.	V. light.	-13.8	-10.9	High wind generally since 11 ^h . At 18 ^h a little snow. Overcast to the end of the observations.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	28	23	28	15	-	Calm.	-14.8	-12.0	Lightly overcast. Faint auroral
17 9 N.N.E. Fresh. 1° 3° Snowing thickly since 15 ^h , and so to 20 ^h . 23 15 E.N.E. Light. 14° 15° Snowing thickly since 15 ^h , and so to 20 ^h . 30 5 21 W.S.W. Light. 5° 15° Snowing thickly since 15 ^h , and so to 20 ^h . 11 30 3 W.S.W. Light. 5° 15° Snowing thickly. Snowing thickly. 17 9 Calm. -8° -5° Overcast, but ceased snowing so after 5 ^h . 18 10 Calm. -6° -8° Sky cleared, and slight aurora (cescribed.) 21 13 Calm. -13° -10° Generally clouded. A faint mass aurora () near the horizon the N, and streamers in the N. 23 15 Calm. -19° -16° Partially clear. 31 00 16 Calm. -21° Partially clear. A faint auroral hi in the N. (). 11 31.3 Calm. -22° $-17^$	29			21		Light.	-17.3	-14.6	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			29	13		Light.	-5.4	-3.1	Overcast again since 9 ^h .
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		17		9	N.N.E.	Fresh.	1.3	3.0	Snowing thickly since 15 ^h , and so on
30 5 21 W.S.W. Light. 5'1 6'3 Snowing thickly. Snowing since 11 30 3 W.S.W. V. light. 2'7 4'7 Overcast, but ceased snowing so after 5 ⁵ . 17 9 - Calm. -8'0 -5'9 Overcast, but ceased snowing so after 5 ⁵ . 18 10 - Calm. -6'0 -8'6 Sky cleared, and slight aurora (described.) 21 13 - Calm. -13'3 -10'4 Generally clouded. A faint mass aurora () near the horizon the N, and streamers in the N. 23 15 - Calm. -19'5 -16'2 Partially clear. 31 00 16 - Calm. -21'8 -18'2 Partially clear. A faint auroral hi in the N. (). 5 21 - Calm. -20'4 -17'9 Unclouded since 2 ^h . 11 31 3 - Calm. -14'8 -11'9 Light cirri and strati in various pa of the sky. 17 9 E.N.E. Light. -22'8' -20'2' Light cirri strati.		23		15	E.N.E.	Light.	14.6	15.0	Lightly overcast, with cirro-cumuli.
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	30						5.1		Snowing thickly. Snowing since 2 ^h .
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			30		w.s.w.	-			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $					-				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				10	-	Calm.	-6.0	-8.6	Sky cleared, and slight aurora (not described.)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		21		13	-	Calm.	-13.3	-10.4	Generally clouded. A faint mass of aurora () near the horizon in the N., and streamers in the N.W.
5 21 — Calm. -20'4 -17'9 In the N. (). 11 31 3 — Calm. -14'8 -11'9 Unclouded since 2 ^h . 17 9 E.N.E. Light. -22'8* -20'2* Light cirro-strati.				15	-	Calm.	-19.5	-16.2	
5 21 Caim. -20'4 -17'9 Unclouded since 2 ^h . 11 31 3 Caim. -14'8 -11'9 Light cirri and strati in various pa of the sky. 17 9 E.N.E. Light. -22'8* -20'2* Light cirrostrati.	31			1	-				Partially clear. A faint auroral haze in the N. ().
17 9 E.N.E. Light22.8* -20.2* Light cirro-strati.					-				Unclouded since 2 ^h .
			31	- 1	-	I			Light cirri and strati in various parts of the sky.
and a faint stationary strip		17 18		9 10	E.N.E. E.N.E.	Light. Light.	-22.8* -22.0	-20·2* -19·2	Light cirro-strati. Detached streamers in the N.E. (), and a faint stationary strip of cirrus nurora at elevation 36° in

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]?a	Date.			Tompo	erature.	
		Wir		Tempe		
Gött. Time.	Mean Time.	Direction.	Force.	Newman corrected.	Dollond as observed.	Weather.
Januar	v 1844.					
D. H. 31 23	D. H. 31 15	N.N.E.	Fresh.	-18·4	° 15'9	Uniformly overcast since 10^{h} . A great disturbance, especially of the Horizontal Force, from 0^{h} to 4^{h} . Most westerly reading of the Declination $(-0^{\circ} 14')$ at 0^{h} 9 ^m . Lowest value of Horizontal Force $(-'046 X)$ at $0^{h} 27^{m}$. Most east- erly reading $(+1^{\circ} 1' 7)$ at $1^{h} 30^{m}$. Range $1^{\circ} 12' 7$.
Feb. 1 5	21 Feb.	N.N.E.	Fresh.	-14.2	-11.3	Overcast, with dense and closely- packed cirro-cumuli.
11	1 3	N.N.E.	Light.	-16.5	-12.7	Unclouded since 8 ^h .
17	9	N.N.E.	Mod.	-10.2	-8.2	Lightly overcast.
23 2 5	21	N.N.E. N. by W.	High. Light.	-5.8	0.9	Overcast. Considerable magnetic disturbance of an unusual obsrac- ter from 19 ^h to 21 ^h , the range of Declination being mostly to the westward. Most easterly reading of Declination (+0° 46'9) at 19 ^h 12 ^m , followed by the most westerly read- ing (-1° 19'8) at 19 ^h 27 ^m , Range 28'7'.2. Lowest value of Horizon- tal Force (-024 X) at 19 ^b 89 ^m Overcast. Slight snow at 7 ^h . Con- siderable disturbance of the same character as before again observed from 5 ^h to 8 ^b . Range of Declination
	1				ł	from 5^{h} to 8^{h} . Range of Declination 0° 51'.
11	2 3	N.	Light.	-1.2	0.8	Lightly overcast.
17	9	N.	Light.	-5.1	-3.1	Lightly overcast. Moderate disturb- ance from 17 ^h to 21 ^h . Most westerly reading of Declination (-0° 38') at 17 ^h 42 ^m ; most easterly (-10° 14' 2) at 18 ^h 48 ^m , Range 0° 49' 6. Hori- zontal Force above the mean dur- ing its continuance. Highest value (+ "026 X) at 18 ^h 4 ^m .
$\begin{smallmatrix}&23\\3&5\end{smallmatrix}$	15 21	=	Calm. Calm.	-9.3	-6·9 -7·1	Snowing lightly. Overcast. A few flakes of snow fall-
11	3 3	-	Calm.	-1.6	1.0	Very light and fleecy cirro-cumuli, with clear space.
17	9	-	Calm.	-5.9	-4.0	Overcast since 12 ^h , and so to the end of the observations at 20 ^h .
Sur. 4 23	nday. 4 15	W.N.W.	High.	7.3	8'3	Overcast since resuming observa- tions at 21 ^b . Very great disturb- ance between 23 ^h and 2 ^h . Most easterly reading of the Declination (+1° 14'8) at 0 ^b 21 ^m , followed by the most westerly (-1° 22') at 0 ^h 30 ^m . Range 2° 36'4. Horizontal Force at 0 ^h 3 ^m , at its lowest value,
55	21	W.N.W.	Light.	-7.3	-5.0	(-·068 X.) Overcast.
11	5 3	W.N.W.	Light.	-1.2	0.5	Unclouded since 6 ^b .
14	6	W.N.W.	Light.	-8.0	-6.5	Unclouded. A faint arch of aurora,
15	7	W.N.W.	Light.	-9.6	-7.4	Unclouded. A moderately bright
16	8	W.N.W.	Light.	-10.3	-8.3	arch of aurora () at elevation 13° . Unclouded; arch as at the last ob- servation. Considerable disturb- ance, principally of the Declination, from 16 th to 19 th . Most easterly reading (+0° 48'3) at 16 th 21 th , fol- lowed by the highest value of the Horizontal Force (+ '022 X) at 16 th 30 th .
17	9	W.N.W.	Light.	-13'4	-11.0	Unclouded. A double arch of aurora (), lower circle at elevation 8°, the upper at 18°, and two detached masses in the N.E., rising verti- cally to the elevation of 13° and 14°.

Da	te.		Wir	ıd.	Tempe	rature.	
Gött. Time.	Me Tir		Direction.	Force.	Newman corrected.	Dollond as observed.	Weather.
February 1844.		4.					
Sun D. H. 5 23	iday. D. 5	н. 15	-	Calm.	° -21.7	-19.3	Continues unclouded. Disturbance renewed from 20 ^h to 23 ^h . Low- est value of Horizontal Force (-'039 X) at 21 ^h 9 ^m . Most westerly reading of Declination (-0° 22'.7) at 21 ^h 36 ^m . Range 1° 3'.
65		21	W.N.W.	Light.	-22.0	-19.1	Lightly overcast since 3 ^h .
11	6	8	N.N.E.	Light.	-8.0	-5.8	Generally unclouded since 6 ^h . At present overcast.
17		9	E.N.E.	Light.	4.3	5*6	Overcast. Magnetic shock from 18 ^h to 20 ^h . Most westerly reading of Declination (-0° 23'.6) at 18 ^h 10 ^m . Most easterly ($+0^{\circ}$ 21'.2) at 19 ^h 30 ^m . Range 0° 43'.4.
23		15	-	Calm.	6.6	7.5	Clear at midnight, otherwise over- cast since 17 ^h .
75		21	-	Calm.	8.8	5.4	A few flakes of snow falling.
11	7	3	-	Calm.	9.2	11.0	Snowing lightly from 10 ^h to 13 ^h .
17		9	-	Calm.	5 9	7.2	Overcast.
23		15	-	Calm.	8.9	9.9	Overcast.
8 1		17	-	Calm.	6.6	7.9	Cirro-strati to the S.; remainder clear. A very faint arch of aurora gathering to a focus in the E. A slight disturbance just over. Range of Declination (0° 37'4.) Lowest value of Horizontal Force (-'021 X) at 0° 0°.
5		21	-	Calm.	6.6	7.7	Lightly overcast. A minimum of Horizontal Force (- 023 X) at 5 ^h 0 ^m .
11	8	3	-	Calm.	19.3	20.0	Light cirrus haze, but otherwise unclouded since 6 ^b .
17		9	-	Calm.	14'3	14.4	Unclouded.
23		15	-	Calm.	12.3	12.9	Clouded over since 22 ^h .
95		21	-	Calm.	12.0	12.5	Continues overcast.
11	9	3	-	Calm.	6.8	7.0	Overcast.
17		9	N. by W.	Light.	-0.8	1.5	Wind sprung up at 13 ^h .
23		15	-	Calm.	-2.4	0.0	Overcast.
10 5		21	N.N.E.	V. light.	0.8	2.9	A heavy hoar-frost depositing since 0 ^h .
11	10	3	-	Calm.	7.9	9.7	Snowing lightly. A glimpse of blue sky in the S.
17		9	-	Calm.	8.7	10.0	Overcast, and calm to the end of the observations at 20 ^h .
11 21	11	13	_	Calm.	-30.8	-27:4	Unclouded. An arch of aurora moderately bright (), extending from N.E. to N.W., and rising to an altitude of 54°. A faint patch of aurora () of great extent, near the horizon in the N.E. A slight change in the Horizontal Force and Inclination, but not sufficient to lead to observations for dis turbance. At 21 ^h 30 ^m no traces of aurora.
23		15	N.N.E.	V. light.	-31.8	-27.9	Unclouded.
12 5	ł	21	1	Calm.	-23.1	-20.1	Overcast; cirro-cumuli and strati.

	Date.		Wi	nd.	Tempe	rature.		
Gö Tir		Me Tin		Direction.	Force.	Newman observed.	Dollond as observed.	Weather.
Fe	brua	ry 184	4.					
D. 12	н. 11	D. 12	н. З	E.N.E.	V. light.	_11·9	° 8·8	Almost clear; light cirro-cumuli.
	17		9	N.N.E.	Light.	-14.9	-12.6	Unclouded since 12 ^h , with the ex-
	18		10	N.N.E.	Light.	-15.3	-12.7	ception of a few strati in the S. Unclouded. A faint arch of aurora (), at elevation 22° from N.E. to N.W.
	21		13	-	Calm.	-14.9	-12.9	A moderately bright arch of aurora
	22		14	-	Calm.	-18.2	-15'2	Unclouded. No aurora at this hour, but a succession of faint arches and e reamers prevailed from 21 ^h to 23 ^h , unaccompanied by any dis-
	23		15	- 1	Calm.	-19.5		unclouded. An arch of aurora (),
13	5		21	-	Calm.	-22.0	-10'7	at elevation 20°. Light cirri and strati covering the
	9	13	3	N.N.E.	Fresh.	-15.0	-13.0	Unclouded 6 ^h to 8 ^h ; at present
	17		9		Calm.	-7.0	-5.0	lightly overcast. Clearing since 15 ^h ; at present un- clouded.
	19		11	-	Calm.	-10.3	-8.2	Unclouded. A faint aurora visible
	20		12		Calm.	-11.5	-8.9	(undescribed). Unclouded. Aurora scarcely dis-
	23		15	_	Calm.	-10.0	-7.3	tinguishable. Unclouded since 17 ^h ; continued so
14	5		21	-	Calm.	-13:3	-11:0	to 3 ^h . Overcast at 4 ^h ; again unclouded. Clouded. Light cirro-strati.
15	11 17 23 5 11 17 20	14	8 9 15 21 8 9 12	N.N.E.	Calm. Fresh. Light. Calm. Calm. Calm. Calm.	$ \begin{array}{c c} -4.8 \\ -5.7 \\ 7.7 \\ 28.1 \\ 14.9 \\ 7.7 \\ 7.7 \\ \end{array} $	$ \begin{array}{c c} -2.0 \\ -2.7 \\ 8.3 \\ 9.0 \\ 29.0 \\ 15.8 \\ 8.9 \\ \end{array} $	Unclouded, but hazy. Overcast since 18 ^h . Lightly overcast. Hazy. Hazy; a few stars visible. Unclouded. No aurora visible. At
	23		15	N.N.W.	, Light.	5*9	7-2	20 ⁶ 15 ^m a brilliant arch, elevation 25 ^o , extending from N.E. to N.W., and gathering to a focus at the N.E. end No disturbance. At 20 ^h 30 ^m the arch separated into short narrow portions, which ap- peared to be suspended vertically, and were dancing up and down, and changing their position, with violent motion. The Billar and Inclinometer Magnets in slight agitation, but no change of reading to call for disturbance observa- tions. At 20 ^h 40 ^m the aurora appeared as two arches, the upper one faint (), at elevation 32 ^o , the inner one scarcely perceptible, and at elevation 26 ^o . No disturbance. At 21 ^h no aurora visible. Unclouded, but hazy.
16	5]	21]	Calm.	12.2	12.9	Unclouded.
	11	16	3	-	Calm.	34.0	32.0	Unclouded, but hazy.
	17		9		Calm.	29.2	28.0	Unclouded. A moderately bright arch of aurora (), extending from N.E. to N.W. At 17 ^h 30 ^m the same, at elevation 15 ^o . At 17 ^h 45 ^m the arch broke up into narrow vertical portions, which were dancing up and down in moderate motion. At the same time two brilliant () masses or foci of aurora to the eastward of N.E.; a slight change of reading in all the instruments.
	18		10	S.S.W.	Light.	29.4	28.4	Unclouded. An arch of aurora of moderate brightness (), extend- ing from N.E. to N.W., altitude 35°; readings of the instruments as at 17 ^h 45 ^m .

Date.		Win	nd.	Tempe	rature.			
Gö Tir	Gött. Mean Time. Time.			Direction.	Force.	Newman corrected.	Dollond as observed.	Weather.
Fe	brua	ev 18	1.1			1		
л. 16	н. 21	D. 16	н. 13	S.S.W.	High.	27.0	28.2	Unclouded. A brilliant burst of aurora, of a pale pink colour. At 21 ^h 24 ^m the sky to the S. nearly covered with faint masses and bands of aurora, in slight motion (). At 21 ^h 36 ^m a brilliant circle or corona (), 20 ^o from the zenith to the N. (This appears to have been caused, not by conver- gence of streamers, but by a convolution of what may be termed auroral cloud.) The circle in vertical and rotatory motion; large bands of diffused aurora surrounding it. Extra observa- tions from 21 ^h to 22 ^h ; range of Declination, 0° 12'8, completely establishing the absence of dis- turybance during the finest portion
	22		14	s.s.w.	Light.	28.9	27.0	of the above display. An irregular arch in the N.W. near
	23		15	S.S.E.	High.	34 4	31.8	the horizon. Unclouded. Faint aurora () still
17	5		21	s.s.w.	Mod.	27.9	26.8	visible. Overcast, with haze.
**	n	17	3	S.S.W.	Fresh.	37.1	36.0	Overcast, with haze.
	15		7	W.N.W.	Calm.	35.2	34 6	Partially clouded. Patches of faint aurora or auroral haze in various quarters, with part of an arch, of moderate brightness, from N.E. to N., at elevation 17°.
	д		8	-	Calm.	35.1	34.1	An imperfect arch, at elevation 28°. Auroral haze in various parts of the sky to the N. No disturbance.
	17	1	9	-	Calm.	83.2	32.1	Hazy. Clouded over after 18 ^h , and so to the end of the observations at 20 ^h .
18	Sun 23	18 18	15	-	Calm.	8.0	9'4	Clouded. Snowing lightly since 22 ^b .
19	5		23	-	Calm.	13.3	13.9	Overcast from 21 ^h to 6 ^h .
	11	19	3	-	Calm.	19.0	20.0	Unclouded since 7 ^h .
	17		9	-	Calm.	4.2	6.5	Continues unclouded.
20	23 5		15 21	-	Calm. Calm.	5·5	7.0	Overcast, with dense haze, increasing since 22 ^h . Hoar-frost. Clouded cirro-cumuli and haze.
	11	20	3	-	Calm.	32.2	31.0	Prevalence of cirro-strati and cirro- cumuli, at present unclouded, but hazy.
	17		9	W.	Fresh.	8.9	10.3	Unclouded since 15 ^h .
	20		12	-	Calm.	2.7	4.0	Unclouded. A faint irregular arch
	21		13	-	Calm.	-1'3	0'8	of aurora, at elevation 30°. Unclouded. Faint auroral haze. An irregular arch in the N., at eleva- tion 33°.
	23		15	-	Calm.	-5.6	-3.1	Unclouded.
21	5		21	E.N.E.	Light.	2.1	4.6	Overcast since 3 ^h .
	11	21	3	N.N.E.	High.	15.6	15.1	Overcast.
	17		9	N.	High.	21.5	20.0	Continues overcast.
	20		12	N.	Mod.	20*4	20.6	Thick and hazy. Three faint patches of aurora () in the N.W., at the elevations of 54°, 60°, and 62°.
	21		13	N.N.E.	Mod.	21.2	21.(Hazy. A faint arch of aurora (at the elevation of 15°.
	22	Į	14	N.N.E.	Mod.	20.1	19'8	Faint aurora visible, through cirro- cumulus clouds.
`22	23 5		15 21	N.N.E.	Mod. Calm.	19'0 19'1	18·9 19·5	Hazy. Faint aurora visible, as before. Calm since 1 ^h . Cirro-cumuli with clear spaces. Hazy.
	11	22	3	-	Calm.	24.3	24.4	Unclouded since 9 ^h . Snow at 6 ^h and 7 ^h .

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Date. Gött. Mean Time. Time.		Wi	nd.	Tempe	rature.			
			Direction.	Force.	Newman corrected.	Dollond as observed.	Wéather.	
Feb	brua	ry 184	4.					
D. :	н. 17	D. 22	п. 9	_	Calm.	° 27•2	26.1	Overcast since 12 ^h .
:	23		15	-	Calm.	30.8	29.8	Continues overcast.
23	5	κ.	21	-	Calm.	32.5	30.9	Unclouded. Clearing since 2 ^h .
	11	23	.3		Calm.	29.9	30.0	Light cirri and strati. Term day commenced at 10 ^h . A day of con stant but slight disturbance. Mos westerly reading of the Declina tion $(-0^{\circ} 13'^{\circ})$ at 4 ^h 40 ^m ; the most easterly $(+0^{\circ} 11'^{\circ}6)$; rang $0^{\circ} 23'^{\circ}6$.
	17		9		Calm.	10.9	· 11·7	Unclouded since 15 ^h .
	23		15	W.N.W.	Light.	0.4	2.7	Snowing slightly since 22 ^h .
24	5		21	-	Calm.	-3.3	-1.5	Unclouded.
	11	24	3	-	Calm.	1.3	4.8	Light cirro-cumuli and cirrus haze.
	17		9	-	Calm.	-4.9	-2.2	Nearly overcast. Dense cirro-cumuli Soon afterwards light wind from N.E. to the end of the observation at 20 ^b .
25	Sun 23	day.	15	W.N.W.	V. Light.	-9.5	-6.8	Unclouded since the commencemen of observations at 21 ^h .
26	5		21	-	Calm.	6.6	9.1	Unclouded.
	11		8	E.N.E.	Light.	33.2	33.9	Cirro-strati and cirro-cumuli.
	17		9	-	Calm.	27.9	25.9	Hazy. Faint halo round the moon diameter 40°.
	23		15	w.s.w.	Mod.	1.9	3.2	Partially clouded. Snow at 22 ^b . A slight disturbance from 22 ^b to 0 ^l giving a minimum of Horizonta Force (-022 X), at 23 ^b 9 ^m , rang of Declination, 0° 11'.
27	1		17	-	Calm.	-2.2	-0'3	Unclouded. Clear bright and broad arch of aurora (), at elevation 25°; no disturbance.
	5		21	-	Calm.	-5.6	-2.8	Uncloaded.
	11	27	3	-	Calm.	-0.9	1.9	Hazy.
	17		9	E.N.E.	High.	-1.3	1.5	Hazy. Wind from N.E. since 12 ^h high since 14 ^N .
	23		15	N.N.E.	High.	3.3	5.3	Overcast.
28	5		21	N.N.E.	Light.	6.8	8.3	Snowing lightly since 10 ⁴ .
	11	28	8	w .	Light.	15.2	16.2	Ceased snowing at 8h.
	16		8	_	Calm.	6*4	6.1	Unclouded. A bright but narror band of aurora () in the S., a elevation 40°, islos an irregular see pentine arch in the N.W., bot of a yellowish tint, and closel striated, conveying the impressio of being near the earth. At 16 ^h 5 much yellow and purple color was developed. At 16 ^h 15 ^m a brigh mass. of aurora, extending fro W.N.W. to S., at elevation 10° f 17°, with short streamers at a elevation of 50° dancing up an down, appearing and disappearing with moderate motion. A dem and brilliant stationary body

Da	ıte.	Win	nd.	Tempe	rature.	
Gött. Time.	Mean Time.	Direction.	Force.	Newman corrected.	Dollond as observed.	Weather.
	гу 1844. D. H.			Ο.	U	aurora in the W.N.W.; detached streamers in the E.; no disturb- ance. At 16 ^h 30 ^m four faint striated bands or arches crossing the me- ridian near the zenith. A bright portion of an arch (3) from E. by N. at elevation 6°, to N. at elevation 40°, terminating in a curl at the upper end. At 16 ^h 45 ^m a broad dif- fused arch of irregular form, at elevation 74°. Five faint and imper- fect arches in the N. at various altitudes. Faint streamers in the S.W. No disturbance.
28 17	28 9	-	Calm.	6.4	6.1	Unclouded. A dense and brilliant band, rising in a zizzag form, and extending from N.W. to N.E., much diffused at N.E. end, and portions striated. At 17^{n} 15 ^m streamers of moderate brightness in various parts of the sky. No disturbance. 17^{h} 30 ^m no aurora visible.
19	11	-	Calm.	-0.3	1.9	Unclouded. No aurora. At 19 ^h 30 ^m very faint diffused aurora in the N.; portions striated.
21	13		Calra.	-1.2	0.0	Unclouded. Bright aurora () not described. 21 ^h 15 ^m aurora in bright serpentine bands () moderately dense, in rapid motion, and faintly coloured, all in the southern sec- tion of the sky.
22	14	-	Calm.	-2.2	-0.5	Diffused bands of aurora () spread irregularly near the zenith, and in the N.W. Slight disturbance.
23	15	_	Calm.	-2.3	0.0	Unclouded. Very faint detached masses of cirrus aurora () float- ing about in the S. Considerable change of Inclinometer scale read- ing at 23 th , for which extra obser- vations were made for half an hour, then discontinued, on the magnet returning with little irregularity to its mean position.
29 0	16	-	Calm.	-3.8	-2.3	Unclouded. Faint cirrus aurora as before, but no disturbance.

Abstract from the Meteorological Journal-continued.

END OF THE OBSERVATIONS AT LAKE ATHABASCA.

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Abstract from Meteorological Journal.

I)ate.	Wi	nd.	Temp.	
Gött. Time.	Mean Time.	Direction.	Force.	Newman corrected.	, Weather.
1 April. D. н. 1 б	844. March. D. H. 31 21	E. by S.	Mod.	8·7	Hazy. Snowing from 1 ^h to 5 ^h Gött.
12	April.				
	Í S	S.E.	Mod.	25.0	Overcast, with light cirro-cumuli, interspersed with clear spaces.
17 18	8 9	S.E. S.E.	Mod. Mod.	15.1	A faint mass of aurora, of striated appearance, in the N.N.E., at 50° elevation. At 17 ^h 30 ^m an arch of moderate brightness (), extending from S.E. to N.N.W., and at 70° of elevation. Unclouded. The arch has recently separated into faint masses () of striated appearance, diffused generally over the sky, and slightly in motion At 10 ^h 16 ^h the aurore consider.
2 0 6 12 17 18	1 15 21 2 3 8 9	S.E. S. hy E. S.E. —	Light. Light. V. light. Calm. Calm.	1.6 10.3 29.3 16.9 15.8	ably brighter () and nearer the zenith. elevation 82°. At 18 ^h 30 ^m still bright and about the same elevation, with moderate serpentine motion. Hazy, but unclouded. Unclouded since 0 ^h . Still unclouded. Still unclouded. Unclouded. A faint arch of aurora () from S.E. to N.N.W., at elevation 74°. Unclouded. Faint aurora () extending from
20	11	_	Calm.	12.7	the E. along the northern quarters; cirrus aurora or haze in various parts of the sky. Unclouded. Cirrus aurora in various parts of
21	12		Calm.	11.2	the sky. Unclouded. Faint aurora from E. to N.W.,
22	13		Calm.	8.6	and suroral haze in various parts of the sky
					Unclouded. No aurora. At 22^{b} 10 ^m a brilliant burst of aurora, attended by great disturb- auce of the magnets. It appeared in the W.N.W., rising rapidly in vertical streamers, which were highly coloured, exhibiting tints of pink, green, and yellow, and in violent pulsating or dancing motion; sometimes, also, chauging position by serpentine development, and presenting themselves in different parts of the sky, both N. and S. of the zenith. It disappeared at 22^{h} 30 ^m . Most easterly posi- tion of the Declination ($+2^{\circ}$ 37') at 22° 540 ^m ; nange 3° 27'. The movements of the Inclinometer and Biflar Magnets exceeded the range of their respective scales.
30	15	-	Calm.	1.2	Unclonded. No aurora visible; but little dis- turbance. Observations were discontinued at $23^{h} 30^{m}$, but resumed at 4^{h} , giving another maximum to the E. of $+1^{\circ} 39'$'s at $4^{h} 24^{m}$.
6 12	$\begin{array}{c} 21\\ 3 \end{array}$	s.w.	Calm. Fresh.	12.7 39.8	Cirro-cumulus clouds. Wind since 8 ^h began
17	8	s.	V. light.	28.9	S.E. Unclouded. Faint arch of aurora from E. to N., at elevation 40°. The magnets not disturbed.
18	9		Calm.	30.4	57° and 65° elevation, and a broad diffused
4 0 6 12 18 19	15 21 4 3 9 10 Friday.	5.E. 5. 5. 5.E.	Calm. Light. Fresh. V. light. V. light.	22.6 29.3 46.5 33.8 31.5	band crossing the zenith from S. to N. Overcast. Lightly clouded to the E.; remainder clear. Nearly overcast. Unclouded, but hazy. The same. Faint auroral haze in the N. and
5 18	5 9	-	-	-	S.W. Casual observation. An aurora of moderate brightness (), chiefly confined to the N.W.
21	12	N.N.W.	High.	22.0	brightness (), chiefly confined to the N.W., annular and irregular in form and motion. Unclouded. Faint auroral haze in S. and W.
6 0	15	W.N.W.	High.	9.2	Wind squally, increased to a gale at 22 ^h . Clouded since 22 ^h , wind somewhat abated. Snow mixed with rain at 23 ^h .
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AT FORT SIMPSON.

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Da	te.	_	Win	ıd.	Temp.	
Gött. Time.	Me Tir	ean ne.	Direction.	Force.	Newman corrected.	Weather.
April	1844			······		
D. H.	1		N W hoN	Mod.	§.3	Unclouded. A sprinkling of snow at 2 ^h , 3 ^h ,
66	5		N.W.byN.			and 4 ^h . Light cirrous clouds, 0.9 of blue sky.
12	6	8	-	Calm.	16.4	Tight offices clouds, o our state and the 18h 15m an
18		9		Calm.	8.9	Nearly unclouded. No aurora. At $18^{h} 15^{m}$ an arch of aurora () extending from E. to W.N.W., extremities at 20° elevation, but rising to 78° in the centre, rather irregular above the elevation of 45° , width 11°, in motion; also, two faint arches from E. to N., at elevation 25° and 38° . Extra observations were commenced, but the disturbance mani- fested was slight. At $18^{h} 30^{m}$ the arch was in the zenith, where it separated into three bands or arches; the general form was regular at the N.W. end, but at the opposite extremity was curved almost to a circle, at the elevation of 18°. Most westerly reading of Declination ($-0^{\circ} 27'.4$) at $18^{h} 30^{m}$. At $18^{h} 45^{m}$ the arch appeared in three detached portions, extending from the zenith to the N.W., slightly in motion. There was also a bright patch in the N., at elevation 20° , and faint haze () in various parts of the sky. Nearly unclouded. A faint arch of aurors (5), at elevation 34° . The most easterly reading of the Declinenter was observed at $10^{h} 45^{m}$
19		10	-	Calm.	6.5	
20		11	-	Calm.	3.6	$(+0^{\circ}16^{\circ}5)$; range only 0° 45° 5°. Unclouded. A double arch of aurora () of striated appearance, at an elevation of 27°, rather brighter than before.
7 23	nday.	7 14	-	Calm.	15.3	Hazy. A faint arch of aurora extending from E. to N.W., elevation 56°.
:8 0		15	-	Calm.	13.2	Unclouded.
6		21	-	Calm.	23.7	Unclouded.
12		8 8	S. by W		42.5	Nearly overcast, with light cirro-cumuli, 0.3 of blue sky.
18		6		Light.	,	Overcast since 13 ^h . Unclouded. Wind gusty.
×90		15			37.1	Unalouded
6		21		High. Brisk.	1	Overcast, and fresh N.N.W. wind since 7 ^b
12		98	1		23.7	Overcast, and fresh N.N.W. wind since 7 th Heavy snow soon after 12 ^h . Hazy, but only partially clouded. Light snow at 15 ^h and 16 ^h .
18 20		1) W. by N 1 W. by P			at 15 ^h and 16 ^h . Unclouded. No aurora. At 20 ^h 45 ^m the auror appeared as a broad arch, crossing the zenit from E. to W. by N., brightest and mos regular in the S.E., up to an elevation of 49 from thence about 9° wide to a distance of 30° from the zenith towards the W. It wa extending itself with moderate motion. N
21		1	2 W. by I	N. Mod.	. 17*1	disturbañce. Aurora was extending in the N.N.W. with violent whirling motion, from an elevation of 25° to 68°, exhibiting faint tints of pink an yellow, with several long streaks rising to wards the zenith in the N. and S. Tr most westerly reading of the Declinometer ($-0^\circ 4' 4$) was at 21° 6°. At 21° 15° a fain band of aurora extended across the zenit and a very bright mass of streamers () roo to the zenith from an elevation of 14° E. by S so closely arranged as to resemble a sing striated beam, but in violent motion, a beautifully tinted. At 21° 30° four fai transverse bands () extended across the meridian near the zenith, from an elevation of 30° above the horizon in the S.E. to elevation of 25° in the N.W., having a se pentine outline and a moderate motion. 21° 46° vertical beams of aurora and detach haze in various parts of the sky.

	Da	te.		Wi	nđ.	Temp.	
	itt. me.	Me Tir	ean ne.	Direction.	Force.	Newman corrected.	Weather.
р. 9	Apri H. 22	1844. D. 9	п. 13		Calm.	° 16*4	Unclouded. The aurora as last described. At $22^{h} 15^{m}$ the same. At $22^{h} 30^{m}$ it had nearly disappeared, leaving only a few vertical beams, and streaks of light moderately bright near the horizon. The most easterly reading of the Declinometer (+1° 10') was at $22^{h} 45^{m}$.
10	0		15	W. by N.	Mod.	14.9	range 1° 16'.6. Unclouded, but hazy.
	6		21	N.W.byN.	Fresh.	20.4	Nearly overcast.
	12	10	8		Calm.	22.8	Nearly unclouded.
	18		9	_	Calm.	12.7	Unclouded. A vertical mass of aurora rising in the S.E., elevation 24°. At 18 ^h 15 ^m faint vertical beams extending from N.N.E. to E. near the horizon. Imperfect arches rather brighter () rising from the S.E. and N.W., in the latter quarter approaching the zenith, in the former rising to 60° elevation. At 18 ^h 30 ^m vertical beams still stationary, and ranging from N.N.E. to E., also an imperfect annular body of aurora in the N.N.E., at an elevation of 40°, and about 23° in diameter. Imperfect arches, and cirrus aurora or haze in various parts of the sky. At 18 ^h 45 ^m the aurora had nearly disappeared. The instru- ments were watched and scale readings taken every 15 ^m during this display, but no disturb- ance was manifested.
	20		11	-	Calm.	11.9	Unclouded. A faint arch of aurora from E. to N. at elevation 28°.
	21		12		Calm.	7.1	Unclouded: A heavy band of aurora, mode- rately bright, crossing the zenith from S.E. to W. by N., of irregular form, with rapid sor- pentine changes, faintly coloured, it vanished in a few minutes, and at 21h 6 th or nothing but a few faint streamers and cirrus aurora was visible; this continued with little change to 21 ^h 45 ^m , and at 22 ^h there was no aurora visible. The magnets considerably disturbed. Most easterly reading of Declinometor (+1° 27'3) at 21 ^h 6 ^m , most westerly reading (-0° 6'9), at 22 ^h 3 ^m , range 1° 26'2.
11	0		15	-	Calm.	2.2	Unclouded.
	6		21	E.	V. light.	13.8	Unclouded.
	12	11	3	E. by S.	V. light.	28.7	Unclouded.
	18		9	E.	Brisk.	21.5	Unclouded, but hazy.
	19 23		10 14	Е. Е.	Brisk. Brisk.	21·5 , 17·1	Still unclouded. A faint double arch from N_{x} to E. at an elevation of 26°, and auroral haze in detached masses. Long and faint vertical beams, and auroral hazo extending from N. to E.; also faint bands (), across the meridian near the zenith.
12	0		15	E: by S.	Brisk.	17.1	Nearly unclouded.
	6		21	E.S.E.	Light.	23.7	Unclouded since 1 ^h :
	12	12	3	-	Calm.	37.0	Still unclouded.
	18	,	9	-	Calm.	32.9	Haze gathering since 13 ^h . At present overcast:
13	0		15		Calm.	30.4	Thickly overcast, and snowing. Very dark.
	6		21	N.W.	Mod,	33.2	Still snowing slightly.
	12	13	3	N.	Brisk.	34.2	Partially clouded, but with clear spaces.
	18		9	W.N.W.	Brisk.	27.5	Overcast since 13 ^h , but now clearing again. Still
	19		10	N.W.	Light.	26.9	hazy. Unclouded. An arch of aurora () at an alti- tude of 33°, which separated at 19 ^h 40 ^m into, faint serpentine bands of little density, in moderate motion, and apparently at a con- siderable elevation in the atmosphere. No, disturbance.
	20		11	N.W.:	Light.	25.2	Dispersed portions of aurora still visible.

Abstract from the Meteorological Journal-continued.

	Date.		Win	ıd.	Temp.	
Gött. Time	M. Ti	ean me.	Direction.	Force.	Newman corrected.	Weather.
D. H	oril 1844 D. unday.		S.E.	Mod.	° 22:6	Unclouded. A bright arch of aurora () from
						E. to N. at 35° of elevation, terminating in a curve or hook at the E. end, at 14° elevation. Long vertical streamers in slight motion from N. to N.E. Dense masses of aurora in the zenith, and in various parts of the sky. The magnets slightly disturbed. Most westerly reading of Declination (-0° 19'1) at 21°, At 21° 15° the features of the aurora were much the same, but considerably fainter. At 21° 30° it had nearly disappeared, excepting faint haze, and a faint imperfect arch from E. to N. at elevation 18°. At 21° 45° there was a faint arch from N.E. to N. at an elevation 27°. At 22° no aurora was visible.
-15 0		15	-		20.6	Unclouded. At 1 ^h the same. No aurora visible, but a considerable degree of disturbance, for which the extra observations were resumed, and continued to 3 ^h . Most easterly reading of the Declinometer (+1° 38'7) at 1 ^h 42 ^m , range since 21 ^h , 2° 16'0.
6 12 18 19	15	21 3 9 10	S.E. S.E. S.E.	V. light. V. light. V. light. Calm.	27 °1 43 °5 32 °5 32 °7	Unclouded. Clouded, light cirrus and haze. Uniformly overcast, with light haze. Unclouded since 18 ⁵ . A faint arch crossing the meridian near the zenith from E. to W.N.W., form irregular in the highest portion, expand- ing with moderate motion. No disturbance, but readings taken overy 15 ^m . At 19 ^h 15 ^m the
	-					The magnets were now observed at intervals of one minute, and showed a slight degree of disturbance, the mean observed at intervals of one minute, and extending the second at the second motion. At 19 ^a 30 ^m the bands were extending with rapid motion to the S. of the zenith, but much fainter than at the last observation. At 19 ^a 45 ^m about half of the sky was covered with aurora in vertical streamers, and cirrus masses of moderate brightness. The magnets were now observed at intervals of one minute, and showed a slight degree of disturbance, the Declination ranging to the W. of its mean position. Most westerly read- ing (-0^{c} 23° 9) at 19 ^b 54 ^m .
2(11	-	Calm.	32.2	ing $(-0^{\circ} 23' 9)$ at 10 ^h 54 ^m . Unclouded. A long range of vertical streamers, faintly coloured, extended from E. nearly to the N., at elevation of 24°, pulsating or dancing with rapid motion. Cirrus aurora, or haze, in various parts of the sky. Most easterly reading of the Declination $(+0^{\circ} 10' 7)$ at 20 ^h 3 ^m , range, 0° 40' 6; a remarkably small quantity for so considerable a display of aurora. At 20 ^h 15 ^m there were no traces of the aurora visible.
23		14		Calm.	26.4	Unclouded since 20 ^h . No observation from 23 ^h to 3 ^h .
16 (1	21	N.W.	V. light.	41.4	A few light cirrus, but nearly unclouded since 3 ^h . Unclouded
19 14		3 5	N.W.byN.	Mod. Calm.	49•5 46•5	Unclouded. Light cirro-cumulus and haze. The Bifilar and Inclinometer began to give evidence of a state of disturbance; the Declination also ranged considerably to the westward of its mean position at this hour. Extra observa- tions were commenced and continued for sixteen hours
17			-	Calm.	38.2	sitteen hours. Hazy. Disturbance still continuing, the Decli- nation exclusively to the west of its mean position. At 17 ^h 38 ^m aurora was first ob- served rising in the S.E. in two curved streams, moderately bright; elevation above the horizon, 35° and 40°. At this same hour the following entry occurs in the Metcorolo- gical Register at Toronto :"Clear overhead; " clouded round the horizon. A faint light " apparent behind the clouds in the N.W, " horizon."

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Abstract from the Meteorological Journal-continued.

Da	ate.	Wi	nd.	Temp.		
Gött. Time.	Mean Time.	Direction.	Force.	Newman corrected.		
April D. H. 16 18	1844. D. H. 16 9	-	Calm.	37.7	Unclouded., No aurora described, but at To- ronto an entry similar to the last is found: "A faint auroral light behind the clouds in "the northern horizon." After which it was clouded at that station, and began to rain at 20 ^h 40 ^m . At 18 ^h 45 ^m imperfect striated arches of aurora extended from E, to N, and from	
19	10	-	Calm.	32.9	S. to N.M.E., moderately bright. A very faint double arch or band crossed the zenith from S. to N.W. Bright cirrus aurora, or haze, in various parts of the sky. Unclouded. The aurora nearly the same as at $18^{h} 45^{m}$. At $19^{h} 15^{m}$ scarcely any traces of aurora, but considerable disturbance, the Declination ranging to the castward. At $19^{h} 45^{m}$ two narrow serpentine bands of aurora crossed the sky, near the zenith, from N.W. by N. to S., moderately bright, and with slight motion. The most westerly read- ing of the Declinometer $(-1^{\circ} 17')^{\circ}$ was at	
20	n	-	Calm.	30*4	10 th 50 th . Unclouded. A broad band of aurora in vielent motion, extending from the S.E. to the zenith, with vertical streamers pulsating or dancing in the N. Extra observations were commenced at Toronto at this hour, and con- tinued for sixteen hours. At 20 th 15 th long vertical streamers in the S.E. and N.E., in moderate motion. At 20 th 45 th aurora extend- ing from E. to W., and passing near the zenith, in the form of an arch of moderate hvichtness finithy coloured at the centor	
21	12	_	Calm.	28*2	end. The extreme casterly reading as the route ($\pm 0^{\circ}$ 39'3) was at this time. Unclouded. The aurorarising from the E and W, in fine vertical streamers, in rapid mo- tion. They all united to form a star or corona near the zonith, having a diameter of 7°, its exact position not recorded. At 21 ^h 15 ^m no traces of the aurora remained, except a few fine streamers in the N. At 21 ^h 45 ^m all trace had	
22	13	-	Calm.	28*6	disappeared. Unclouded. Aurora reappeared, of irregular form, moderately bright, and extending from N. to S.W., in slight motion. Extra obser- vations were commenced at Greenwich at this hour, in consequence of a change of De- clination of 8' 45" between 20 ^h and 22 ^h . Soon after the same hour the range of Declination at Toronto passed to the westward of the mean, and did not rise to the mean value during the remainder of the observations. At, $22^h 15^m$ no traces of aurora were visible; tho same at $22^h 30^m$ and $22^h 45^m$.	
23	14		Calm.	28.0	Unclouded. Aurora visible, in vertical stream- ers and dense cirrous patches, both N. and. S. At $23^h 45^m$ a sleuder serpentine band crossing the zenith. The most westerly read- ing of the Declination at Toronto ($-0^5 54' \cdot 5$) was observed at $23^h 25^m$; range, $1^2 4t' \cdot 3$.	
17 0	15	_	Calm.	27*6	Aurora no longer visible; day dawning. The disturbance still continued, and soon after 1 ^h exceeded the limits of the scales of all the instruments. Most easterly reading of the Declinometer (+6° 32′0 nearly) at 1 ^h 24 ^m ; range not less than 8° 10′, possibly somewhat greater. The more active part of this dis- turbance, which was the greatest observed, appears to have terminated about 8 ^h 66tt, or 11 A.M. of mean time at the station. It is remarkable that its relative extent was by no means so great at Toronto, where the range- observed has been often exceeded, and was quite inconsiderable at Greenwich. Disre- garding minor changes, it may be described	

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<u> </u>	D	ate.		Wi	nd.	Temp.	
	ött. ime.		ean me.	Direction.	Force.	Newman corrected.	Weather.
	,					A:	to have consisted at Toronto, as regards the Declination, of a great easterly excursion, having a maximum at 21 ^h , and followed by a westerly excursion, giving one minimum at or near $23^{h} 30^{m}$, and another at $0^{h} 15^{m}$, the two being separated by a marked return to the eastward at 0^{h} . The succeeding maximum is at 3^{n} , after which the changes of this element are unimportant. Referring to the obser- vations at Fort Simpson, there is no general feature corresponding to either of these. Great and rapid changes of Declination pre- vailed during the whole continuance of the observations, but the most important of these, between 1 ^h and 1 ^h 30 ^m , when the ele- ment reached the user large deviation of
р. 17	April H. 6 12	1844. D. 16 16	н. 21 3		C m.	40°5 50:0	 ment reached the very large deviation of 6°32 from its normal value. A the same hour, has no corresponding feature at Toronto, where at that period the changes of Declination were moderate. As regards the Horizontal Force, we have at Toronto a minimum soon after 20%, succeeded by a very decided increase of force, having a maximum two hours later; this is followed by two minima, the most considerable between 23^a and 0^a, and the other soon after 1^b, after which there is a very gradual return towards the mean value of the element for several hours. It is curious to observe that a feature very much resembling the first of these, namely, a maximum, between two minima, occurs at Fort Simpson three hours earlier, at 19^a instead of 22^b, but in relative extent is not so great. To the minimum in question at Toronto, there is no feature corresponding at Fort Simpson ; on the other thand, each of the two succeeding minima at Toronto has correspondence which cannot be regarded as accidental with a minimum at Fort Simpson, and the second, which at the latter station exceeds any other observed, is but moderate at Toronto.
					Ω.		0.7 of blue sky. A few cirro-cumuli and cirro- strati. A slight degree of disturbance was observed from $13^{\rm m}$ to $14^{\rm m}$, the Declinometer ranging to the westward of its mean position. Most westerly reading ($-0^{\circ} 20'$.9) at $13^{\rm m} 9^{\rm m}$.
	18 22		9 14		Calm. Calm.	38*3 33*2	Unclouded, but hazy.
1,8	22 0		14 15	_		-	Almost unclouded. A few vertical beams of aurora in the N. No observation. At 23 ^h and at 2 ^h calm and un- clouded.
	6		21	-	Calm.	42.2	Nearly unclouded.
	12	18	3	E. by S.	Light.	51.7	Unclouded.
	18		9	-	Calm.	42'1	Nearly unclouded.
	20		11	-	Calm.	38.0	Unclouded. Auroral haze in the S.E.
	21		12		Calm.	36.3	Unclouded. A faint arch of aurora from E. to
	22		13	-	Calm.	83.9	W., at an elevation of 79°. No disturbance. Unclouded. A long range of slender vertical beams, ranging from E. to N., of moderate brightness, and showing but little motion.
19	0		15	-	Calm.	83·8	Unclouded.
	6		21	-	Calm.	44.4	Unclouded.
	12	19	3	N.W.	Light.	54'5	Still unclouded, but somewhat hazy.
	18		9	-	Calm.	40.7	Partially clouded.
	20		11		Calm.	37.5	Unclouded again. A dense mass of aurora in
						1 (E. by S., at elevation 22?, moderately bright.

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I	Date.		Wi	nd.	Temp.	
Gött. Time.	M Ti	ean me.	Direction.	Force.	Newman corrected.	Weather.
Арг д. н. 19 21	il 1844 D. 19		S. by E.	V. light.	36.2	An arch of aurors () extending from N.N.E to W., elevation 30° , the end nearest the N terminating in a curve or hook, at an eleva- tion of 36° ; also a faint streak from N. to E No disturbance. At 21° 15 ^m no traces of
22		13	S.E.	Light.	85°0	Faint broad bands of aurora crossing the zenith from E. to W. At 22 ^h 45 ^m faint striated masses of aurora () in the N.W. At 23 ^h un aurora visible. Extra readings were taker from 22 ^h to 0 ^h , showing a slight degree of disturbance. Most westerly reading ($+0^{\circ}6^{\circ}3^{\circ}$) at 22 ^h 45 ^m : most ensterly ($+0^{\circ}6^{\circ}5^{\circ}$)
20 0 6	}	15 21	-	Calm. Calm.	32.8	23 ^h 6 ^m ; range, 0° 45′·4. Unclouded. Unclouded.
12	20	8		Calm.	36·8 45·7 37·6	Still unclouded.
18 20		9 11	<u>s.e.</u>	V. light. Calm.	37°6 32°6	Unclouded, but hazy. A faint irregular arch of aurora, elevation 40° with slender vertical beams or strize in slight motion. No disturbance.
21 22	nday.	13	E.	Light.	3 8·0	Unclouded. Auroral haze in various parts of the sky.
23	1	14	E.	Light.	36.8	A very faint arch of aurora, at elevation 63°, ex- tending from E. by N. to N.N.W.
22 0 6	[$\frac{15}{21}$	S.E.	Calm. V. light.	85•5 44•7	Unclouded. Unclouded.
12 18	22	-3 9	N. by W. N.	Light.	46.5	Unclouded.
23 0		15	N. 1	Brisk. Mod.	$36.7 \\ 28.1$	Unclouded. Wind in gusts. A few light cirrous clouds.
6 12	23	21 3	N. N.	Fresh. Brisk.	33·4 37·0	A few cirri and cirro-cumuli. About 0.2 of well defined cirro-cumuli, ranging from W. to S.W.; remainder of the sky un- clouded.
18		9	N.	Mod.	31.0	Densely overcast, with close packed cirro- cumuli.
24 0 6	1	$\begin{array}{c} 15\\ 21 \end{array}$	E.S.E.	Mod. Fresh.	25·9 30·4	Nearly overcast. Hcavy snow at 22 ^h . Overcast.
12 18	24	3 9	S.E. S.E. S.E. by S.	High. Fresh.	37 · 2 33 · 5	Overcast. Magnetic term day began at 10 ^h . Overcast, with little change since the last
25 0		15	-	Calm.	33.0	observation. Overcast. Thick cirro-cumuli. It was partially
6		21	s.w.	Light.	58.0	clear at 21^{h} and 22^{h} . No aurors seen. Light uniform haze. A considerable degree of disturbance prevailed during this term day especially from 2^{h} to 4^{h} Gött, at which period both Declinometer and Bifilar ex- hibited its maximum effect. The movements
10	05	9	G 117 L 6	Data	00-0	or the Binar have their counterpart very decidedly marked at Toronto. Those of the Declinometer, which were equally great at Fort Simpson, have no corresponding move- ment whatever at Toronto, but, on the con- trary, there is at that time a marked absence of movement there. On the other hand, the Declinometer at Toronto was disturbed from 12 ^h to 20 ^h Gött., during which time there was no disturbance of that element at Fort Simpson. Most easterly reading of the Decli- nometer $(+2^{\circ} 54' \cdot 5)$ at $2^h 55^m$ Gött.; most westerly $(-0^{\circ} 27' \cdot 5)$ at $2^h 55^m$; range, 8' 46' 0
12 18	25	3	S.W. by S. W by S	Brisk.	68·0	Overcast, with neecy cirro-culluli.
18 22		9 13	W. by S. N.	High. V. high.	54 [.] 9 42 [.] 1	Overcast. Wind increasing, in gusts. Sky clearing; a few stars visible since 21^{h} Faint auroral haze. Blowing a gale since 20^{h} A considerable disturbance began at 20^{h} , with a westerly range of the Declinometer, and prevalled down to $26^{d} 2^{h}$. Most westerly reading ($-1^{\circ} 16'7$) was actually at $0^{h} 24^{m}$ The most easterly reading ($+1^{\circ}2'1$) preceded it at $0^{h} 9^{m}$, but a westerly doviation, amount- ing to $0^{\circ} 48'1$, was previously attained at $20^{h} 45^{m}$, and the general character of the dis- turbance of Declination was westerly; range $2^{\circ} 20'4$.

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	Da	te.		Wi	nd.	Temp.	
G Ti	ött. me.		ean me.	Direction.	Force.	Newman corrected.	Weather
D.	ń.	1844. D.	н.			0	
26	0	25	15	N. by W.	Light.	87.8	Unclouded. Wind fallen since 23 ^h .
	6 16		21	N.W.	V. light.	44.5	Overcast again since 1 ^h .
	12 18	26	8 9	e. E.	V. light. V. light.	46•5 40•7	Overcast. Overcast with dense cirro-cumuli; began to rain soon after. A considerable disturbance, which commenced with a westerly range of Declination, prevailed from $18^{\rm h}$ to $2^{\rm h}$. Most westerly reading $(-1^{\circ} 15^{\circ} 1)$ at $18^{\rm h}$; most easterly $(+0^{\circ} 26^{\circ} 7)$ at $27^{\rm d} \ 0^{\rm h} 18^{\rm m}$; range, $1^{\circ} 58^{\circ} 5$. This disturbance was marked by a constant state of vibration in the magnets, which was not usual. No aurora was visible at $0^{\rm h}$, when it was for a short period un- clouded.
27	0	ł	15	-	Calm.	84.5	Continued rain since 18 ^h , at present mixed with
	6		21	_	Calm.	41.9	sleet. Overcast. Ceased rain and snow after 1 ^h .
	12	27	3	N. by W.	V. light.	50'1	Overcast, with close cirro-cumuli.
	18	ļ	9	-	Calm.	86.8	Dense cirro-cumuli, closely packed.
28	Sun 21	18 5 Sunday. 21 28 12 0 18 6 21	12	-	Calm.	29.6	Unclouded. A broad and diffused but faint () arch of aurora, extending through the zenith from S.E. to N.W. At 21^{a} 15 ^a faint auroral haze alone. A considerable disturb- ance prevailed from 21^{a} to 8^{a} , commencing with a westerly range of the Declinometer. Most westerly reading (-0° 28'6) at 21^{a} 43 ^a ; most easterly reading (+1° 46'5) at 2^{a} 3 ^a ; range 2° 36'8. No aurora was visible at 22^{a} , when it was unclouded.
29			15	E.	V. light.	29.6	A few light cirro-strati.
	6]	21	S.W.	High.	48.5	Wind high, with gusts. Sky covered with cirro- cumuli.
	12	29	8	s.s.w.	Light.	53.8	Covered with cumuli and cirro-cumuli.
	18		9	-	Calm.	43.7	Hazy, but unclouded.
30	0		15 21	 s.e.	Calm. V. light.	34.0	Overcast with uniform haze. A moderate dis- turbance was observed from 0 ^h to 2 ^h . The range of Declination easterly. Most easterly reading $(+1^{\circ} 27' 9)$ at 0 ^h 18 ^m ; most westerly $(-0^{\circ} 7' 3)$ at 1 ^h 3 ^m ; range, 1^{\circ} 36' 4. The sky was overcast during its continuance. Lightly overcast.
	12	30	3	N.W.	Mod.	43.3	Fine drizzling rain commencing. Observations at intervals of 15 ^w were taken from 14 ^h to 16 ^h in consequence of high range of Horizontal Force and prevailing westerly range of Decli- nation, but no disturbance was observed. Most westerly reading (-0 13') at 14*30 ^w . This amount of deviation from the mean is large for that hour, having been exceeded only four times.
м	18 ay.		9	N.	High.	23.7	Rain from 0 ^h to 15 ^h , which changed to snow, and so continues.
1	0		15	N. by W.	V.high.	14.6	Strong northerly gale prevailing since 19 ^h , at- tended by snow down to 20 ^h ; overcast tho whole time. At 21 ^h a considerable disturbance commenced, and was observed down to 1 ⁴ 1 ^h . Most easterly reading (+2° 18'3) at 21 ^h 36 ^m . Most westerly (-0° 26'7) at 22 ^h 51 ^m ; range, 2° 44'8.
,	6	T.	21	N. by W.	High.	18.9	Nearly unclouded.
	12		iy. 8	N.	Brisk.	26'8	Covered with close cirro-cumuli.
	18	1	9	N.	V. light.	22.1	Thickly overcast.
8	0		18	-	-	-	No observation. At 1 ^h it was calm and un-
	6		21	S.E.	V. light.	29.0	clouded. Still unclouded.
	12	2	3	S.E. by E.	V. light.	37.7	Still unclouded.
	18	1		S.E. by E.		32.0	Clouding over since 16 ^h . At present overcast.

Abstract from the Meteorological Journal-continued.

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	Da	te.		Win	nd.	Temp.	
Gö Tir	nt. no.	Me Tir		Direction.	Force.	Newman corrected.	Weather.
р. 2	Мау н. 19	1844. D. 2	н. 10	S.E.	Brisk.	° 28*2	Again unclouded. Two arches or bands of aurora extending from E. and S.E. through the zenith to N.W., nodorately bright, and ir slight motion. At 19 ⁴ 15 th a bright narrow band extended through the zenith from E. to N.W., in moderate scrpentine motion. Con siderable disturbance prevailing from 19 th to 0 th , commonding with a westerly range of De clination. Most westerly randing (-0° 31'2
3	0		15	S.E.	Fresh.	21.5	at 19 ^h 36 ^m . Generally unclouded since 19 ^h .
J	6 12 3 18 4 0 6		13 21 3	S.E. S.E.	Light.	42·5	Light cirro-cumuli and cirro-strati. The dis turbance observations were resumed at 4 ^h , the range of Declination being now easterly. Mos casterly reading (+1° 33'.1) at 4 ^h 21 ^m ; range 2° 33'.4. Light cirri.
			9	S.E.	Mod.	36.7	Overcast since 15 ^h . Slight rain from 15 ^h 40 ^m t
							17 ^h .
98			15 21	S.E. S.E.	Mod. Light.	31·2 42·5	Cirri and strati. Unclouded, save light cirrus haze.
	12	4	3	N.W.	Light.	42 5	Nearly overcast, with cirro-cumuli. Slight rai
		1			-		at 13 ^h . Overcast, with dense cirro-cumuli.
	18 19		9 10	-	Calm. Calm.	38·7 35·7	Unclouded. Irregular sorpentine bands c aurora moderately bright () crossing th zenith, and extending to the S., with rapi motion. A very slight degree of disturbanc was shown by the magnets, for which extr readiness were not taken.
	20	}	11	-	Calm.	33.4	Unclouded. Aurora still visible, but not de scribed.
5	Sun 22	day.	13	N.N.W.	V. light.	30*4	Unclouded. Aurora crossing the meridian from E.N.E. to N.W. in an irregular narrow band with slight serpentine movement. Auror was also observed on the evening of the 5th a two stations in the State of New York (Re gent's Roports.) A slight disturbance we observed from 29^{h} to 23^{h} 30 ^m . Most easterl reading of Declinometer (+1° 4' 4) at 22^{h} 9 ^s followed by the most westerly readin (-0° 11'7) at 22^{h} 21 ^m , range, 1° 10' 5. This i the last observation of aurora recorded, th nights being already sufficiently light to per mit out-door pursuits oven at midnight, and t make it nearly impossible to distinguish the appearance from light cirrus clouds.
6	0	5	15	-	Calm.	29.1	Unclouded.
	6	1	21	N.N.W.	V. light.	38.2	Overcast. It began to snow at 65 ^h , and so continued to 9 ^h .
	12	6	3	N.W.	Light.	39.8	Strati and cumuli, with 0.6 of clear sky.
	18		9	-	Calm.	32.0	Overcast, with uniform haze.
7	0	1	15	-	Calm.	28.1	Cirri and cirro-strati scattered over the sky.
	6		21	-	Calm.	42.4	Unclouded since 4 ^h .
	12	7	3	S.E. by E.	Light.	48.9	Scattered cumuli and cirro-cumuli.
	18		9	-	Calm.	40.0	Closely packed cirro-cumuli. Auroral light w observed at Toronto at 16 ^h .
8	0		15	E.	Mod.	34.4	Thickly overcast.
	6	1	21	S.E.	Light.	44·4 55·7	Unclouded since 3 ^h . Detached cumuli.
	12 18	8	3 9	s. —	Light. Calm.	43.0	Overcast entirely since 10 ^h . Auroral light w observed at Toronto at 15 ^h . Light cirri, with haze.
9	0	1	15		Calm.	35.7	
	6		21	S.E.	V. light.	47.1	Nearly unclouded.
	12	9	3	s.	V. light.	56.2	0.4 of blue sky, with cumuli over the remainder
	18	1	9		Calm.	44.7	der. Closely overcast since 15 ^h .

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Abstract from the Meteorological Journal-continued.

	Dr		`	Win	nd.	Temp.	
Gö	itt.	Me	an	Direction.	Force.	Newman	Weather.
Tir		Tiı		Direction.	rorce.	corrected.	· · · · · · · · · · · · · · · · · · ·
	May	1844.			¢		;;
D. 10	н. 0	D. 9	н. 15		Calm.	0 3617	A few stars visible since 21 ^h , and now nearl
10	-		i				unclouded.
	6		21	S huw	V. light. Mod.	54°0 55°5	Unclouded from 1 ^h to 4 ^h . At present hazy.
	12	10	8	S. by W.	Light.	48.3	Overcast, with uniform haze. Wind in gusts.
11	18 0		9 15	s.	1/1g110.		Ovorcast, with uniform haze. No observation. At 23 ^h and at 1 ^h calm and
11			1				unclouded.
	6		21	W. by S.	Fresh. Brisk.	54.8	Unclouded.
	12	11	8	S.W. N.N.W.	Mod.	55°5 37°4	Cirri and cirri-cumuli scattered over the sky.
	18 Sun	dav	9	N.N.W.	mou.	01.4	Heavy rain, which began at 15 ^h 45 ^m , and con- tinued to 19 ^h . Heavy gale from N.N.W., with snow, nearly all day.
13	Sun 0	12 12	15	N.N.W.	Fresh.	27 • 2	Unclouded.
	6		21	N. by W.	Light.	36.2	Unclouded.
	12	13	3	Е.	V. light.	41.2	Cirri-cirro-strata, and haze.
	18		9	E. by S.	V. light.	37*3	Overcast, with thick cirro-cumuli. Extra observations were made from 18^{h} to 21^{h} , in consequence of a westerly range of the Declination, but no decided disturbance was observed. Most westerly reading $(-0^{\circ} 29'.7)$ at $18^{h} 12^{m}$; most easterly, which was still to westward of the mean $(-0^{\circ} 7'.3]$ at $19^{h} 9^{m}$.
14	0		15	S.E.	Mod.	31.0	tion, but no decided output name was observed. Most westerly reading $(-0^{\circ}29'')$ at 18 ^h 12 ^m ; most easterly, which was still to westward of the mean $(-0^{\circ}7''3)$ at 19 ^h 9 ^m . Unclouded. A slight magnetic shock was ob- sorved from 0 ^h to 1 ^h , the range of the Decli- nation being easterly. The most easterly reading $(+0^{\circ}30'1)$ at 0 ^h 15 ^m ; the most west- erly $(-0^{\circ}7''1)$; at 0 ^h 48 ^m ; range, 0° 47' 2.
	6	1	21	S.E.	Light.	43.4	Still anoioladea.
	12	14	3	E.S.E.	V. light.	54.6	Light cirrì and cirro-strati since 11 ^h .
	18		9	E.S.E.	Light.	45.1	Covered with light cirro-cumuli. A faint auroral light was visible at Toronto at 16 th and 12 th , connected with streamers at 16 th . Aurora was, also observed at four stations in the state of, New York (Regent's Reports.)
15	0		15	S.E.	Light.	34.6	Cirri, with general haze.
	6		21	-	Calm.	47.9	General haze.
	12	15	3	N. by W.	Light.	63.0	Scattered cirri.
	18		9		Calm.	53.3	Overcast with cirro-cumuli;
16			15	S.E.	V. light.	42.0	A few cirri but nearly unclouded.
	6		21	-	Calm. Calm.	61·4 69·3	Unclouded.
	12	16	3		Calm.	58.7	A few cumuli, 0.8 unclouded. Covered with cirro-cumuli.
17	18 0	1	9 15	_	Calm.	46.4	Unclouded since 23 ^h . Rain at 20 ^h .
1/	6		15 21	S.S.E.	V. light.	58.5	A few cirri, but nearly unclouded.
	12	17	3	S.	Light.	67.6	Still unclouded.
	18		9	S.E.	Mod.	58.7	Thick cirro-cumuli, increasing since 14 ^h . Distinct thunder at 17 ^h 45 ^m . Loud thunder fol-
18	0		15	N.	V. high.	47.5	lowed by heavy rain at 19 ^h . Wind increasing since 21 ^h . At present blowing, a gale.
	6	1	21	N.	High.	48.4	Detached cumuli, but sky nearly clear.
	12	18	3	N.	High.	47.0	Overcast.
	18 Sun	 day. 19	9	N.N.E.	Mod.	36.2	Still overcast.
20		19		S.E. by S.	Light.	37.3	Cirri and haze.
	6	١.	21	-	Calm.	53.2	Unclouded since 1 ^h .
-	12	20	8	N.	V. light.	65.9	Still unclouded.
	18		9	E.	V. light.	56.7	Light uniform haze.
21		1	15	S.E.	V. light.	43.5	Cirro-cumuli and strati,
	6	07	21 °	S.E.	V. light.	46.3	Unclouded since 2 ^h .
	12 19	21	3 9	S.E. S.	Light. Brisk.	52.4	Unclouded. Cirro-cumuli and haze.
	18	•	9		DITER.	41.7	Onto-cumun and nazo.

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Abstract from the Meteorological Journal-continued,

-	Da	te.	Win	n d.	Temp.	
Göi Tin		Mean Time.	Direction.	Force.	Newman corrected.	Weather.
		11111E. 1844 D. H. 21 15 16 21 22 3 9	S.E. S.E. S.E. S.E. S.E.	Fŕesh. Fresh. Fresh. Fresh.	<u>°</u> 31·1 37·9 50·5 42·7	No observation. At 23 ^h wind S. and fresh. Overcast, with thick cirro-cumuli Light cirri prevailing. A great disturbance began to be observed at 21 ^o 1 ^h , and prevailed throughout this day and part of the Declino- meter on the 22 ^d (+1 ^o 56' 8) was at 1 ^h 33 ^m ; the most westerly (-0 ^o 43' 4) at 12 ^h 24 ^m ; range, 3 ^o 40'. Light cirri prevailing. Overcast, with cirro-cumuli. Uniform light haze. Auroral light was visible in the N. at Toronto at 17 ^h , 18 ^h , and 19 ^h Gött., accompanied at 17 ^h by an arch of small streamers, extending from N.W. to N.E., about 14 ^o wide in the centre, with an eleva- tion of 40 ^o . The extra observations, which were discontinued at Fort Simpson at 4 ^h
23	0	15	_	Calm.	86.2	Gott., were resumed at 12^n , and continued to 19^h . One hour later a disturbance began to be observed at Toronto, the observations being there continued to 20^h . Overcast. Light rain at 22^h . Extra observa- tions were resumed at 23^n , and continued io 3^h . The most westerly reading of the Decli- nometer being $(-0^o 44' 5)$ at $0^h 51^m$; the most easterly $(+1^2 44') 0$ at $1^h 45$; range, $2^o 33' 4$. Of the separate portions of the disturbance observed at Fort Simpson, the middle one only has an imperfect correspondence with the disturbance at Toronto, principally shown by the charges of Horizontal Force; the first and last portions, which comprise the greatest changes, do not appear to have extended to Toronto.
	6	21	-	Calm.	48.6	Uniform light haze.
	12	23 3	S.E.	V. light.	61.2	Uniform light haze.
24	18 0	9 15	S.E.	Light Calm.	53·8 44·4	Cirro-cumuli, with haze. Overcast, with cirri and cumuli. A slight dis- turbance was observed from 0 ^h to 4 ^h . The most westerly reading (-0° 2' 9) at 0 ^h 57 ⁿ ; the most easterly (+0° 54' 2) at 1 ^h 33 ^m ;
	6	21	N.W.	V. light.	57.7	Uniform light haze.
	12	24 3	-	Calm.	63*5	Uniform light haze. Magnetic term day began
	18	9	-	Calm.	56.4	at 10 ^h . Unclouded. Occasional cirro and cirro-strati
25	0	15	E.	Light.	45.0	since 14 ^h . Unclouded, but hazy.
	6	21	S.E.	V. light.	58.7	Overcast since 5 ^h .
	12	25 3	-	Calm.		Uniform light haze. A constant but moderate degree of disturbance prevailed during the whole of the term day, which terminated at 10 ^h , and also characterizes the term obser- vations at Toronto. There is no decided cor- respondence in the changes of the Declination at the two stations; but there is some cor- respondence in the changes of Horizontal Force between 12 ^h and 14 ^h Gött. on the 24th, and again at 9 ^h Gött. on the 25th.

END OF THE OBSERVATIONS AT FORT SIMPSON.

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METEOROLOGICAL OBSERVATIONS.

FORT CHIPEWYAN.

Abstract of Hourly Observations made during the month of October 1843.

FORT	CHIPEWYAN.	
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Abstract of Hourly Observations made during the month of October 1843.

Date.		Spirit Thermometer by Newman, corrected.										-					,			Spin	rit Thern	ometer 1	oy Newn	an, corr				
Gött. Mean Time,	Noon.	1,	2.	3.	4.	5.	6.	7.	8.	9.	10.	ń.'	. 12.	1		18	3. 1	4. 1	15.	16. 1			1				11	
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16	31.0	31.1	30.4	31.7	31.7	83-9	36-5	89.0	42.1	43.6	44.5	43.8	42-9			41.5	87.	8 88.	5 39.8	3 37.5	35.4	34.5		1	30.2	-1.2	-4.	
17	27.0	28.1	27.4	33· 5	32.8	82.6	33.0	32.5	32.7	32.7	33.2	33-5	82.7			81.9	32.4	4 32	4 32.1	81.5	31.5	1	82.0	1 ***		29.6 32.0	871	
18	31 ·9	31.2	30*8	31-1	82.2	33.7	34-4	35.0	37.5	37.3	38.0	36.6	36-0			84.5	1	31.	9 31.8	81.8	31.7	31.4	81.2	81.0	1	30.0	764	
19	30.0	29•4	29.2	29•8	30.4	31.8	32.3	32.3	84.0	81.7	31.9	32.7	81.7		а 11	81.3	}	1	4 30.4	30.4	30.1	29.9	80.4	29.2	29.0	29.0	787.	
20	28.1	~	29*8	29•2	30.1	30.4	31.2	31.7	32.3	32.3	31.7	32.7	32.2			32.2	}				31-3	30.4	29.2	29.0	28.1	29.1	647.1	1
21	29.2	29.2	29.6	29.6	30.0	31.7	36.0	37.7	43.2	47.5	48.2	47.5	47.5			46.0	49.9	47.6	5 45.0	1	41.3	41.4	38.8	-	-	-	h	1 1
22	-															15.7	14.2	14.4	-	<u> </u>	-		-	15.3	15.0	14.8	\$884.6	36.86
23	14.9	14·9 12·7	15.1 12.5	15·5 13·0	15.6 13.8	16.0 17.1	15·9 17·1	16·6 19·8	16·6 20·0	17·9 20·2	17·7 20·2	18·0 19·5	16·1 19·1			19.1	18.3	1		1	16.2	16.4	16.4	15.3	14.6	14.8	381.1	15.88
24 25	14·6 17·7	12 7	20.9	21.3	21.6	21.7	22.0	22.3	20 0	20 2	20 2	21.2	19 1			14.6	12.3	10.7	1		17.2	18'3	16.9	17.2	17.2	17.5	414.4	17.27
26	-2.5	-5.8	-7.6	-6.2	-5.1	-0'1	1.2	1.9	3.3	5.1	6.6	6.2	4.4			0.0	-3.4	-4.7	1	1	2.2	7·8	6.8	4.9	3.3	0.1	360.1	15.00
27	0.0	0.5	-0.1	-1.1	-0.2	1.2	3.3	4.2	5.9	8.2	8.2	9.2	8.9			8.2	8.0	7.4	1	5.7	5.2	5.8	0.2 4.4	0.4	-0.1	-0.1	-15.7	-0.62
28	-1.6	-2.0	-2.4	-2.4	-2.2	-0.1	2.2	4.2	5.0	6.2	7.8	8.0	7.0		1	6.8	6 •8	8.0	8.0	9.1	7.8	6.6	5'5	-	0.1	-0.1	100.0	4.17
29	-	-		-	-	-	-		-	-	-	-	-				-	-		-	-	-	-	22.5	22.5	22.5	{155.9	6.20
30	22.2	22.6	22.5	22.9	22.9	23.8	23.8	23.8	24.8	24.0	24.0	23.8	23.9			23.1	22.5	22.5	1	21.6	21.5	21.5	20.6	19.4	19.5	19.6	538.9	22.45
31	19.8	19.8	19.1	20.6	22.1	22.8	23.9	24.7	25.7	24.7	24.7	24.3	24.0			22.7	20.2	20.3	19.1	16.9	16.0	15.2	15.2	14.6	14.6	14.6	486.2	22 40
Sums -	262.9	231.3	257 . 2	268.2	276.3	296.5	313 • 4	325 • 7	345.6	354.9	360*5	857.3	843.7			327 • 1	313·2	310.9	304.7	293 • 4	295.8	291.7	281.1	262.3	256.9	253.4	7184.0	300.64
Hourly }	18.78	17.79	18.37	19.16	19.74	21.18	22.39	23.26	24.09	25.35	25.75	25.52	24.55			23.36	22.37	22.21	21.76	20.96	21.13	20.83	20.08	18.74	18'35	18.10	514.42	21.44
Diurnal Varia- tion -	-2*66	-3.62		1	-1.70	-0.56	0.95	1.82	3·25 N	3.91	4.31	4.08	3.11			1.92	0.93	0.22	0.32	-0.48	-0.31	-0.61	-1.36	-2.70	-3.09	-3.34		-

8^h Göttingen time = noon of local mean time.

* Sum and mean of triplets.

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FORT CHIPEWYAN-continued.

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Abstract of Hourly Observations made during the month of November 1843:

Date. Gött.	Spirit Thermometer by Newman, corrected.													
Mean Time.	Noon.	1.	2.	8.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
1	14.8	14.6	14.6	14.8	15.7	17.9	18.2	20.6	21.9	26.7	28.1	29.0	29.4	
2	21.3	20.6	20.5	21.1	21.1	22.9	26.0	28.1	80.4	32.0	32.7	80.2	28.1	
8	24.7	24.9	23.8	23.8	24.1	23.8	25.1	25.1	27.4	27.0	29.4	30 6	80.8	
4	-	-	-	27.9	27.0	27.6	28.6	29.3	29.1	29.3	29.2	27.7	27.0	
5		_	_	_	-	_]	-	-	-	-	~ }	-	-	
6	14.8	14.8	14.6	13.4	13.6	15.9	15.0	16.8	22.3	24.7	24.5	24.1	20.7	
7	16.9	16.8	15.4	15.7	15.7	16.1	16.8	17.0	17.5	16.8	15.7	15.3	15.0	
8	19.1	19.0	18.1	17.6	18.9	19.5	20.1	19.3	20.2	18.9	18.8	15·6 [\]	14.0	
9	6.9	6.8	6.6	6.4	6.4	7.6	8.0	8.9	10.0	10.0	9.2	8.8	8.2	
10	-1.1	-1.0	-0.5	-0.9	-0.9	1.0	3.2	8.3	8.2	9.6	9.1	9.6	7.6	
11	2.0	2.1	2.3	4.4	6.4	5.2	7.2	7.3	6.8	5.2	6.3	6.8	6.0	
12	-		-	-		-		-	-	-	-		-	
13	-6.8	-6.0	-5.0	-8.3	-0.1	0.6	2.3	4.4	4.9	5.7	6.0	6.2	8.2	
14	9.1	10.5	13-2	11.2	10.3	11.2	13.3	14.1	15.9	18.4	18.9	17.9	17.2	
15	8.0	6.9	5.1	3.4	4.2	6.0	8.1	8.3	9.8	4-2	7.9	8.0	7.8	
16	11.0	10.1	10.1	11.9	12.7	15.1	15.8	17.8	17.3	15-1	13.2	12.3	12.3	
17	10.4	10.0	10.0	8.8	7.2	5.0	8.3	8.7	9.5	9.1	8.9	10.0	10.5	
18	4.2	8.3	8.3	3.1	3 •6	4.8	6.2	8.0	8.9	9.0	9.5	8.7	8.8	
19	_		-	-	-	-	-	_		-			-	
20	7.0	7.7	7.3	7.7	7.7	7.6	7.8	7.8	8.1	8•4	8.4	8.4	6.8	
21	6.7	6.9	6.4	6.5	7.0	7.3	7.2	9.0	9.3	9.3	7.7	7.8	7•0	
22	5.8	5.8	5.6	5.7	5.6	6.9	8.3	9.3	9· 8	10.0	10.0	9.7	9.6	
23	-5.2	-5.2	-3.2	-3.1	-1.3	0.5	2.7	4.2	5.2	5.2	6.2	6.2	7.3	
24	5.0	4.3	3.8	3.5	8.0	3.2	3.1	4.2	5.3	5.4	4.7	3.8	2.3	
25	4.1	3.8	4.1	3.3	2.5	0.9	-0.6	-0.6	1.5	1.9	2.1	1.5	0.8	
26	_	-	-	-	-	-		-	-	-	-	-	-	
27	2.7	3.5	3.1	3.3	2.3	4.2	4.6	5.1	7.1	6.9	8.9	9.2	9.9	
28	0.3	-0.7	-1.2	-2.6	-2.7	-2.3	-0.5	0.3	8.0	4.2	4.3	3.6	3.3	
29	13.4	17.9	20.3	17.8	16.4	14.8	14.6	15.3	15.0	14.9	13.0	11.0	7.8	
30	-5.2	~5.8	-5.8	-5.6	-5.2	-4'7	-3.6	-3.4	-2.3	0.0	0.1	0.3	0.3	
81	-	-	-	-	-	-	- ,	-	-	-	-	-	-	
Sums -	189.6	190.2	192.2	215.5	220.6	211.6	266.7	294.0	322.1	328.7	333-2	323.4	301.2	
Hourly Means	3 7.58	7.61	7.69	8.39	8.48	9-29	10.26	11.31	12.39	12.64	12.82	12:44	11.60	
Diurnal Varia- tion	}	-2.12	-2.02	-1.42	-1.38	-0.47	0.20	1.22	2.63 N	2.88	3.00	2.68	1.84	

8^h Göttingen time = noon of local mean time.

METEOROLOGICAL OBSERVATIONS.

FORT CHIPEWYAN-continued.

Abstract of Hourly Observations made during the month of November 1843.

	Γ								nometer						Nove	em be	er 184	3.	
	13	3. 1	4.	15.	1	T	17.	118			T			1			11		_
									s, _ 1	9.	20).	21.	22	2.	23.	Sur	ns. Mean	s,
	29 26	1	8.1	26			1.2	20	2 21	.1	21.	5 2	2.2	22.	5	21.5	524	1.7 21.80	-
	26 29		5.4	24.8	1		3.3	23.	2 23	•2	22.	1 24	6.2	25.	7 5	25.5	603		1
	20	- -	9°4	27.7	}		7.7	27 •	7 27	•9	27 .	2 -	-	_			404	1	1
	21		3.8	27.0	26	4 2	5.3	24 •	1 23	3	23	3 -	-	-			Ь		
	17.	3 1			-	• •	-		-	-	-	19	•8	19.	8 1	6.6	378	•7 25•25	*
	14.	1	.8	16.5	1 -0		•1	17 1		9	18.	1 18	·1	18.	2 1	7 9	427	.9 17.83	
{	12.		-3	15.5	1 -		•4	16.6		8	17.8	3 18	·1	18.6	3 1	9.1	395	1	
	7.	1	•6	11.3	1		•0	8.8	ľ	2	8.0) 7	.7	7.6	5	7-2	343	1	1
	6.		.7	5.7	5.		.7	2-2		1	-0.1	~0	•2	-0.3	-:	1.2	136	1 5.67	Ì
}	6.	-	.7	4·3 6·6	3.1		5	4•6	1 -	- 1	3.3	2	0	1.5		3.2	95	1	I
				0.0	7.	5 6	8	6.8	6.	8	6.8	-	-		-		17-0-		Į
	2.5	3 1		1.6				~-	-			-6.	0	-6.2		3.8	103	5 4.31	l
	16.5	1 -		16.2	0·3	ļ	1	0.4	-1.0	1	2.3	5.	9	5.9	8	3.0	39.	3 1.64	ĺ
	8.1	1		9.4	9.9		1	19.0	17.8	1	17.8	17.	9	13.6	10	0.0	362.	0 15.08	1
	12.5	1		12·4	11.1	1	-	11.2	11.8		12.8	13.	1	13.6	111	•4	208	1 8.67	
	9.5	1		9.8	7.9		1	8.7	8.0	1	9.2	10.	7	10.7	10	•2	289	6 12.07	
	8.9		1	9.5	10.9	8· 9·		7.5	6.0		5'9	6.1	5	4.8	5	•7	199.8	8 8133	
				_	10.9	9.	,	8.8	7.2		6.9	-			-	-	} {174·1		
	6.6	5.8	3	4.8	4.4	4.	.		-	1	-	7.0		6.8	7	•0	51/4-1	7.25	
	6.0	5.8		5.7	3°9	6.0	1	5.9	6.3		6.6	6.5	1	6.4	6.	3	164.7	6.86	
	9'1	8.8	1	7.7	7.2	4.8		6.3	6.6	1	6.2	6.0		5.2	5.	5	163.8	6.82	
1	8.0	8.1	1	8.0	8.1	8.1		2.7	0.8		0.6	-1.5	-	-2.7	-3.	6	136-3	5.68	
	2.5	2.5	1	2.8	3.3	3.0		8.6	8.8		9.0	8.0	1	5.2	1 .	1	105.5	4.40	
	0.0	0.2	1	0.7	2.4	1.3	1	3·2 1·7	3.6		4.2	4.1		3.8	3.	8	88.6	3.69	
1.	~		.	_	~-	1.0	1	7.5	2.2		2.6	-					46.1	1.92	
	9.9	9.8	1 8	3.8	8.2	8.0		7.1	4.7			3.1		3.5	2.8	€ £	15 1	1 02	
:	3·5	3.2	1	.3	1.5	0.4	1	0.8	4.7 3.2	1	5·1	4.3		3.0	2.(- 11	141 9	5.91	
1	5.3	2.5	0	.9	0.8	0.6	}	0.4	-3.2	1	3.2	7.9	1	0.4	12.3		57.0	2.38	
)'1	-1.3	-1	.2	-1.6	-1.5		0.0	-3 5	1	4.7	-6.2	1	6.1	-9'4	- 11	172.2	7.18	
-	-		-	-					~ 2	-	1.4	2.4	1-	2.3	-1.2	; ·	-54.4	-2.22	
							.		_				1	-	-		-	-	
287	••	276•8	263	•9 2	58.1	249.6	244	•1	232.7	23	1.6	197.3	18).2	178.7		031.3	0=7:00	
							-						.				-01 0	257.90	
11.0	04	10.62	10.	15	9.93	9.60	9.	39	8.95	9.	02	7.89	7	57	7.15	2	35.74	9.7	
	-												1_						
1.5	28	0.89	0.3	39	0.12	-0'16	-0.	37	-0.81	-0.	74	-1.87	-2.	19	-2.61				
			~~~~~	~~ <u>`</u> ~~			1	• Mc	an by fa		1		1						

• Mcan by triplets. O 193

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#### METEOROLOGICAL OBSERVATIONS.

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#### FORT CHIPEWYAN-continued.

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Abstract of Hourly Observations made during the month of December 1843.

Date. Gött.				Spi.	rit Ther	momete	er by Ne	wman,	correcte	d.			]
Mean	Noon.	1.	2.	<u>S.</u>	4.	5.	6.	7.	8.	9.	10.	11.	12.
1	-1.2	0.6	2.1	3.4	5.1	6.4	7.3	8.0	8'2	7.2	5.8	5.8	5.6
2	23.6	19.1	18.9	17.6	15.2	7.8	5.1	4.7	4.7	3.0	1.9	0.6	-0.3
8	-	-	_	-			-		-		-	-	
	4.0	8.1	8.0	2.3	3.0	8.0	4.6	6.2	10.8	11.5	10.1	8.8	8.8
5	3.7	3.3	4.4	4.4	3.3	8.8	5.3	0.6	1.2	2.1	2.1	3.5	3.5
6	17.9	19.1	21.1	22.9	26.1	27.0	29.9	31.6	34.2	34.2	35-3	33.7	<b>33</b> 15
7	4.6	3.2	1.8	0.9	-1.3	-2.0	-0.4	3.2	4.1	5.2	6.2	7.7	9.1
8	17.0	16.4	15.7	14.7	15.3	15.1	22.5	27.0	30.4	31.4	29.4	28.4	25.0
9	19.4	19.4	21.2	22.0	21.4	19.6	21.5	21.9	21.5	19.3	15.7	13.0	9.8
10	_	_	_				-		-	~	-	-	
11	-2.9	-1.3	-1.2	-1.6	-1.4	-1.2	-2.0	-2.1	-1.9	~1.9	-1.9	-3.3	-2.6
12	6.4	4.9	4.4	4.2	4.4	4.4	3.1	2.3	2.2	2.0	2.4	1.8	1.6
13	13.7	-12.6	-13.3	-14.7	-16.3	-19.8	-18.5	-16.3	-15.2	-15'9	-17.6	-18.3	-21.1
14	-22.3	-20.5	-22.4	-23.9	-19.4	-16.5	-12.7	-10'1	-9.3	-7.2	-7.0	-6.0	-5.8
15	-4.7	-3.3	-4.7	-4·Ò	-4.6	-4.7	-3.4	-1.1	-0.2	-0.1	-0.6	-1.3	-1.4
16	-5.8	-6.2	-7.8	-8.7	-8.7	-9.2	-7.1	-6.4	-4.6	-5'8	-5.9	-6.8	-6.9
17	-	_		-	-	-					-		
18	<b>*-2</b> ·8	-1.4	-0.1	2.0	4.0	4.6	5.2	7.8	6.8	7.2	6.8	5.2	5.5
19	-7.2	-8.0	-8.3	-8.4	-9.0	-9.4	-9.5	-9.1	-7.8	-9.8	-10.3	-11.0	-10.3
20	5.3	5.3	6.8	5.2	2.7	1.1	1.1	-2.8	-2.8	-2.2	-4.1	-5.8	-9.1
21	-11.6	-10.0	-10.1	-9.3	-9.0	-9.1	-7.0	-7.3	-4.7	-2'3	-3.5	0.5	4.0
22	-2.5	-3.4	-4.9	-7.1	-8.0	-9.5	-9.5	-9.2	-8.4	-9.0	-10.3	-12.2	-12.7
23	-4.6	-4.7	-3.1	-1.2	-0.1	-01	0.3	2.0	3.3	3.9	5.4	1.5	1.5
24	_	-	-	_	-	-	-	-	-	-	-	-	
25	_	_		-	-			-	-	-	-	-	-
26	-0.2	-2.3	-3.4	-2.7	-3.7	-3.2	-3.2	-3.2	-2.9	-3.5	-3.0	-3.5	-1.4
27	-5.6	-4.6	-3.5	-1.1	-0.1	2.3	3.3	4.8	5.9	7.0	7.3	8.0	8.8
28	17.7	17.7	17.2	15.8	15.8	16.5	16.8	17.7	17.7	16.1	12.5	11.7	9.9
29	-5.9	-7.1	-8.4	-8.4	-8.0	-6.3	-4.6	-3.2	-2.3	-1.4	-1.2	-2.4	-4.3
30	-11.4	-12.1	-10.9	-13.8	-15.3	-17.4	-20.5	-23.0	-23.0	-22.5	-22.0	-22.7	-24.5
81	-	-	-	-	-	-		-	1 -	1 -	-	-	-
Jan. 1	-		-	-	-	-	-	-		-	-	-	-
Sums -	16.9	14.3	14-6	10.4	11.4	2.4	26.0	44.2	69'1	68*3	54.4	36.1	25*6
Means -	0.68	0.22	0.28	0'42	0.46	0.10	1.04	1.77	2.76	2.73	2.18	1.44	1.02
Diurnal Variation	}0.58	0.12	0.18	0.05	0.08	-0.30	0.64	1.37	2.36 N	2.33	1.78	1.04	0.62

#### METEOROLOGICAL OBSERVATIONS.

#### FORT CHIPEWYAN-continued.

# Abstract of Hourly Observations made during the month of December 1843.

	Spirit Thermometer by Newman, corrected.														
	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.		
	6.2	6.3	7.7	7.8	8.9	9.3	9.6	10.0	11.6	12.8	13.4	167 <i>°</i> 8	7.41		
	-1.8	-2.6	-2.6	-1.8	-2.2	-3.2	-4.6	-8.1	0.3		$- \\ 2 \cdot 2 $	98.2	4.10		
	9.2	8.9	9.4	9.4	7.8	12.2	11.3	9.9	9.6	6.6	6.2	180.4	7.52		
	3.4	4.0	4.3	4.3	4.1	4.3	5.2	7.2	7.8	11.2	15.3	113.0	4.71		
	28.6	21.4	17.2	16.4	14.6	12.0	10-2	9.7	7.7	6.6	6.3	512.2	21.34		
	9.3	9.6	10.9	11.7	13.2	13.9	12.3	13.2	14.6	15.6	16.7	184.2	7.67		
	21.7	22.2	22.1	22.2	20.7	21.4	19•1	23.7	21.9	22.0	19.8	525.1	21.88		
	7.7	6.2	4.4	3.3	8.1	0.3	0.1	-2.4			-)				
		-	-	-	-	-	~		-3.3	-3.2	-3.3}	258.6	10.47		
	-2.2	-2.3	-0.5	1.1	0.3	0.3	2.1	6.6	7.8	6.1	6.2	0.5	0.01		
	1.6	-0.3	-2.4	-4.7	~5.7	-6.6	-7.4	-9'4	-10.0	-11.8	-12.8	-25.4	-1.06		
i	-20.6	-21.9	-21.9	-23.7	-24.9	-\$3.9	-23.9	-23.9	-23.8	-23.5	-22.9	-468-2	-19.21		
	-5'8	-3.2	-3.2	-3.3	-2.6	0.0	-0.3	-2'4	-2.6	-2.8	-4.2	-214.6	-8.94		
	-2.3	-2.6	-3.4	-4.6	-6.3	-6.9	-6.3	-9.5	11.0	-8.6	-6'8	-101.2	-4.22		
	6.9	-7.3	-8.0	~8.0	-7.8	-5.9	-4.9	-5'1		-	- }	154.6	-6.44		
			-	-	-	-	-	-	-3.2	-3.2	-3.2)	-10# 0	~~0.22		
	3.8	1.6	-2.0	-2.8	-3.3	-3.2	-4.2	-5.0	-5'5	-5'9	-6.2	17.0	0.21		
	-10.3	-10.5	-9.9	-9.8	-6.8	-6.1	-4.9	-3.2	-2.8	-1.2	0.3	-183.4	-7.64		
	-9'2	-11.0	-11.8	-10.3	~10.0	-10.1	-10.5	-9.5	-10.3	-11.4	-11.4	-116.8	-4.87		
	7.8	8.8	8.8	8.8	12.4	11.1	8.3	6.2	5.9	5.9	2.1	7.4	0.31		
	-11.6	-12'2	-11.6	-13.4	-13.4	-12.2	-11'4	-9.9	-7.1	-7.2	-5.8	-222.0	-9.22		
	2.1	2.6	2.6	2.3	2.2	2.1	2.3	4.3	~	-	[ - ]				
	-	-		-	-	-			-		- }	23.3	0.92		
	-	-	-	-	-	-			-0.1	0.1	-0.4)				
	-1.1	-1.0	-0.4	-0.5	-4.2	-4.2	-4.9	-5'4	-4.7	-6.1	-6.2	-76'5	-3.18		
	8.1	5.2	8.1	10.0	13.5	14.6	15.7	16.6	16.4	16.1	16.8	173•7	7.24		
	7.7	6.4	3.1	1.8	0.3	-1'1	-2.4	-2.4	-4.2	-5.9	-5.8	199.8	8.35		
	-6.1	-7.8	-8.0	-8.0	-6.9	-5.9	-5.6	-5.8	-8.6	-10.3	-11.9	148.9	-6.50		
	-26.9	-29.1	28.7	-30.9	-33.7	-33.3	34'1	35 * 3	-	-	- ]				
	-	-	-	-		-	-	-	-	-	- }	-512.4	-21.32		
	_	-	-	-	-	-	-	-	-7.1	-7.3	-6.9)				
	7.6	-8.0	-15.8	-22.5	-27.2	-22.7	-29.1	-29.0	-1.2	-4.7	-3.6	+237.2	+10.53		
	0.30	-0.35	-0.63	-0.90	-1.03	-0.01	-1.16	-1.10	-0.06	-0.13	-0.14	+9.49	+0.40		
	-0.10	-0.2	-1.03	-1.30	-1.49	-1.31	-1.26	-1.26	-0.46	-0.25	-0.24				

195

8^h Göttingen mean time = noon of local mean time.

# FORT CHIPEWYAN-continued.

Abstract of Hourly Observations made during the month of January 1844.

Date. Gött.		Spirit Thermometer by Newman, corrected.													
Mean Time.	Noor	ı. <u>1</u> .	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.		
			-	-	-		-								
1	-	-	-	-	-	_	_	_	_	_		_			
2	-5.4	-3.2	-1.5	-2.5	-1.6	3 -0.8	-0.6	-0.	8 -1.1	-0.8	-0.8	-8.3	-6.5		
8	-18.1	-20.5	-23.5	-24.8	-25.0	) -23.4	-22.7	-18.	1 -17.1	-13.9	-14.8	-13.0	1		
4	-7.6	-7.3	-6.0	-6.2	-6.6	6.2	-6.0	-6.	2 -6.9	-5.6	-5.3	-5.8	-5.9		
5	-6.2	-6.9	-6.8	-7.8	-9.2	-10.3	-10.3	-11.1	5 -12.2	-14.4	-15.6	-18.2	-20.9		
6	-36-3	- 35 . 9	-35.7	-38.9	-39.0	-87.5	-38.6	-36-8	3 -33.8	-34.8	-35.1	-34.6	-36.4		
7	-	-	-	-	-	-	-	-	1	-	-	_	-		
8	-31.8	-32.0	-32.9	-32.9	-32.5	-32.0	-29.9	-27.8	3 - 26.3	-26.2	-27.4	-29.3	-29.9		
9	-39.2	-39.3	-38.1	-38.0	-38.8	-39.8	-37.5	-38.8	3 -38.0	-36.7	-35.2	-35.3	-35.3		
10	-32.0	-30.6	-29.7	-29.2	-28.4	-26.5	-22.3	-20.7	-22.1	-21.6	-23.7	-24.1	-25.0		
11	-25.0	-26.8	-22.9	-18.3	-17.4	-11.4	-10.1	-10.3	-9.6	-9.2	-9.0	-6.9	-5.8		
12	-2.3	-2.8	-4.7	-5.8	-5.8	-6.0	-6.1	-1.2	-1.5	-1.4	-1.4	-2.8	-4.0		
13	-17.6	-17.9	-17.1	-18.9	-20.2	-21:8	-22.7	-21.0	-18.4	-18.1	-18.2	-20.2	-22.7		
14		-	-	-	-		-	-	-		-	-	_		
15	-20.7	-20.9	-19.5	-19.9	19.1	-16.9	-14.4	-11.0	-8.8	-6.6	-6.6	-0.7	-2.0		
16	-5.8	-8.0	-10.3	-11.5	-12.8	-13.3	-10.6	-10.7	-10.3	-10.3	-10.1	-10.6	-9.9		
17	-18.4	-20.9	-21.6	-21.8	-22.8	-23.9	-23.0	-24.1	-23.2	-23.2	-23.1	-22.4	-22.7		
18	-32.2	-32.9	-35.6	-36.3	-37.6	-37.2	-33.4	-32.5	-30.2	-30.6	-32.2	-33.6	-34.0		
19	-38.5	-39.0	-38.2	-38.7	- 39.7	-38.4	-37.8	-36.5	-35.6	-35.4	-35.3	34 • 4	-34.1		
20	-37.6	-37.4	-38.6	-38.8	-38.6	-38.3	-35.6	-34.3	-32.8	-30.6	-30.4	-32.2	-32.9		
21	-	-	-	-	-		-	-	-	-	-	-	-		
22	-39.6	-46.7	-47.2	-49.2	-48.2	-46.5	-40.8	-37.4	-36.1	-35.4	-35.3	-37.9	-38.2		
23	-44.1	-44.7	-43.3	-43.2	-43.3	-43.3	-42.2	-39.2	-37.8	-35.6	-35.9	34.5	-35.3		
24	-40.9	-39.9	-40.9	-40.9	-41.3	-40.6	-38'5	-37.5	-38.8	-38.3	-38.5	-39.4	-39.5		
25	-47.0	-45.6	-46.3	-47.7	-45.4	-43.7	-42.0	-38.8	-39.7	-39.6	-40.6	-40.2	-38.8		
26	-26.1	-25.5	-24.7	-24.2	-25.9	-26.0	-25'0	-23.9	-25.0	-24.1	-24.3	-24.0	-24.8		
27	-38.0	-39.3	-41'3	~41.3	-40.9	-38'6	-34.2	-33.1	-31.8	-30.3	-28.4	-28'0	-25.8		
28	-	-	-	-	-	-		-	-		-				
29	-16.0	-16.0	-16.4	-16.4	-16.1	-17.2	<b>~17∙3</b> ∙	-15.4	-13.1	-9.2	-7.2	-5.4	-3.5		
30	14.6	9.9	9.1	10.1	6.6	5.1	4.2	4.3	4.2	4.2	3.1	2.7	1.0		
31	-21.8	-22.3	-18.8	- 20.5	-21.2	-20 4	-17.6	-14.8	-13.2	-12.8	-12.9	-14.8	-16.1		
Sums -	∵3ə16	652.7	652.6	64.4	671 • 1	654 9	615.0	578.6	559•5	541.0	544.2	548.9	558.0		
Means -	~24*45	-25.10	-25.10	-25.55	-25.81	-25.18	-23.65	-22.25	21.52	-20.81	-20.93	-21.11	-21.46		
Diurnal Varia- tion -}	-1.42	-2.10	-2.10	-2.25	-2.81	-2.18	-0.62	0.75	1.48 N	2.19	2.07	1.89	1.54		

8^h Göttingen mean time = noon of local mean time.

#### METEOROLOGICAL OBSERVATIONS.

#### FORT CHIPEWYAN—continued.

# Abstract of Hourly Observations made during the month of January 1844.

	Spirit Thermometer by Newman, corrected.													
	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	by Dollond's Thermo.
	-	-	-	_	_	_	_	-	-		_	-	°	_
	-7.0		-9.5	-11.0	-11:0	-12.8	-14.1	-14.1	-14.8	-15.1	-17.1	155•4	-6.62	
	-11.9	-11.6	-11.2	-10.3	-9.3	-9.8	-8.3	-8.0	-8.0	-7.8	-7.3	351.5	-14.65	lets.
	-6.5	-7.1	-7.8	-6.2	-6.9	-7.1	-6.9	-6.4	-6.1	-5.9	-5.5	154.7	~6.45	-
	-23.1	-24.1	-25.0	-26.1	-25.2	-27.5	-28.9	-30.6	-34.4	-35-2	-36.7	469.5	-19.26	-
•	-38.2	-36.3	-35.2	-37.2	-37.6	-37.9	-38.6	-39.0	-	-		1	00.01	
		-	-		-		-	-	-34.3	-32.3	-82.0	<i>872</i> •1	-36.34	'
	-30.3	-29.2	-28.6	-28.8	-29.2	-29.8	-29.8	-30.4	-34.4	-37.0	-40.1	739.7	-30.82	29.9
	-34.1	34 • 4	-34.4	-34.4	-34.7	-35.2	-35.2	-34.5	-33.8	-33.2	-32.8	867.2	-36.13	-35.9
	-24.3	-24.3	-23.9	-24.1	-22.6	-19.3	-18.6	-18.4	-22.0	-24.3	-24.3	582.3	-24.26	-23.8
	-4.2	-3.2	-1.3	-1.0	-1.3	-1.5	-1.3	-0.8	-0.6	-2.6	-2.6	203.5	-8.48	-7.7
	4'5	-4.9	-4.9	-5.8	-4.7	-7.4	-9.7	-11.2	-15.0	-16.2	-17.6	148.8	-6.50	-4.8
	-24.8	28.3	-27.6	-29.3	-30.9	-30.8	-29.4	-29.6	1		-	2		
4		-		-	-	-	-	-	-20.2	-20.2	-20.7	547.3	-22.80	-21.9
	4.3	5.2	6.5	6.2	5.8	5.2	7.8	8.2	11.0	7.8	-0.1	94.0	-3.95	-2.0
	-9.9	-9.8	-9.9	-10.3	-10.3	-11.8	-12.2	-13.8	-17.1	-17.1	-18.3	274-4	-11.43	-10.0
1	-21.8	-23.0	-22.8	-23.9	-25.2	-26.1	-26.3	-26.6	-27.8	-29.7	-:0.6	574.9	-23.95	-22.8
	-34.9	-35.7	-35.0	-34.0	-32.9	-34.0	-34.5	-34.1	-35.4	-35.6	-16.3	821.3	-34.22	-33.5
	-34.0	-34.9	-34.6	-35.9	-37.4	-38.4	-38.6	-38.6	-38.6	-38.6	- 38.3	889.8	-37.08	-36.9
	-34.2	-34.0	-32.9	-33.3	-34.0	-34.0	-34.0	-34.7	~	-	_	2000		
		-	-		-	-	-	- '	-38.4	-42.0	-40.9	850.5	-35.44	-35.2
	-39•4	-40.8	-40.2	-39.8	-39.2	-40.9	-42.0	-42.2	-43.6	-43.2	-43.9	994·9	-41.45	-41.4
	-37.4	-37.6	-38.6	-38.6	-39.9	-40.6	-41.3	-42.0	-40.9	-40.6	-39.9	960.4	-40.02	-39.7
	-40.9	-43.2	-43.4	-44.0	-44.2	-44.3	-43.6	-42.2	-44.3	-46'6	-46.5	998.5	-41.60	-41.8
-	37 • 4	-36.1	-85.4	-35-2	-31.8	-30.9	~30'4	-27.8	-27.3	-26.7	-26.6	901·0	-37.54	-37.2
	-25'5	-26.3	-27.4	-29.6	-32.9	34-2	-35'2	35 • 7	-36.7	-37.8	-38.7	683.5	-28.48	-27.6
	-23.9	-21.6	-17.3	-15.0	-13.8	-11.2	-10.5	-10.0	~		-	201010	07.00	
	-	~	-	-	~		-		14-6	-14.6	-14.8	\$ ^{619·2}	-25.80	-25.0
	-1.6	-1.2	~0.6	-0.1	1.3	8.3	5.2	5.9	11•2	12.5	14.6	96-3	-4.01	-3.6
	-0.1	-1.3	~1.6	-4.2	-8.0	-6.0	-6.8	-13'7	-13-3	-18.2	-19.2	13.7	-0.22	+0.04
1	-18.1	-20.5	-18.7	-21.7	-22.8	-22.0	-22.7	-22.9	-18'7	-18•4	-18.4	452.4	-18.85	-17.9
ĺ	564.0	564.5	561.9	574.4	579.8	584.3	585.2	593'3	598.4	612.6	630.1	14331.0	597.29	_
	-21.69	-22.58	-21.61	-22.09	-22:30	-22.47	-22.21	-22.82	-23.02	-23.27	-23.90	552.04	-23.00	
	1.31	0.42	1.39	0.91	0.20	0.23	0.49	0.18	-0.05	-0.52	-0.80	-	-	_

# FORT CHIPEWYAN-continued.

Abstract of Hourly Observations made during the month of February 1844.

	Dat	e. 1						~													
	Göt	t. ]_						Spirit	Theri	nom	eter l	oy No	ewm	an, cor	rected						
	Mea Tim	n e.	Noo	n.	1.	2.	3.	.   .	1.	5.		6.	7.		s.	9.	1	0.		1	-
					·						-							<u> </u>	11.	12.	_
	1	ŀ	-18'	8 -16	3•1	16.4	-16	0 -14	1·8  -	14.5	-1	5.2	-16	0 -14	··1  1	4.0	-15	·1 -	16•2	-14.8	
	2		-2.	4   1	L•7 -	-1'3	-0.	7 -1	. 5 .	-1·1		D-8	-0·	3 -0	·1 -	0.1	-0	1	·1·5	-4.7	
	3	-	-11'	3  -18	3.7	13.2	-11	6 11	.2 -	10.3	1-1	.1	-5.	9 -4		8.5	-2			1	
	4			-	•   •		-	1~	.		1	.					_2		·1·6	-11.8	1
	5		7.4	เ 8	.8	1.0	-2.	6 -3	.8	-7•3	-0		-4.	5 -4		2.2	~~			-	
	6	-	22.3	3 -20	.7 -	3.4	-22.	7 -22	.5 -	22.0		•4 -	-15:			1	-2		1.2	-3.2	
	• 7		4.6	3	·3	8.1	3.	8 4	.8	3.8		·6	6':	-   -	-	0.2	-10		8.0	-6.9	1
	8		9.8	6	·6	6.4	6.		.2	6.6	1 -	.9		1		3.2	8		9.2	8.5	I
	9		12.1	9	.7 ] ]	0.4	11.(	1	-1	12.0			12.1		_	8.6	21 ·	· ] -	9.3	17.9	
	10	.	-8.1	-3	1	2.8	~1.8			0.8	13		14.6		1	.3	9.	4	6.8	5.2	l
	11			_		_ }			1	0.0	2	3	6•4	⊾  7·	5 10	.9	8.	3	7.9	6.8	ł
1	12		30.8	-27	2 -2	8·2	-26.0	-24.						-	-			-	-	~	
1	13	_	21.4	-22	- 1 -	5.0 .	-25.9		- 1 -	3.1	-21		16.5	1	2 -12	•9  ~	-10.	8 [1:	۱•9	-13.2	
	14		10.3	-14	1-	3.8	-15.0	1	1-	2.0	-19	1	19.2	1	0 -15	·0	-12.	5 – 8	3.4	-6.2	I
	15		8.8	7.		1·9		1		3.3	-12.		-7.8	-5'	3   -5	·4	-5.8	8 -4	8	-9.4	l
	16		5.1	4.			5.0			7.9	13	- 1 -	15.6	21.	3 25	8	30.1	1 28	1	32.2	
	17		3.8			.8	8.2	9.		2.5	19.	9	24.2	27.5	2 29	3	21.5	5 34	0	23.5	
	18		00	27 .	2 28	•5	27.0	24.	1 2	7.9	30*	4 ;	32.7	35 - 8	3 37	5	37•4	1 37	·1	35.5	
	19		-	-				-	-	•	-	.		-	-			-		_	
	19 20		8·2	8.8	1	•2	11.1	11.6	5   18	.3	13-4	1 ]	15•9	16.6	5 19·	3	21.3	19	0	17.2	
			6.2	7.8		.1	11.0	11.2	13	•4	15.6	5   1	6.8	22.4	27	9   1	80.8	32	5	32.7	
	21		5.8	~6.0	1 -		-5.0	-3.8	2	1	4.2	'	6.6	7.4	9.	9 :	12.3	15	6	16.9	
	22		5.8	15.6	1 -	1	11.6	15.3	19	•1	23.6	2	4.7	27.4	28.		26.1	24	3	24.7	
	23	1	).6	30.9	28	1	28.4	30.3	32	.2	30.4	3	0.4	30.9	30.	1 2	29.4	29.	9	30.4	
	24	1 1	. 0	~1.4	-2	5 -	-6-8	-5.3	-3	3	-1.4		0.0	3.3	3.8		2.6	1.	3.	-1.2	
	25	-	·		-		-	-				-	-	~	-	_					
	26	-10	.3	4.3	5.	5	4.2	5.3	6	6	14.6	11	9.3	28.1	33.0	3	3.3	33.		34.5	
	27	0	.6	-2.2	-6.	2   -	-6.7	-8.0	-5	6 -	-2.2	1-8	3.1	1.9	3.2	1	2.9	-0.		-1.5	
	28		.1	3.4	6.	6	6.4	6.8	6.	4	11.7	13	•4	14.6	15.1	1	5.1	15.		14.6	
	29	-3	•8	-4.7	-6.	₽	5.8	-4.7	-3.	5   -	-2.6	2	•3	6.2	6.8	}	7.5	9.1		8.9	
			- -							- -						-				_	
Su	ms •	-2	1	~0.8	-12.0	)  -1	1.4	+2.5	+38.	3  +1	9•8	+15	2.8	+216-2	+256*	+20	58.3	+269	0 + 2	35.3	
						1				- -									-		
Me	ans -	-0.0	8  -	0.03	-0.48	-0	•46  +	-0.09	+1.24	+3	•99	+6.1	1 +	-8*65	+10.26	+10	.33	+10.7	3+9	•41	
Va	rnal tria- n	-4.8	7	4.82	-5.27	-5	25 -	4.73	-3.25	-0	·80	1.3	2	3.86 N	5.47	5.1	54	5.97	4	·62	
								States of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local division of the local di	Contraction of the local division of the loc	-	· ·						1		1	1	

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 $S^h$  Gottingen mean time = noon of local mean time.

#### METEOROLOGICAL OBSERVATIONS.

#### FORT CHIPEWYAN-continued.

### Abstract of Hourly Observations made during the month of February 1844.

				s	pirit Th	iermom	eter by ]	Newman	n, correc	cted.				By Dollond's
	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	2.	Sums	Means.	Ther- mometer.
i														
	-16 [°] 0	-12 [°] 9	-11.6	-10.0	-10.2	-10.3	-8.4	-6.3	-6.1	-6.1	-5.8	-305.8	12.71	-11.2
ĺ	~3.8	-4.6	-4.9	-5'1	-5.1	-5.8	-6.8	-8.0	-8.5	-9.3	-9.3	-87.5	-3.62	~2·4
	-9.5	-9.3	-7.1	-6.0	-5.9	-6.5	-6.3	-6.1	-		- }	-142.2	-5.92	-4.7
		-	-	-	-		-		7.8	7.5	7.3)			
	-6'3	-8.0	-9.6	10.3	-13.4	-17.1	-17.3	-17.8	-18.3	-17.6	-21.7	-183.3		-6.8
	-7.4	-4.7	-2.0	-3.3	4.3	5.2	5.7	6.0	5.7	7.6	6.6	-191.2		-6.7
	6.2	6.2	6.2	6.4	5.9	5.8	5.2	4.6	6.6	7.7	8.9	147.7	6.12	6.8
	17.3	17.2	16.8	14.1	14.3	12.4	15.2	14.7	13.4	12.7	12.3	317.3	13.22	13.7
	6.0	3.9	3.5	2.7	-0.8	0.0	0.3	-0.1	-1.2	-0.2	-2.4	153.9	6.41	7.2
	<del></del>	6·0	5.7	6·8	8.7	4·4	0.9	-2·4	-30.8	-32.1	-31·8	-19.3	-0.80	0*8
	-16.7	-14.8	-14.5	-14.9	-14.9	-15.3	-15.3	-15.0	-14.9	-18.2	-19.2	-433.2	-18.05	-16.8
	-2.2	-3.1	-3.3	-6.7	-7.0	-9.4	-10'3	-11.2	-11.9	-9.7	-10.0	-326.4	-13.60	-12.6
	-12.0	-9.3	-8.8	-6'1	-5.7	-3.1	-2.6	-1.1	-0.5	4.4	7.7	-166.3	-6.93	-5.7
	31.5	31.3	24.4	19.5	14.9	12.2	9.8	7.7	6.6	6.0	5.9	375.3	15.64	16.8
	25.7	26.8	20.1	25.9	29.2	29.4	31.2	29.4	27.0	28.9	34.4	538.1	22.42	22.7
	83.9	83.2	35.2	35.1	33.2	16.2	9.8	7.2	-	-	- }	634.3	26.43	26'5
	-	~	-	-	-	-	-	-	7.8	8.3	8.0)	0010	20 10	200
	15.6	12.3	11.2	11.2	4.3	7.1	6.6	3.3	3.0	4.5	5.2	271.4	11.31	12.3
	81.7	29.9	27.0	19.3	8.9	7.7	4.3	2.2	-1.3	-2.8	-5.6	358.1	14.92	15.2
	19.3	19.1	<b>20·1</b>	22.2	21.5	21.0	20.4	20.4	21.2	20.1	19.0	269.5	11.23	12.0
	23•4	22.5	24.0	26.6	27 • 2	28.1	29•4	31.3	30.4	31.1	30.8	573-2	23.88	24.0
	26•9	23.4	19•1	13.9	10.9	7.8	5.3	2.1	1.7	1.0	0.4	505.1	21.05	21.3
	-5.6	-7.4	-9.2	-9.5	-4.9	-5'8	-5.3	-4.7		-	- 7			
	-				-				-2.4	-5.8	-9.25	-80.5	-3.34	-1.8
	32.2	29 . 9	24.7	28.1	27.9	20.7	14.6	6.8	1.0	2.1	1.9	408.3	17.01	17.8
	-2.6	-2.4	-1.7	-2.5	-1.3	-0.2	-0.4	-0.4	-0.6	3.3	3.3	34.3	-1'43	0.1
	12.5	11.2	8.8	6.4	6.4	1.2	-0.3	-0.6	-1.2	-2.2	-2.3	172.2	7.17	8.3
	11.6	11.2	11.2	14.3	13.6	12.3	12.4	12'1		-	-	107.8	5.12 {	By trip- lets, 6.4
	+218.6	+208.2	+185.6	+178'4	+161.9	+124.6	+98.6	+74.9	+34'5	+40.1	+34.7	2862.4	119.93	-
	+8•74	+8.33	+7:42	+7.14	+6•48	+4.98	+3.94	+3.00	+1.44	+1.62	+1.42	114.68	+4.79	-
	8.92	3.24	2.63	2.35	1.69	0.19	-0.82	-1.79	-3.32	-3.12	-3.34		-	-

### LAKE ATHABASCA.

# Spirit Thermometer by Dollond, corrected.

Date.		D	larch 184	4.			A	pril 1844.			
Mean Time.	Sunrise.	9 a.m.	3 p.m.	9 p.m.	Mean.	Sunrise.	9 a.m.	3 p.m.	9 p.m.	Mean.	
*1		0.2				14•4	19.6	22.7	12.3	78.05	ļ
*2	_		_	25.0		-2.5	2.0	14.4	12.3	17.25	l I
•3		-12·5 27·9	34.0	20°0 3°5	-	11.3	17.5	39.0	10°2 83•0	6·10 25·20	
*4		-14.9	-8·4	-15'6		31.0	35.0	46.0	39.0	25 20 37 · 75	
5	-20.8	-15.6	-7.4	-13.6	-14.35	25.8	37.0	46.0	89·0	36.95	
6	-10'5	-10.2	-5.8	-12.2	-9.82	33.0	40.0	45.0	35.0	38.25	
7	-11.2	-15.6	-6.3	-11.2	-11.23	31.0	38.0	38.0	28.9	33.97	
8	-7.4	-7:4	0.9	-1.1	-3.75	28.9	. 36·0	41.0	83.0	34.72	
9	-22.9	-21.9	-7.9	-17.7	-17.60	36.0	46.0	45.0	35.0	40.50	
10	-17.7	-8.4	-4.3	-12.2	-10.72	28.9	37.0	39.0	28.9	33.45	
11	-14.6	-10.2	-1.1	-6.3	-8.13	18.2	24.7	29.9	19.6	23.17	
12	-20.8	-15'6	3.0	4.0	-7.85	17.5	22.7	25.8	22.7	22.17	
13	12.3	15.4	21.6	11.3	15.15	24.7	28.9	41.0	35.0	32.40	
14	8.2	10.2	16.5	4.0	9.72	28.9	29.9	31.0	27.9	29.43	
15	2.0	4'0	12.3	7.1	6.35	18.5	28.9	<b>33</b> .0	29.9	27.57	
16	4.0	5'1	8.2	2.0	4.82	31.0	41.0	53.0	43.0	42.00	
17	7.1	12.3	28.9	10.2	14.63	33.0	45.0	53.0	37.0	42.00	
18	35.0	37.0	31.0	19.6	30.62	28.9	29.9	35.0	28.9	30.67	
19	17.2	20.6	19.6	18.2	19.05	31.0	42.0	56.0	44.0	43.25	
20	24.7	35.0	32.0	22.7	28.60	16.2	23.7	33.0	24.7	24.48	1
21	8.3	10'2	<b>32·0</b>	37.0	21.85	22.7	32.0	<b>3</b> 9·0	39.0	33.17	1
22	31.0	38'0	42.0	27.0	34.20	33.0	39.0	61.0	43.0	44.00	
23	-2.5	-3.2	4.0	-6.3	-1.92	41.0	53.0	65.0	41.0	50.00	
24	-12.2	-6.3	-2.5	-12.2	-8.38	22.7	21.6	25.8	22.7	23.20	
25	-22.9	-15.6	-5.3	-8.4	-13.02	24.7	36.0	53.0	49.0	40.68	1
26	-4.3	-2.5	3.0	-6.3	-2.42	45.0	59.0	55.0	41.0	50.00	
27	-16.7	-10.2	2.0	-5.3	-7.62	40.0	51.0	55.0	45.0	47.75	
28	-15.6	-10.2	2.0	-11.2	-8.90	41.0	48.0	59.0	39.0	46.75	l
29	-22.9	-16.2	0.0	-2.5	-10.42	37.0	45.0	43.0	43.0	42.00	1
30	-4.3	-3.5	8.5	8.3	2.23	41.0	55.0	52.0	49.0	49.25	
31	12.3	16.2	19.6	14.4	15.70	-		-	-	-	
Sums -	-65.3	30.0	246.5	58.3	67.53	834.7	1064.4	1274.6	1018.7	1048.08	
Means -	-2.45	1.13	9.13	2.16	2.20	27.82	35.48	42.49	33.96	34.94	
Diurnal Variation	} -					_	_	_			

# METEOROLOGICAL OBSERVATIONS.

### LAKE ATHABASCA.

Spirit Thermometer by Dollond, corrected.

<u> </u>			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	pirit 1 her						1
: · ·		-	May 1844.					June 1844.	I	
	Sunrise.	9 a.m.	3. p.m.	9 p.m.	Mean.	Sunrise.	9 a.m.	<u>3 p.m.</u>	9 p.m.	Mean.
	4510	56.0	49.0	38.0	47.00	_	_ ]	_	_	-
	45.0	28.9	27.9	21.6	27.60	29.9	35.0	39.0	36.0	34.97
	32.0	28 9 82·0	36.0	31.0	29.65	28.9	33.0	84.0	29.9	31.45
	19.6	1	52.0	41·0	41.50	31.0	34.0	35.0	31.0	32.75
	31.0	42.0	56.0	41.0	46.25	31.0	41.0	45.0	<b>33</b> .0	37.50
	35.0	53.0	39.0	31·0	37.00	35.0	37.0	46.0	41.0	39.75
	87.0	41.0	40'0	34.0	37.75	39.0	45.0	40.0	38.0	40.25
	36.0	41.0	40 0 56 0	47.0	45.75	45.0	51.0	56.0	45.0	49.25
	35.0	45.0	55.0	42.0	46.25	37.0	63.0	64.0	55.0	54.75
	37.0	51.0	56.0	51.0	49.25	55.0	68.0	70.0	58°Û	62.75
	87.0	53.0	62.0	51.0	53.75	55.0	71.0	75.0	55.0	64.00
	46.0	56.0	ļ	36.0	46.25	51.0	46.0	46*0	38.0	45.25
	45.0	49*0	55.0	26.8	32.45	38.0	45.0	55.0	46.0	46.00
	33.0	37.0	33.0	28.9	31.42	48.0	59.0	65.0	59.0	57.75
	26.8	31.0	39.0	45.0	41.00	52.0	61.0	66.0	58.0	59.25
	31.0	41.0	47.0	45.0	46.20	45.0	55.0	58.0	53.0	52.75
	47.0	49.0	45.0	1	52.50	45.0	74.0	74.0	63.0	64.00
	41.0	53.0	64.0	52.0	38.00	50·0	55.0	54.0	46.0	51.25
	37.0	35.0	45.0	35.0	1	42.0	65.0	64.0	55.0	56.20
	34.0	33.0	40.0	33.0	35.00	54.0	84.0	88.0	69.0	73.75
	35.0	51.0	59.0	47.0	48.00	69.0	88.0	88.0	71·0	79.00
	33.0	31.0	35.0	31.0	32.20		76.0	74.0	66.0	
	25.8	84.0	36.0	34.0	32.45	63.0	1	66.0	58.0	69·75 62·75
	39.0	46.0	51.0	49.0	46.25	61°0	66.0		55.0	
	45.0	49.0	44.0	41.0	44.75	51°0	58.0	61·0 63·0	58.0	56.25
	47.0	55.0	69.0	55.0	56.20	53.0	65.0	1	ł	59.75
	55.0	73.0	66.0	63.0	64.25	55.0	65.0	64.0	59.0	60.75
	55.0	59.0	64.0	53.0	57.75	57.0	65.0	66.0	61.0	62.25
	49.0	61.0	56.0	4S.0	53.20	57.0	56.0	53.0	49.0	53.75
	51.0	57.0	63.0	53.0	56.00	46.0	48.0	44.0	42.0	45.00
	46.0	47.0	59.0	45.0	49.25	46.0	49.0	53.0	47.0	48.75
	47.0	59.0	63.0	55.0	56.00				-	
	1213.2	1448.9	1561.9	1304.3	1382.07	1368.8	1658.0	1706.0	1474.9	1551.92
	39.14	46.74	50.38	42.07	44.28	47:20	57.17	58.83	50.86	53.52
	_	_			-	-	-			-

* Not included in Sums and Means.

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# 202

### FORT SIMPSON.

Abstract of Hourly Observations made during the month of April 1844.

Date. Gött.				s	pirit Tl	iermom	eter by	Newma	ın, corr	ected.			
Mean Time.	Noon	. 1.	2.	3.	4.	5.	6.	7.	8.	9.	10	. 11	12.
1	-2.8	-1.0	0	L 0.8	3 3 3	L 5·7	8.	7 13.	7 17.	3 20.	4 23.	7 23.	9 25.
2	1.6	i   -0'7	7 -2.3	l – 3'8	3   -1.8	3 2.8	10.	3 17.	2 23.	8 24.	8 32.	5 31.	6 29
8	1.5	i 0.1	5 0.4	1 2·1	ŭ 7 8	3 15.1	12"	7 27.	1 36.	0 <b>35</b> .	5 34.	5 39.	1
4	22.6	20.4	19.4	19.4	19.4	L 22.0	29.	3 33.	4 41.	5 44.	5 44.	6 46.	3 46.1
5	-	-	-	-	-	-	-		-	1 -	1 -		_
6	9.2	7.1	6.0	6.0	7.3	8.2	9'8	3 11.	3 16.	2 16.	5 16.	0 16.	2 16.4
7	-	-	-	-		-	-	-	-	-	_	_	1 -
8	13.2	-	9.1	10.4	12.3	13.8	23.7	29.2	3 37.9	2 42.1	5 44.	45.	) 42.5
9	37.1	37.2	35.2	37.4	38.3	40.4	42.4	44.8	3 45·1	41.	) 41.1	5 40.4	36.8
10	14.9	14.0	13.8	16.9	16.0	16.3	20.4	21.5	1 22.4	22.0	5 22.6	3 22.0	22.8
11	2.7	0.2	0.2	2.8	4.9	6.4	13.8	19.3	24.0	3 28.1	29.4	1 29.8	28.7
12	17.1	14.0	14.7	15.0	16.0	19.3	23.7	28.2	31.6	5 84·e	36.4	38.2	37.0
13	30.4	31.0	31.5	81.2	31.1	30.2	33.5	34.3	35.7	36.8	38.6	35.9	34.5
14	-	-	-	-		-	-	-	-	-	1 -		-
15	20.6	19.3	21.4	22.6	22.9	26.1	27.1	82.5	37.5	41.2	82.5	43.3	43.5
16	-	-	-	27.1	29.1	36.2	41.4	45.5	49.5	50.0	51.5	51.8	49.5
17	27.6	27.5	27.6	30.4	34.2	36.2	40.5	42.4	45.4	48.5	49.4	50.0	50.0
18	-		32.4	32.4	34.2	37.4	42.2	45.7	49.9	51.3	51.2	51.2	51.7
19	33.3	81.3	31.3	83.6	37.2	39.6	44.4	48.2	52.5	54.5	54.6	55.1	54.5
20	32.8	31.4	31.2	32.4	33.3	34.9	86.8	39.4	42.3	44.1	44.5	45.5	45.7
21	-	-		-		-	-		~	-	-	-	-
22	35.2	-	35-3	36.2	39.1	40.6	44.7	47.5	49.6	49.8	48.5	47.4	46.5
23	28.1	28.1	28.4	28.2	29.8	32.4	33.4	35-3	37.0	36.7	37.3	37.4	37.0
24	25.9	-	26.0	27.2	28'1	29.0	30-4	31.7	32.8	32.8	34.1	35.7	37.2
25	33.0	32.2	35.2	37.8	40.6	43.5	58.0	58-3	58.7	61.2	65.5	66.5	68.0
26	37.3	36-2	36.2	40.0	40.2	42.4	44.5	45.6	48.1	47.6	50.0	48.5	46.5
27	34.2	34-4	34.8	37.9	39.2	40.0	41.9	42.5	43.5	46.5	49.4	50.0	50.1
28	-	-		-		-			-	-	-	-	-
29	29.6	29.3	82.2	34.2	85.7	39.2	48.5	53.3	54.6	54.8	56.4	56.2	53.8
30	34.6	34.2	35.2	38.2	40.2	45.2	48.6	48.6	49.7	51.8	49•4	48.3	43.3
Sums -	520.6	427.5	537.0	598.1	639.2	705.5	810.2	896.3	982.4	1017.3	1048.5	1053.6	1086.6
Means -	22.63	21.37	22.37	23.92	25.57	28.22	32.41	35.85	39.30	40.69	41.94	42.14	41.46
)iurnal Varia- tion -}	-9.85	-11.11	-10.11	-8.26	-6.91	-4.26	-0.02	3.37	6.82	8·21 N	9.46	9.66	8.98

9^h Göttingen mean time = 0^h  $18^m$  local mean time.

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#### FORT SIMPSON.

Abstract of Hourly Observations made during the month of April 1844.

				Spirit	Thermon	neter by	Newman	, correct	ed.			
13.	14.	15.	16.	17,	18.	19.	20.	21.	22.	23.	Sums.	Means.
23.8	22.6	21.5	19.7	15-1	11.3	8.4	8.4	8.2	6.2	4.2	288.5	12.02
29.7	26.5	26.5	19.7	16.9	15.8	12.7	12.7	11.2	8.6	7.8	354.7	14.78
40.3	39.1	37.0	83.0	28.9	30.4	29.7	30.4	27.3	25.2	24.1	597.4	24.89
46.0	44.0	41.5	88·9	85°7	33·8	81·5	83·0		20.4		<b>}</b> 769·8	32.07
17.1	10.6	14.9	11.4	8.9	8.8	6'2	3.6			15.3	284.9	11.87
40.9	40.5	41.1	40.0	87.5	38.2	38.2	86.9	36.2	36.3	37.0	747.0	31.76
30.4	30.4	30.5	28.2	26.4	23.7	23.8	22.8	17.1	16.4	14.9	782.3	36.60
22.6	22.0	20.4	18.2	16.0	12.7	11.9	11.9	7.1	6.3	6.0	401.8	16.74
29.0	30.9	29.3	24.2	21.7	21.5	21.5	20.6	19.3	18.6	17.1	444.7	18.53
37.0	85.9	34.8	35.9	83.9	82.9	33.1	33.3	82.9	82.5	31.9	699.8	29.16
83.9	83.7	33.4	81.1	30.4	27.5	26.9	25.2	-	_	_	5	
1 -	-	-	_			-	-	22.6	22.2	20.4	\$742.6	30.94
43.0	41.5	41.0	41.7	38.7	82.2	82.7	32.2	28.2	27.1	26.4	785.8	32.74
48.7	46.5	44.5	42.5	88.2	87.7	32.9	30.4	28.2	28.6	28.0	838'1	37.89
49.8	50.4	49.5	47.0	41.9	88.8	85.8	83.7	84.2	88.2	80.4	954`7	89.78
52.1	51.4	52.1	50.6	45•4	42.1	89.0	38.0	36.3	88.9	83.2	954.9	42.09
53.2	52.5	50.7	50.2	43*8	40.7	39.8	37.5	36.2	35.0	84.4	1045.0	43.54
45.0	42.9	41.8	41.0	88.9	37.6	85.2	<b>32.</b> 6	-	-		200000	00140
	-		-		-	-	-	38-3	38.0	36-8	<b>}</b> 923`0	38.46
46.5	45.8	<b>43</b> .0	41.0	38.2	86·7	34.2	82.7	30.8	29.6	28.2	928.4	40.00
87.1	36.9	35*8	84.2	32.3	<b>31</b> '0	32.1	82.2	30.1	29.2	27.1	787.8	32.82
38.3	36.2	34.8	<b>\$3</b> *6	32 ⁵	33.2	83*9	33·1	33.0	32.2	32.6	745.2	32.38
68.0	66.9	63•0	60.2	56.1	54.9	52.5	52.9	42.4	42'1	39.2	1257 . 9	52.41
44.8	45.0	46.2	43.1	40.0	40.7	38.2	38.3	36.9	36.2	36.2	1009.6	42.07
49.9	48'1	46.3	45.7	<b>3</b> 9 · 3	36-8	35.0	33.6	-	-		}906-2	40.26
-	-	-	-		-	-	-	29.6	28*4	28.5	5000 2	30 40
53.0	55*7	53.0	47*5	46.5	43`7	42.5	39•7	37 . 9	8518	34.8	1068.3	44.51
41.5	37.8	35.0	30.6	28.0	23.7	20.0	19.3	16.2	15'4	12.9	848.1	35•34
1021-9	1000-1	967 • 9	910-1	832.7	786-9	749.5	725.6	681.1	656•3	621.6	19226 • 5	812.74
40.88	40.00	38.72	36.40	33.31	31.48	29.98	29.02	27.24	26.15	24.87	775.92	32.48
8.40	7.52	6.24	3.92	0.83	-1.00	-2.20	-3:46	-5.24	-6.33	-7.61	-	

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# METEOROLOGICAL OBSERVATIONS.

# FORT SIMPSON-continued.

Abstract of Hourly Observations made during the month of May 1844.

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Da Gö				•	ł	Spirit T	hermon	ieter by	Newm	an, corr	ected.				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Me	an	Noo	n. 1.	2.	3.	4.	5.	6.	7	. 8	. 9.	. 10	.   11	. 12	 }.
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1	L	14.	6 12	6 16.	0 14.	3 14.	7 17.	1 18	9 20	1 24	8 94	9 97	0 00	0 00	
3       21:5       22:0       -       23:7       24:2       29:2       31:6       34:4       37:6       39:5       42:4       43:6       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5       40:5	2	3	-	14.	0 17.	8 20.	6 23.						-		-	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	8	3	21.	5 22.	0 -	23.	7 24.	2 28.					1	1		
5         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -	4		31.	2 32.	7 33.	6 35·	3 37.	3 39.		1			{			
7         25-1         30-4         31-5         35-1         35-3         35-5         40-6         51-5         53-1         50-6         43-7         33-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         55-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         50-7         5	5	\$			-		1	1 _	-						40	°
7       28:1       30:4       31:5       33:4       36:0       39:7       42:4       46:0       51:5       43:5       53:3       50:6       47:9         8       34:4       34:3       34:5       36:6       39:5       40:8       44:4       46:5       53:7       56:7       57:5       56:7       55:7         9       35:7       55:3       39:5       40:3       42:0       45:5       47:1       51:2       54:3       55:5       53:3       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:6       56:5       56:5       56:6       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5       56:5<	6	;	29	1 30.	6 33	5 33.	7 35.	1 36.	5 38.	5 38	6 40	0 43.	1 43.	5 89.	5 39.	
8       34 * 4       34 * 3       34 * 5       36 * 6       39 * 5       40 * 8       44 * 4       46 * 5       53 * 7       56 * 7       57 * 5       56 * 7       55 * 5         9       35 * 7       35 * 3       39 * 5       40 * 3       42 * 0       45 * 5       47 * 1       51 * 2       54 * 3       55 * 5       53 * 3       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 5       56 * 6       56 * 5       56 * 5       56 * 6       67 * 7       68 * 6       63 * 5       51 * 1       54 * 6       56 * 5       56 * 5       56 * 6       56 * 5       56 * 6       57	7	,	28	1 30.	4 31.	5 33.	4 36.	0 39.	7 42.	4 .46	0 51.					
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	8		34	4 34.	3 34.	5 36.	8 39.	5 40.	8 41.	4 46.		1				
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$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	10		36.4	7 38.	3 43.1	5 42.	L 44.	0 48·	5 54.	0 54.	6 56.	1				1
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1 11		-	48.	5 47.4	47.	49.	5 52.4	1 54.	8 58.	3 58.	4 56.	5 56.	54.		- 1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12		-	-	-	-	-	-	-	_	-   -	-	-	_	-	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	13		27.2	2 29.8	3 31.8	3 31.0	32.8	33.8	36.	5 40.	0 44.	1 43.	3 44.1	5 45.	5 44.1	5
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	14		31.6	33-6	5 36.(	36.1	37.6	3 40·(	43.	1 49.	3 52.	5 49.9	51.8	58.1	5 54.0	6
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	15		34.6	3 37.6	3   41.2	2 40.4	42.8	3 43.8	3 47.1	52.	5 58.	3 60·8	3 62.4	63.	5 63 0	,
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	16		42.0	) 44.6	3 49°C	50.1	52.2	55.6	61.4	64.	2 66.0	66.1	67.7	68.6	69.3	3
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1		46.4	50.6	53.5	51.1	54.0	56.8	58.1	5 61.0	64.1	5 66.3	67.5	71.0	67.7	,
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1		47.5	46.5	46.7	46.4	48.5	47.5	48.4	50.0	51.0	49.5	48.6	48.5	47.0	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	19		-	-	-	-	-	-	-	-	-	-	-	-	-	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1				44.4	44.7	47.5	50.2	53.5	60.8	63.5	64•4	65.5	65.8	65.9	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1		43.5				43.5	44.5	46.3	49.1	52.4	52.4	52.5	52.5	52.4	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			-	1	1	30.2	32.6	35.2	37.9	42.1	44.0	46.4	47.5	48.1	50.5	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1			1	44.8	1	45.5	46.6	48.6	52.9	57.0	56.9	57.2	60.9	61.2	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1		44.4	44.2	-	48.0	50.3	54.2	57.7	61.2	63.9	64.4	63.0	63.2	63.5	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			-	-	-	-	-	-	-	-	-	-	-		-	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1		-	-	-	-	-	-	-	-	-	-	-	-	-	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			-	-	-	-	-	-	-	-	-	-	-	-	~	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1			-	-	-	-	-	-	-	-	-	-	-	-	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1			-	-	-		-	-			-	-	-	-	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1			-	-	-	-	-	-	-	-	-			-	
$ \frac{\text{Means}}{\text{Variation}} = \frac{34\cdot54}{N} \frac{35\cdot18}{27\cdot86} \frac{37\cdot91}{28\cdot54} \frac{37\cdot91}{28\cdot54} \frac{37\cdot92}{28\cdot45} \frac{37\cdot92}{28\cdot96} \frac{39\cdot65}{24\cdot207} \frac{42\cdot97}{44\cdot91} \frac{48\cdot97}{44\cdot91} \frac{51\cdot49}{48\cdot97} \frac{51\cdot44}{51\cdot49} \frac{51\cdot49}{52\cdot55} \frac{52\cdot92}{52\cdot78} \frac{52\cdot78}{52\cdot92} \frac{52\cdot78}{52\cdot78} \frac{51\cdot44}{51\cdot49} \frac{51\cdot49}{52\cdot55} \frac{52\cdot92}{52\cdot78} \frac{52\cdot92}{52} \frac{52\cdot92}{52} \frac{52\cdot92}{52} \frac{52\cdot92}{52} \frac{52\cdot92}{52} \frac$						-	-	-	-	-	-	-	-	-	-	
$ \frac{\text{Means}}{\text{Variation}} = \frac{34\cdot54}{2} \frac{35\cdot18}{37\cdot91} \frac{37\cdot91}{37\cdot03} \frac{37\cdot05}{39\cdot05} \frac{39\cdot05}{42\cdot07} \frac{44\cdot91}{44\cdot91} \frac{48\cdot07}{48\cdot07} \frac{51\cdot44}{51\cdot49} \frac{52\cdot55}{52\cdot55} \frac{52\cdot92}{52\cdot78} \frac{52\cdot78}{52\cdot78} \frac{52}{2} \frac{52}{78} 52$	Sums	-	621.7	738.8	720.3	791.2	832.7	883.4	943.2	1009.4	1080.2	1081.2	1103.6	1111.3	1108.3	
$\frac{\text{Diurnal}}{\text{Variation}} \left\{ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Means	-	34.54	35.18	37.91	37.03	39.65	42.07	44.91	48.07	51.44	51.49	52.55			
$\frac{1}{Months} \frac{1}{N} \frac{1}{27\cdot86} \frac{1}{28\cdot45} \frac{1}{29\cdot24} \frac{1}{30\cdot20} \frac{1}{32\cdot00} \frac{1}{34\cdot54} \frac{1}{38\cdot12} \frac{1}{41\cdot43} \frac{1}{44\cdot84} \frac{1}{45\cdot62} \frac{1}{47\cdot57} \frac{1}{47\cdot06} \frac{1}{46\cdot63} \frac{1}{46$	Diurnal Variation	n}	-10.05	-9.38	-6.62	-6.88	-5.91	-2.49	0.32	3.21	6.88	6.93	7.99			
$ \frac{Months}{N} \stackrel{2}{\xrightarrow{N}} 27.86  28.45  29.24  30.20  32.00  34.54  38.12  41.43  44.84  45.62  47.57  47.06  46.63  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  46.63  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.57  47.06  47.57  47.06  47.57  47.06  47.57  47.57  47.06  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.57  47.$	TWO	-	1142.3	1166.3	1257.3	1389.3	1471.9	1588.9	1753 • 4	1905 • 7	2062.6	2098.5	2188.1	2164.9	2144.9	
			27.86	28.45	29.24	30.20	32.00	34.24	38.12	41.43	44.84	45.62 N	47.57	47.06		

9^h Göttingen mean time = 0^h 18^m local mean time.

### METEOROLOGICAL OBSERVATIONS.

#### FORT SIMPSON—continued.

Abstract of Hourly Observations made during the month of May 1844.

					Spirit	Thermor	neter by	Newman	, correct	ed.			·····
	13.	14,	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Mcans.
	26.0	26.7	25.0	23.7	23.7	22.1	20.8	18.4	18.6	15.3	14.0	491.5	20.48
	38.0	37.8	35.1	<b>33</b> ·9	32.8	32.0	28.2	27.5	26.4	21.2	21.7	678.8	29.06
	41.9	41.7	41.3	42.0	41.4	36.2	36.2	34.1	33.8	32.2	32.7	805.4	34.28
	48.7	45.3	46.2	45.5	41.0	38·7	35.7	33`4	31.3	30.4	29.5	974-4	40.60
	39.7	39.5	39.5	37.7	35.9	82.0	29.9	28.7	29.5	29.3	28.4	851.6	35.48
	49.2	48.9	46.9	44.2	43.7	40.0	38.7	37.7	36.2	35.2	34.7	996-3	41.51
	55.5	55.6	53.2	53-1	46.9	43.0	40.5	38.7	38.0	37.8	85.5	1089.1	45.38
	54.5	54.7	52.7	49.7	47.8	44.7	41.8	40.2	38.7	38.1	37.8	1111.7	46.32
	55.8	55.5	53.9	51.9	50.6	48.3	45.5	45.5	45.5	45.3	40.9	1176.0	49.00
	55.7	48.5	45.7	43.7	41.1	37.4	37.0	35.2	-	·	- 1	1050-0	40.00
•		-		-	-	-	-	-	30.4	28.9	28.85	1072.8	46.22
	45.0	44.9	45.0	42.5	39.7	87.3	36.2	34.7	84.5	31.2	31·0	905.9	37.75
	54.7	53.9	55.3	54.5	52.2	45.1	42.8	40.2	38-8	37.7	35.7	1080.3	45.01
	63.7	63.0	62.7	61.8	58.2	53.3	52.8	49.5	47.9	45.5	44.2	1250.9	52.12
	72.5	70.6	67 . 9	63.6	62.1	58.7	57.5	56.2	54.2	49.5	48.4	1418'8	59.12
	65.0	64.1	64.1	64.1	57.8	58.7	55.7	55.2	50.2	51.2	49.5	1405.7	58.57
	46.2	44.8	43.2	41.2	39.2	36.2	84.2	32.2	-	-	- }	1061-1	44.21
			-	-					40.5	38.5	87.75	7004-0	
	65.2	66.1	65.1	63.8	61.5	56.7	51.3	50.2	47.1	46.5	45.5	1324.0	55.17
	51.7	51.5	49.7	48.5	44.9	41.7	87.5	32.2	31.6	30.4	28.2	1071.7	44.65
	48.7	47.0	44.8	46.5	44.8	42.7	39.7	37.7	37.1	37.1	36.9	938.9	40.40
	62.5	61.2	59.1	57.9	56.7	53.8	50.8	49.9	47.5	46.1	45.7	1238.6	51.61
	64•4	63.2	62.7	62.2	58·4	56.4	52.0	49.6	47.4	47.1	46.2	1289.7	55.69
	-	-	-	-	-	-	-				-	-	-
		-	-	-	_	_				-	-		-
		-	-			_				_		_	
		-	-	-		_						_	
								_	_				
	_			_	-	-	-	-	_		_	-	
-	10/10	1005.7	105017	700010		916.0	865.5	829.5		776.0	759.0	22233.2	075:04
ŀ	104·9 52·61	1085·1 51·67	1059·1 50·43	1032·3 49·16	980·7 46·70	43.62	41.21	829°5 39°50	805 · 8 38 · 37	36.95	753·0 35·86	1067.27	935.04
ŀ	8.05	7.11	5.87	49 10	2.14	-0.94	-3.32	-5.06	-6.19	-7.61	-8.70		
ŀ												47.450.27	
ŀ		2085.2	2027.0	1942.4	1813.4	1702.9	1615.0	1555.1	1486.9	1432.3	1374.6	41459.7	
	46.23	45.33	44.07	42.23	39•42	37*02	35.11	33.81	32.32	31.14	29.88	37.92	

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# MAGNETICAL ABSTRACTS.

Note.—Regular Observations which were followed by Extra Readings, in consequence of disturbance, are distinguished by *Italic* figures throughout the following Abstracts. The Daily Means of imperfect days are derived from the 8-hourly series that may be complete. At Lake Athabasca 0^h Gött.=15^h 55^m M.T., or 3^h 55^m A.M. At Fort Simpson 0^h Gött.=15^h 14[•]6^m M.T., or 3^h 14[•]6^m A.M.

LAKE ATHABASCA. net of Hourly Observations made during the month of October 1843.

	Abstra	act of H	lourly C	bservat	ions m	ade du	ring th	e mont						
Date.					Declir	nation I	lagneto	meter.						
Gött. Mean Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
			[-						·	-		=	=	
1 2 3 4 5 6 7 8 9	=	=	=	=	=	=	=	=	=	=	=	Ξ	Ξ	
3. 4	=	=	=	-	=	=	=	=	=	=	=	- 1	=	
5	=	=	=	=		-	=	=	=	=	=	=		
7	· =	_	=	=	=	=	=	=	=	=	=	=	=	
9	=	Ē	=	=	=	=	-	- 1	=	=	=	=	=	i
10 11	1 = 1	=	=	=	=	=	=	=	=	_	=	=	=	
12 13		-	=	=	=	=	=	-	=	_	_	_	=	
14 15 ⁵	=	_		422.5	412.1	420.0	416.5	413.6	415.0	406.0	408.4	410.0 406.8	$408.2 \\ 406.0$	
· 16	491°6ª 425°8	417.0 ⁸ 446.0 ⁸	413.0	410.0 418.8	405.0	414.0 424.4	$408.0 \\ 412.0$	$411.0 \\ 408.0$	$408.4 \\ 403.0$	$410.0 \\ 406.0$	$410.0 \\ 408.0$	409.8	408.0	
A 18 E 19	414.0	418·2 416·6	415·2 419·6	422.0	424 0 421 5	422·2 418·0	418·2 418·3	411·8 415·4	415.0	410·8 406·6	$411.8 \\ 412.6$	$412.8 \\ 418.0$	414.0	
Jo 17 18 19 20 ^b 21	430.0	418.0	418.0 418.0	$426.0 \\ 417.2$	420.0	425.4	426.6	414.0	411.0	410.0	412.0	408.5	410.0	
22 23	420.0	419.0	419.0	422.0	Fort C 418.6	418.0	416'0	416·0 415·0	419.4	411.0	414.0	414.0 408.2	415°0 409°2	
24	425·0 419·8	430°0 420°0	420°6 420°0	$432.8 \\ 424.0$	419·2 421·0	419°2 412°0	416.0 406.4	410.2	408.0	406.0	407.2	412.0	415.4	
25	420.0ª	434.0ª 450.5ª	431.8	419·5 423·0	424.6 419.0	414.5 426.0	420.5 417.8	401'0	416.4	412.0	410.0	411·1 398·0	411.6	}
27 28	436°7° 425°0	430 3	419.6	423.6	422.0 Fort C	424'0 hinewy		412.5	414.5	407.8		411.4	413.0	
25 26 27 28 29 30 31	419.6	443.0	490.0	441.6	424.6	419.8 418.0	420.0	414.4	413.0	417.0	412.0	408.0	414.0	
31	489.0	457.8	424.0	417.4	421 0	100								-
Sums	5571.9	5599.8	5533.7	5496.2	5451.3	5457.5	5414.0	5352.3	5357 <b>·</b> 7	5322.6	5326.4	5322.8	5335.3	
Sums							47.0140	411.72	412.13	109.43	409.72	109.45	410.41	
Means	- 428.62	430.75	425.67	422.78	419.33	419.81	_	-	_	_			_	-
Diurnal	19.19	21.32	16.24	13.35	9'.90	10-38	7:03	2.29	2:30	6·0	0 29	0'02	0 . 98	3
Variatio	n 10 10		1	<u> </u>	1	1		1			as im	herfect (	lavs.	*****

LAKE ATHABASCA. Abstract of Hourly Observations made during the month of October 1843.

					D	eclinat	ion Mag	netome	ter.				
13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Means.
408.0 411.6 410.0 410.0 412.0 412.0 412.0 414.0 408.8 413.0 413.0 413.0 408.0 413.0 398.4 414.0 407.2	$\begin{array}{c} \\ - \\ 409 \cdot 7 \\ 410 \cdot 0 \\ 412 \cdot 0 \\ 412 \cdot 2 \\ 424 \cdot 0 \\ 412 \cdot 4 \\ 412 \cdot 9 \\ 410 \cdot 4 \\ 414 \cdot 0 \\ 424 \cdot 0 \\ 412 \cdot 4 \\ 414 \cdot 0 \\ 412 \cdot 4 \\ 402 \cdot 0 \\ 414 \cdot 0 \\ 414 \cdot 0 \\ 414 \cdot 0 \end{array}$	407.0 409.0a 407.6 412.6 414.0 411.4 418.0 414.0 414.0 414.0 414.0 414.0 414.0 414.0 414.0 416.0 400.8 414.0	$\begin{array}{c} \\ 413 \cdot 8 \\ 409 \cdot 6 \\ 417 \cdot 6 \\ 414 \cdot 8 \\ 412 \cdot 0 \\ 416 \cdot 6 \\ 412 \cdot 0 \\ 416 \cdot 4 \\ 412 \cdot 0 \\ 411 \cdot 5 \\ 416 \cdot 4^{n} \\ 415 \cdot 6 \\ 399 \cdot 4 \\ 420 \cdot 0 \\ 415 \cdot 6 \end{array}$	$\begin{array}{c} - \\ 405 \cdot 1 \\ 440 \cdot 0 \\ 3392 \cdot 0 \\ 414 \cdot 6 \\ 416 \cdot 0 \\ 416 \cdot 0 \\ 416 \cdot 0 \\ 412 \cdot 8 \\ 420 \cdot 0^{n} \\ 422 \cdot 0 \\ 408 \cdot 0 \\ - \\ 408 \cdot 0 \\ 416 \cdot 0 \end{array}$	409.0 ^a 448.3 ^a 411.6 <i>\$82.0</i> 412.0 403.0 	407:3a 412:5 436:0 414:4 411:0 412:0 412:0 412:0 412:0 412:0 412:0 412:0 412:0 414:6 412:0 338:0 338:0 338:0 414:6 412:0 406:0	$ \begin{array}{c}$	$390.0^{n}$ $416.5^{n}$ $410.0$ $414.0$ $392.0$ $414.0$ $418.4$ $414.0$ $426.0$ $472.0^{a}$ $474.0^{a}$ $408.0^{a}$	400'6a 420'06 415'2 410'5 400'9 414'06 5unday, 419'4 419'4 420'0 4419'6a 4419'6 4419'6 5unday, 411'5 Sunday, 411'5 Sunday, 411'5 8	$586.0^{n}$ $422.0^{a}$ $419.5^{n}$ $413.2$ $420.0$ $414.6$ $419.6$ $422.0$ $421.8$ $432.5^{n}$ $418.4$ $415.0$		$\begin{array}{c} & 392 \cdot 53 \\ 416 \cdot 13 \\ 413 \cdot 38 \\ 412 \cdot 08 \\ 412 \cdot 54 \\ 416 \cdot 47 \\ 416 \cdot 75 \\ 417 \cdot 42 \\ 417 \cdot 25 \\ 417 \cdot 25 \\ 417 \cdot 52 \\ 417 \cdot 52 \\ 417 \cdot 32 \\ 410 \cdot 49 \\ 416 \cdot 63 \end{array}$	414 24
	5360·0 412·31		5371·3 413·18							5437 • 4 418 • 26	129635•4 9964•27	415.50	
 0.49	2'-88	1.88	3.75	3'.47	3':30	3.72	0.49	1.15	4.61	3.31	_	6.07	

Increasing numbers denote a movement of the north end of the magnet towards the East.

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* Visible aurora.

#### MAGNETICAL OBSERVATIONS.

LAKE ATHABASCA-continued.

Abstract of Hourly Observations made during the months of November and December 1843.

Date.					Decl	ination	Magnet	ometer.						Ī
Gött. Mean					1	1	1	1	1	1	1	1	1	1
Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
1	417.0	423.6	423.0	418.0	418.0	420.0	417.1	412.0	413.1	416.6	413.8	418.0	413.5	
2 3b	417.0	414'4	417.2	414.8	419.8	418.0	423.5	410.0	409.0	409.0	411.0	406.0	416.0	l
4 ^b	418.0	425.0	420.0	414 0° 415 2	416.0	418.2	415.8	411.2 418.0	408.6	412.0	414.0	416.0	415°0 418°0	
4 ^b 5 6 7 8	464.0				t Fort C	hipewy	an.	-	- 1		-		-	
7	414.2	440'0 416'0	444.5	426.0 418.4	424.0	420.0	418.0	414·0 400·2	410.0	412.0	412.0	410.0	416.0	
89	418.0	422.0 419.8	418·9 419·0	$424.0 \\ 420.4$	422·2 419·6	420.0	416.0	413.6 417.0	407·8 416·0	414·0 415·2	409.6	410'0	409.0	
10	420.6	418.0	421.0	418.0	420.0	422.0 418.4	418.0 420.0	411.4	414.0	416.3	416·0 414·2	415.8	419.7 412.4	
11 12	417.0	419.4	416.2	417.6	419•4 t Fort C	420.8	414•2	405.0	405.0	404.0	410.0	410.3	416.0	
13 14	422·2 416·0	414.0 420.0	$425.0 \\ 426.0$	436.0	1 438.0	1 414.2	1 410.0	408.0	416.0	412.7	413.0	413.0	412.5	
15	420.0	428.0	426.0	416°0 433°2	$422 \cdot 2$ $411 \cdot 0$	416.0	420.0	412·0 416·0	410.5	410.6	410.4	410.3	410.0 413.0	
16 17	414.0 418.2	419°2 418°0	417·4 420·0	416°6 420°0	$419.4 \\ 422.0$	420.4 418.2	419.2	414.6 412.4	410.0	408.0	408.0	410.2	419.6	
18	418.0	421.1	418.0	418.4	420.2	420.0	418.4	410.0	405.0	406.8	410.6	415.0	416·0 414·4	
19 20	418.4	422.4	427.0	A1 422.0	t Fort C   421 *0	hipewy 1 420 0	an. 1418.0	416.2	412.2	418.0	416.2	414.4	417.0	
21	420°0 419°8	416.4	418.0	417.6	420.0	420 4	419.0	417.0	412.2	415.2	412.0	411.8	412.7	
A 23	422.0	434·0 419·1ª	436.5 420.0ª	436°0 418°9	422.4	425.0 416.0	419.6	415.7	412.8	411.8	413.7	418.0	417.0	
er 23 C 24 E 25	$421^{+}2$ $420^{+}0$	430°0 419°0	$436.2 \\ 419.0$	424·0 418·4	430.0	420°0 420°0	417.8	408.2	412.0 420.0	410.4	413.0	414.0	410.0	
0 26				Δ	419•0 t Fort C	hipewy		418.4	] [		415-2	416.4	412.8	
F 27 28	$420.0 \\ 421.0$	422·1 418·0	$422.0 \\ 418.4$	418°0 420°0	420.0	421.2	423.0 430.0	420·8 408·)	414.2	416.0	415.8	416.0	414.0	l
29	419·6 416·0	425.24	422.0ª	\$421.0	414.0	416.2	418.0	417.4	416.7	418.4	416.2	413.0	410.8	
30		415.2	414.0	415.2	412.0	414.2	416.5	411.0	410.4	409.0	411.0	412.2	414.4	Į
Sums -	10096.2	10121.2	10137.5	10108.5					9878 . 9	9902.0	9912.7	9919.7	9940.8	
Means -	420.67	421.72	422.40	421.19	420.47	419.17	418.14	412.66	411.62	412.58	413.03	413.32	414.20	
Diurnal Variation	\$ 9.05	10.10	10.78	9.57	8.85	7.55	6.52	1.04	<b>'0·0</b>	ó·96	1.41	í·70	2.58	
1	422.4	430.8	417.0	428.0	416.0	412.2	406.4	408.2	406.0	406.4	410.0	410.0		
23	434.0	442.0	450.1	446°0	442°2 t Fort C	422.0	416•0 an.	414.2	420.0	417.6	417.0	415.0	416.4	
4 5	421.2	$420.0 \\ 424.0$	419·6 427·0	420·2 424·4	420.0	$ \begin{array}{c}420.4\\421.6\end{array} $	421.8 417.0h	417.0	413.0	415.0	414.0	413.6	412.8	
	429.8	436.5	424.8	419.8	420.0	422.8	421 2	418.2	418.0	414.0	413.0	412.4	414'4	
6 7 8	421.4 419.2	419.2	415 6 417 8	417°0 419°2	416.4 420.0	417.0	416°0 420°0	416.6	414.0 420.0	414·4 420·0	413·9 396·0	416.0	414°0 419°2	
9 10	414.4	417.8	424.0	422.0	418.0	420.0	420.0	410.2	406.4	410.0	408.2	410.4	413.5	
10 11 12	422.2	423.2	420.8	Δ1 416·4	423.8	427.0	408.8	410.0	412.4	406.0	410.0	406 8	405.0	l
$     12 \\     13   $	425·8 424·2	414.4	413.6	410'4 420'8	416.6 421.0	$420.0 \\ 420.2$	425·4 428·0	426.0 424.2	414·0 420·0	419.6 416.2	415°0 419°6	$  \begin{array}{c} 422.0 \\ 418.2 \end{array}  $	428.4 424.8	l
14	429.0ª	430 · 0ª	430.4	426.0	427.8	430.0	434.0	428 8	426.2	424.2	429.0	426.7	424 6	
$15 \\ 16$	$426.0 \\ 425.0$	422·4 424·7	$426.0 \\ 425.2$	431.0 420.6	422.0	428.4 423.8	426.0	$427.4 \\ 426.0$	418.0	416.4	420°0 418°0	420.0 418.2	420.8	
17	429.4	422.2	429.5	At 429.0		hinewv	ın.			- 1				
÷ 18 19	425.0	426.0	426.3	426.0	422.0	$  \begin{array}{c} 418.0 \\ 420.0 \end{array}  $	416.7	416.2	418 0 422 4	413.4	420.0	420.0	419·8 420·0	Ĺ
$\left \begin{array}{c} P \\ P \\ P \\ P \end{array}\right  \left\{ \begin{array}{c} 20 \\ 21 \end{array} \right.$	438.2 426.0	432.0 415.8	$432.2 \\ 412.6$	427 · 0h 414 · 2	423·8 415·0	422.0	408·4 417·4	$410.0 \\ 412.2$	408.0	418.0	421.0	416.2	417·9 412·3	
19 19 20 21 22 23	420.0	419.0	419.2	419.0	420.0	420.0	420.0	412.0	412.6	411.3	416.0	420.0	416.7	
24	415.5	416.0	417.2	420`0 At	419.7 Fort C	422 · 8 hipewya	421.0	414.0	416.0	417.0	416.5	414.0	415.8	
25 26	422.0	428.0	429.5	$\begin{array}{c} At \\ 426.0 \end{array}$	Fort Cl 426.0	hipewya   426•5	n.   424.6	426.0	422.0	420.2	420.0	421.4	426.4	
27 28	447'0 ⁿ 421'4	438.0	421.2	419.6	419.0	428.0	416.8	406.8	415.8	419.0	422.1	422.0	422.0	
29	425.5	$421.4 \\ 425.0$	$400.4 \\ 419.5$	477 8 424 0	424 ° 0 424 ° 2	426°0 423°0	426.6	415·5 424·0	$419.8 \\ 422.0$	418.0	418.2	418.6 417.0	415.8 412.0	
30k	426.4	424.0	429.0	425.8	429.0	430.0	426.0	419.7	411.8	412.0	418.8	419.7	422.0	
Sums -	10200.7	10192.4	10147.0	10204.4	10125 • 1	10120.2	10093.1	10014.5	9987 • 7	9974.9	9966.9	9986.7	10023.1	
Means -	425.03	424.68	422.79	425.18	421.88	421 • 67	420.55	417.27	416.15	415.62	415.29	416.11	417.63	1
Diurnal Variation	}	9 [.] 89	4.50	9.89	6.29	é∙38	5.26	í·98	ó·86	ó·33	<b>'0·0</b>	ó·82	2.34	I

Visible aurora. Hourly readings taken during disturbances are distinguished by a difference of type.
 Omitted from the Means, as not being complete days.
 By the five complete 8-hourly series.
 Taken at 23^h 30^m.
 Twenty minutes late.

# LAKE ATHABASCA-continued.

Abstract of Hourly Observations made during the months of November and December 1843.

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	1								5 000 11	iontus	OI IN	ovem	ber and	Decem	ber	1843.	
							Decli	nation 1	Magneto	ometer.							
	18	_	<b>1</b> .   1	5. 1	6. 1	7. 18	3. 1	9. 20	). 2	1. 2	2.	23.	Sums	. Mea	ns.	Fortnight Means.	ly
	413 403 415 418	$\begin{array}{c c} \cdot 4 & 408 \\ \cdot 0 & 416 \end{array}$	0   410 0 410	0 412	· 4 414	$3.0^{\circ}$ $373$ 3.2 $414$	0 37		·0 410		5.2ª	416·0 416·0*	9992 9838 8725	1 409	92		~
	416 415 411 419 412 412	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} \cdot 8 & 414 \\ \cdot 0 & 425 \\ \cdot 0 & 419 \\ \cdot 0 & 414 \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} \cdot 0 & 416 \\ \cdot 0 & 416 \\ \cdot 0 & 420 \\ \cdot 5 & 410 \end{array}$	$ \begin{array}{c c}             0 & 416 \\             0 & 475 \\             0 & 416 \\             0 & 408 \\             0 & 408 \\         \end{array} $	$ \begin{array}{c c} - & - \\ - & 0 \\ - & 416 \\ - & 417 \\ - & 427 \\ - & 5 \\ - & 416 \\ - & 2 \\ - & 411 \\ \end{array} $	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	- 404 ·2 411 ·0 415 ·8 420 ·0 ^a 416		0.0   4 1.8   4 1.4   4 3.0   4 8.8   4	32.0°° 114.0 115.0 132.0 19.2 19.2	\$ 8739 10078 9932 10091 10042 9976	$\begin{array}{c cccc} 0 & 419 \\ 5 & 413 \\ 9 & 420 \\ 1 & 418 \\ 418 \\ 4 \end{array}$	92 35 50 2		
	414 414 410 410 416 415	$\begin{array}{c c} 0 & 416 \\ 8 & 410 \\ 2 & 418 \\ 0 & 418 \\ 6 & 413 \\ \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} \cdot 2^{a} \\ \cdot 6 \\ \cdot 6 \\ \cdot 8 \\ \cdot 8 \\ \cdot 420 \\ \cdot 0 $	$ \begin{array}{c}         0 & 419 \\         0 & 414 \\         0 & 420 \\         2 & 440 \\     \end{array} $	·0 416 ·0 422 ·6 416 ·0 408	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	·8 ^f - 410 ·0 ^a 402 ·0 408 ·0 418 ·6 417	Sund ·6   407 ·6   444 ·8   416 ·0   416 ·0   418	lay. 0 4 8 4 6 4 0 4 2 4	19.4 20.4 18.4 15.0 20.0	<pre>     9926     9996     9953     10017     9993 </pre>	$\begin{array}{c c}9 & 413 \\ 2 & 416 \\ 5 & 416 \\ 5 & 414 \\ 7 & 417 \\ 4 & 416 \\ 3 & 416 \\ 3 & 416 \\ \end{array}$	2 1 4 1 9	410.61	
	416 417 414 417 416 416 416	$\begin{array}{c ccccc} 0 & 415 \\ 7 & 417 \\ 0 & 417 \\ 4 & 416 \\ 5 & 414 \\ \end{array}$	$\begin{array}{c cccc} 0 & 417 \\ 8 & 422 \\ 2 & 417 \\ 2 & 414 \\ 6 & 418 \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 0 & 415 \\ \hline 4 & 417 \\ 0 & 419 \\ \hline 6 & 414 \\ 0 & 416 \\ 0 & 423 \\ \end{array}$		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 6 \\ - & 415 \\ 0 & 433 \\ 0 & 419 \\ 2^{a} & 414 \\ 0 & 416 \end{array}$	$\begin{array}{c c} Sund \\ 0 & 419 \\ 0 & 414 \\ 2 & 418 \\ 8^{a} & 421 \\ 2 & 417 \end{array}$	ay. 8 4 2 4 8 4 0 4 7 4	16°0 19°6 16°0 19°4 18°0 17°6 15°8	9999 8 9976 9 10035 4 10006 7 10072 8 9987 6 10061 8	2 415.6 4 418.14 7 416.9 5 419.6 8 416.1			
	419 · · · · · · · · · · · · · · · · · · ·	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 0 & 418 \\ 6 & 418 \\ 0 & 416 \\ 8 & 412 \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 0 & 410 \\ 0 & 415 \\ 4 & 421 \end{array}$	$\begin{array}{c c} 0 & 414 \\ 5^{a} & 425 \\ 6^{a} & 419 \end{array}$	0 414 0 ^a 418 6 ^a 416 0 ^a 416	Sund 4 416 0 417 0 ^a 414 0 ^a 414	ay. 0 41 0 41 7 41 0 41	17.2 16.0 18.7 12.0 ⁿ 16.4	$\left.\begin{array}{c} 10001 \\ 3\\ 10010 \cdot 1\\ 10021 \cdot 7\\ 10014 \cdot 7\\ 9985 \cdot 4\\ 9959 \cdot 6\end{array}\right.$	$\begin{array}{c} 417.09\\ 417.57\\ 417.28\\ 416.06\end{array}$		- 417.58	
	414.41				_	_				-	•6 100		239970.7				
	2.79	3.17									2 417	.75	9998.75	416.61	-		
	417.0						1	1	1	4 6.4	0 6	13		4.99			
	416.0	418.4	416.0	416.6						Sunda	y.	7.8	′9959•1 {10148•3	414.96 422.85	1		
	412.8 418.4 411.8 416.4 416.4 415.2	414.0 419.0 414.8 419.0 418.0 418.0 412.4	419.6 417.8 412.6 421.5 418.5 417.0	$\begin{array}{c} 417.2 \\ 414.0 \\ 416.2 \\ 410.2 \end{array}$	$\begin{array}{c} 415 \cdot 4 \\ 416 \cdot 0 \\ 416 \cdot 0 \\ 410 \cdot 0 \end{array}$	414·4 415·0 419·2 464·9	416.2	416.0 415.2 417.0 416.6	418.8 417.8 418.0 414.0	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.8	10033.0 10009.4 10040.2 10009.5 10017.1	422 85 418.04 417.06 418.34 417.06 417.38	K		
	$\begin{array}{r} &$	$\begin{array}{r}$	$\begin{array}{r}$	409.8 419.8 421.2 426.2 419.2 419.2 419.6	$\begin{array}{r} 412.3 \\ 424.5 \\ 419.0 \\ 426.0 \\ 418.0 \\ 421.4 \end{array}$	$\begin{array}{r} 412.4 \\ 423.0 \\ 425.8 \\ 427.0 \\ 420.0 \\ 418.0 \end{array}$	414.0 423.0 426.0 423.0 424.0 415.0	412.7 421.5 428.2 428.2	$\begin{array}{c} 419.6 \\ 412.0 \\ 422.4 \\ 426.0 \\ 424.0 \end{array}$	414 6 423 6 425 0 425 6 422 5	419 413 423 427 424 424	.0ª	9969.0 9929.3 10093.8 10153.3 10246.3 10137.3	$\begin{array}{r} 415\cdot37\\ 413\cdot72\\ 420\cdot57\\ 423\cdot05\\ 426\cdot93\\ 422\cdot39\end{array}$		419-28	
	419.5 419.6 417.0 413.2 421.0 419.6	419.0 419.0 420.0 416.0 419.5 419.0	$\begin{array}{c} - \\ 421 \cdot 0^{i} \\ 420 \cdot 0 \\ 424 \cdot 0 \\ 417 \cdot 0 \\ 418 \cdot 0 \\ 422 \cdot 0 \end{array}$	$\begin{array}{r}$	$\begin{array}{r} 424 \cdot 2 \\ 419 \cdot 8 \\ 419 \cdot 0 \\ 418 \cdot 6 \\ 415 \cdot 2 \\ 420 \cdot 0 \end{array}$	$\begin{array}{r} 423^{\circ}9\\ 417^{\circ}0\\ 413^{\circ}8\\ 416^{\circ}0\\ 420^{\circ}0\\ 418^{\circ}0\end{array}$	$\begin{array}{c} 421 \cdot 0 \\ 414 \cdot 0 \\ 416 \cdot 7 \\ 418 \cdot 0 \\ 421 \cdot 8 \\ 420 \cdot 0 \end{array}$	420.0 454.5 416.2 419.0 420.0 417.5	$\begin{array}{c} 418.0\\ 418.0\\ 423.3\\ 421.6\\ 412.0\\ 425.6\\ \end{array}$	446.0 417.2 413.6 418.0 Sunday	428 422 444 418 416 416	·8 ·2 ·4	$\begin{array}{c} 10113.7\\ 10109.9\\ 10183.3\\ 10077.0\\ 9964.6\\ 10035.4\\ \end{array}$	421.40 421.25 424.30 419.87 415.19 418.14			
4	425.6 421.2 416.4 422.4 421.2	426.0 419.8 418.0 422.0 423.7	$\begin{array}{r}$	$\begin{array}{c} - \\ 426.0 \\ 420.0 \\ 423.0 \\ 423.8 \\ 428.0 \\ \end{array}$	$\begin{array}{c}$	420.4 430.4 423.8 429.2 433.4	423·4 419·4 421·4 428·2 428·6	$\begin{array}{r}$	Chi 416.3 423.0° 424.0 420.0 422.0	1stmas- 416.0	day.   420   420   420   422   422   416	4) 0 ^a 4	10034.7 10179.1 10141.1 10138.0 10164.7 8911.6	$\begin{array}{r} 418^{\circ}11\\ 424^{\circ}13\\ 422^{\circ}55\\ 422^{\circ}42\\ 423^{\circ}53\\ 424^{\circ}42\end{array}$	}	421 26	
		10057·3 419·05	10065.7	10046.9		10132.0				10125 - 2	10108	3.7 2	41887.1		-		
-				418.62	419.44	422.17	419.10	421.12	418.75	421.88	421.2	20 1	0078 61	419.94			
	2.74	3.76	4.11	3.33	4.12	6.88	· \$`81	5.83	3.46	é·59	5.8	1	-	4.65			
	• F11	ueen mi	inntog l	ato		L 17										· · ·	

Fifteen minutes late.
 ^k Five minutes late.
 ^k Not included in the mean, the day being incomplete.
 Increasing numbers denote a movement of the north end of the magnet towards the East.

# LAKE ATHABASCA—continued.

Abstract of Hourly Observations made during the months of January and February 1844.

1	1			vacions				utils of	Janua	ry and	rebru	ary 184	14.
Date. Gött.					De	clinatio	n Magn	etometo	ər.				
Mean Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1	-	-	-	-	_	_	-	-	-		_		
2 ^b 3	429°1 424°8		443.0				422.0						424.2
4	425.2	424 9	426.6	d 426.4	423.0	431.2	427.5	422.0	424.8	426.0	$424^{2}$	422.4	420.0
5	449°3 452°0		426.0		424.2	432.0	420.0	426.0		422.6	3 420.0	)   419.0	424.6
6 7 8	1	1	1		t Fort (	Dhipewy	an.	1	1	417.4	422.0	428.0	418.4
1 8 1 95	432.0 429.2	428.3	426*8 433*0	426.0			429.0	422.0	414.2	416.0	408.0		
10	428.0	429.0	430.0	429.0	1 430.0	430.4	435.6	425.0	420.2	416.0	1 412.8	428.0	416·0 407·2
11 12	425.1	428.0		434·2 420·0	432.2	436.0	436 °0 431 °6	429.8	430.0	422.0	422.0	420.0	424 0
13	423.6	428.0		432.2	433.0	431.2	430 2	428.0	424.8	422.2	424.2		
14 15	431.6	434.0	428.0	429 0	t Fort (   429 0	Thipewy 429.5		424.0	419.8	1 -	- 1	- 1	1
16	421.0	427.5	426.2	426.7	427.0	[ 426.4	424.8	421.8	433.0	432.0			419.0
17	435.0	430.8		438.0	435.5	432.0	431.0	430.2	426.0	1 419 8	419'4	424.0	424 0
19	427.4	423.8	429.0	432.6	430.0	430.0	423.8	426.0	424.0	425.3	427.2	424.0	427.0
20 21	434.0	430.0	427.0	429.1	426 • 0 t Fort (	426'4	430.0	425.2		417.4			427.8
. 22	428.8	428.4	430.8	444.0	1 444 2	436 0	1 416.5	412.0		424.5	123.6	424.4	426.0
123 1 23 22 25 22 25 26 26 26 26 26 26 26 26 26 26 26 26 26	430.0 434.0	434.0	432.0	435.0	435°0 428°0	434·8 432·4		427.0	421.0	420.4	421.0	430.0	432.0
A {21 E {25	484.2	551.0	484.0	454.0	441.0	427.0	423.0	424 2	421 0			428.4	430.0
5 26 E 27b	421°4	423.0 427.0	426.0	426.8	429.8	436.2		426.0	423.0	420.0	421.4	430.0	423.2
28 ^b 29	432.4	) -	- 1	A	t Fort (	hipewy	an.	1 -	1	1 -	1	424.0	419.6
29 30	426.0	434.0	423.0	424.2	434.4	424.6	420.0	418.0	416.5		413.0	423·0 420·2	420.0
31	432.0	432.2	431.0	430.0	428.0	425.0	424.8	425.8	421.6		410.0	420 2	420.8
Sums -	9954-3	10056.7	9893.8	9896'5	9896.6	9900.5	9834.4	J778·9	9716.9	9670.7	9669.2	9722.0	9711.5
Means -	432.80	437.25	430.17	430.27	430'29	430.46	427.58	125.17	422.47	420.47	420.40	422.70	422.24
Diurnal Variation	}12.40	16.85	9.77	9.87	<b>9</b> ∙89	10.06	7.18	4.77	2.07	ó·07	6.0	2:30	í.84
1	430.2	476.0	462.8	111.0	432.2	437.0	424.0		1 11011	1	1	1	1
23	424.0	426.0	421.2	444*8 434*0	439.0	435.8	425.0	411.4	412.4	425.5	412.4	414·8 418·5	412.2
3 4	422.8	425.2	426.0	425.7	425.2	428.0	426.0	418.6	424.4	412.4	416.8	476.3	418.0
5	399.1	436.0	430.0	419.6	420.0	436.0	420.0	425.4	411.0	420.3	410.8	413.5	416.0
6 7	434.0 420.2	425·8 432·8	436.0. 439.0	$428.0 \\ 437.2$	424.8	437.8	428.0	421.0	416.0 423.7	414.4	413.6	426.0	417.8
8	450.6	445.2ª 428.6	449.2	1 436.0	446.2	448.4	414.2	405.6	415'8	418.0	410.2	414'6 416'0	416·2 418·8
9 10	424 2	428.6	426.0	422.0 421.0	426.0	424.0	425.2	$420.6 \\ 428.0$	418.8	419.8	421.2	424.4	423.0
11	434.0	433.0		- 1	1 -		- 1	- 1	- 1	-	1	417.8	422.0
12 13	430.2	434 4	430.4 430.6	431.0 428.2	426.0	430.6	429.0	424.6	420.3	425 0 418 8	422.0	426.0	428.0 428.0
14 15	427 · 9 428 · 8	426.0 436.0	428.0 419.6	425.8	428.0	431.0 429.8	430.3	424.0	424.7	424.8	424.0	421.5	422.0
16	425.0	425.4	429.6	428.0	428.0	429.6	423.6	422.8 436.0	424.0 418.0	421.6 416.1	414.0	414.2	415°2 416°2
17 18	432.0	430.0	430.2	427.1	424.8	423.4	419.2	416.0	419.0	419.0	417.8	418.0	416.0
19	431.4	436.4	434.0	434.0	432.0	429.2	427.6	422.4	422.4	422.0	424.0	422.0	426.0
20 21	422.4	426.0	426°6 436°8	426°2 438°6	426.0	429.8	424.0 424.2	424.6 419.6	420.0	422.0	416.6	418.2	420.2
	423.2	425.0	430.4	428.2	431.7	435.2	432.8	430.0	424.0	415.7	412.4	420.2	423 · 8 423 · 4
a 22		4.3 ** - **		430.4	424.6	412.8	424.3	422.2	420.6	419.7 425.8	422.0	422.4	424.0
far 22 G 1 23 H 24	426.0	427.8	434.2	432.0		423.0					1 474 1		
22 22 23 24 25 24 25 25 25 25 25 25 25 25 25 25 25 25 25	$426.0 \\ 433.8 \\$	425.0	434.2	432.0	434.2	423.0	430.4	422.8	428.2	- 1	1	426.0	420 4
Q 11.20 11.20 26 27	$ \begin{array}{r} 426.0 \\ 433.8 \\ \\ 432.0 \\ 432.8 \\ \end{array} $	425.0 430.4 435.4	434.2 	432.0 444.0 430.0	434.2	424.2	426.2	425.0	422.4	420.4	419.0	422.4	422.2
27 28	$\begin{array}{r} 426.0 \\ 433.8 \\ \\ 432.0 \\ 432.8 \\ 432.4 \end{array}$	425.0 430.4 435.4 428.3	434.2 434.0 432.6 437.0	432.0 444.0 430.0 429.0	434.2 434.0 425.2 430.0	$424 \cdot 2$ $431 \cdot 0$ $430 \cdot 8$	426·2 430·8 434·0	425.0 423.0 437.7	422.4 424.8 428.4	420·4 424·0 404·0	$\begin{array}{c} \\ 419.0 \\ 426.0 \\ 420.0 \end{array}$	422·4 423·0 409·0	422.2 421.8 417.8
27 28 29	420.0 433.8  432.0 432.8 432.4 437.0 ^a	$\begin{array}{r} 425.0 \\ 430.4 \\ 435.4^{n} \\ 428.3 \\ 428.2^{a} \end{array}$	434.2 434.0 432.6 437.0 430.0f	432.0 444.0 430.0 429.0 438.0	434.2 434.0 425.2 430.0 427.2	424.2 431.0 430.8 432.3	426°2 430°8 434°0 431°0	425.0	422·4 424·8	420·4 424·0	419·0 426·0	422·4 423·0	422·2 421·8
27 28 29 Sums -	426.0 433.8 	$\begin{array}{r} 425.0 \\$	434.2 434.0 432.6 437.0 430.0f 10383.7	$ \begin{array}{r}     432.0 \\     444.0 \\     430.0 \\     429.0 \\     438.0 \\     \overline{10355.4} \end{array} $	434.2 434.0 425.2 430.0	$424 \cdot 2$ $431 \cdot 0$ $430 \cdot 8$	426°2 430°8 434°0 431°0	$\begin{array}{r}$	422.4 424.8 428.4 420.8	420·4 424·0 404·0	419°0 426°0 420°0 422°6	422·4 423·0 409·0 422·4	422 • 2 421 • 8 417 • 8 422 • 0
27 28 29	420.0 433.8  432.0 432.8 432.4 437.0 ^a	$\begin{array}{r} 425.0 \\ 430.4 \\ 435.4^{n} \\ 428.3 \\ 428.2^{a} \end{array}$	434.2 434.0 432.6 437.0 430.0f	432.0 444.0 430.0 429.0 438.0	434.2 434.0 425.2 430.0 427.2	424.2 431.0 430.8 432.3	426°2 430°8 434°0 431°0	$\begin{array}{r}$	422.4 424.8 428.4 420.8	420·4 424·0 404·0 418·2	419°0 426°0 420°0 422°6	422·4 423·0 409·0 422·4	422 • 2 421 • 8 417 • 8 417 • 8 422 • 0
27 28 29 Sums -	426.0 433.8 	$\begin{array}{r} 425.0 \\$	434.2 434.0 432.6 437.0 430.0f 10383.7	$ \begin{array}{r}     432.0 \\     444.0 \\     430.0 \\     429.0 \\     438.0 \\     \overline{10355.4} \end{array} $	434.2 434.0 425.2 430.0 427.2 10317.3	$\begin{array}{r} & 424 \cdot 2 \\ 431 \cdot 0 \\ 430 \cdot 8 \\ 432 \cdot 3 \\ \hline 10328 \cdot 8 \end{array}$	$\begin{array}{r} 426 \cdot 2 \\ 430 \cdot 8 \\ 434 \cdot 0 \\ 431 \cdot 0 \\ \hline 10227 \cdot 1 \end{array}$	425.0 423.0 437.7 413.0 10099.5	422.4 424.8 428.4 420.8 10094.5	$\begin{array}{r} 420 \cdot 4 \\ 424 \cdot 0 \\ 404 \cdot 0 \\ 418 \cdot 2 \\ \hline 10062 \cdot 5 \end{array}$	419.0 426.0 420.0 422.6 10019.5	422·4 423·0 409·0 422·4 10056·5	422.2 421.8 417.8 422.0 10101.0

Visible aurora.
 ^b Days omitted from the Mean, not being complete.
 ^c Seven minutes late.
 ^c At 21^h 30^m 418^o0.
 ^c Seven minutes late.
 ^c At 21^h 30^m 418^o0.
 ^c Ten minutes late.

### MAGNETICAL OBSERVATIONS.

### LAKE ATHABASCA-continued.

# Abstract of Hourly Observations made during the months of January and February 1844.

									netome			y and rea		
	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Means.
	$\begin{array}{c} & & & & & & & & & & & & & & & & & & &$	420 · 2 416 · 0 423 · 0 425 · 0 424 · 0 423 · 3 429 · 0 423 · 3 429 · 2 424 · 0 423 · 3 426 · 2 424 · 0 423 · 3 421 · 3 421 · 3 421 · 3 421 · 3 421 · 3 421 · 3 421 · 3 421 · 3 421 · 3 421 · 3 421 · 3 423 · 0 423 ·	$\begin{array}{c} - \\ 427 \cdot 0 \\ 426 \cdot 2 \\ 423 \cdot 0 \\ 428 \cdot 2 \\ 423 \cdot 0 \\ 423 \cdot 0 \\ 424 \cdot 6 \\ 424 \cdot 6 \\ 424 \cdot 6 \\ 421 \cdot 8 \\ 426 \cdot 0 \\ 424 \cdot 0 \\ 425 \cdot 5 \\ 424 \cdot 0 \\ 424 \cdot 0 \\ 424 \cdot 0 \\ 424 \cdot 0 \\ 424 \cdot 0 \\ 424 \cdot 0 \\ 424 \cdot 1^{a} \\ 426 \cdot 0 \\ 426 \cdot 1^{a} \\ 426 \cdot 0 \\ 420 \cdot 4 \\ 426 \cdot 0 \\ 420 \cdot 4 \\ 426 \cdot 0 \\ 420 \cdot 0 \\ 421 \cdot 8 \\ 417 \cdot 0 \\ 420 \cdot 0 \\ 421 \cdot 8 \\ 417 \cdot 0 \\ 420 \cdot 0 \\ 421 \cdot 8 \\ 417 \cdot 0 \\ 420 \cdot 0 \\ 424 \cdot 0 \\ 9773 \cdot 4 \\ \end{array}$	422:4 422:6 420:0 428:0 428:0 438:0 436:4 421:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 422:0 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	422.96	124.29	124.93	425.10	125.49	423.84	427.31	422.23	425.78	428.48	427.50	10230.18	426.26	
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	$\begin{array}{c} 415\cdot4\\ 418\cdot0\\ 414\cdot0\\ 414\cdot0\\ 414\cdot2\\ 423\cdot8\\ 419\cdot7\\ 421\cdot6\\ 422\cdot8\\ 422\cdot6\\ 422\cdot3\\ 426\cdot0\\ 419\cdot9\\ 419\cdot6\\ 414\cdot6\\ 424\cdot3\\ 426\cdot6\\ 419\cdot9\\ 419\cdot6\\ 414\cdot6\\ 424\cdot3\\ 422\cdot6\\ 422\cdot3\\ 422\cdot0\\ 422\cdot6\\ 422\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 423\cdot6\\ 423\cdot6\\ 423\cdot5\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 423\cdot5\\ 423\cdot6\\ 423\cdot5\\ 42$	$\begin{array}{c} 420\cdot8\\ 420\cdot0\\ 426\cdot0\\ 426\cdot0\\ 422\cdot0\\ 422\cdot2\\ 422\cdot2\\ 422\cdot2\\ 422\cdot2\\ 422\cdot2\\ 422\cdot30\\ 415\cdot2\\ 41$	$\begin{array}{c} 417.8\\ 424.0\\ 423.2\\ 423.0\\ 423.0\\ 423.0\\ 423.0\\ 423.0\\ 423.0\\ 423.0\\ 422.0\\ 422.0\\ 422.0\\ 422.0\\ 422.0\\ 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422\cdot45\end{array}$	$\begin{array}{c} 444\cdot 0^{n}\\ 420\cdot 0\\ 424\cdot 0\\ 424\cdot 0\\ 422\cdot 2\\ 423\cdot 0\\ 422\cdot 0\\ 422\cdot 0\\ 422\cdot 0\\ 420\cdot 0\\ 420\cdot 0\\ 420\cdot 0\\ 420\cdot 0\\ 420\cdot 0\\ 420\cdot 4\\ 426\cdot 7\\ 426\cdot 2\\ 426\cdot 7\\ 426$	$\begin{array}{c} 412 \cdot 0 \\ 512 \cdot 420 \cdot 4 \\ 420 \cdot 4 \\ 420 \cdot 4 \\ 420 \cdot 0 \\ 421 \cdot 3 \\ 422 \cdot 0 \\ 417 \cdot 9 \\ 451 \cdot 5 \\ 422 \cdot 0 \\ 414 \cdot 2^3 \cdot 8 \\ 413 \cdot 2 \\ 435 \cdot 2 \\ 413 \cdot 2 \\ 413 \cdot 2 \\ 413 \cdot 2 \\ 410 \cdot 0^a \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 0 \\ 428 \cdot 2 \\ 428 \cdot 0 \\ 428 \cdot 4 \\ 10148 \cdot 5 \\ 422 \cdot 85 \\ 122 \cdot 85 \end{array}$	417.0 421.2 396.0 418.6 417.5 418.6 417.4 430.6 430.2n 430.2n 423.0 410.5 422.0n 423.6a 420.61 423.6a 420.61 423.6a 423.6a 423.6a 424.0 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æ .	3.90	4.82	5.27	5.14	4.76	4.97	7.08	5:37	4.92	5.36	8.75		<u>6.76</u>	
	1		l	1	۱ <u></u>	1	<u> </u>	<u> </u>	1		L		L	1

^m Twelve minutes late. ⁿ Three minutes late. ^o Twenty minutes late. Increasing numbers denote a movement of the north end of the magnet towards the East.

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# LAKE ATHABASCA-continued.

Abstract of Hourly Observations made during the months of January and February 1844.

Date.				Secon	d Doelir	nation N	 Iscrieto	meter 9				, 		T
Gött. Mean	Second Declination Magnetometer, 2-inch bar.           Noon.         1.         2.         3.         4.         5.         6.         7.         8.         9.         10.         11.         12.													
Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
1 25 3 4 5 6 7	216°6 222°0 220°3 252°5 259°4	217 °0 219 °6 ° 220 °0 300 °0 243 °4	241 '8 220 °6 221 °0" 219 °8 231 °5	$\begin{array}{r}$	230°0 219°6 218°6 218°8 218°8 232°0	221.0 220.6 224.2 223.8 226.0	216.0 218.0 220.0 215.8 220.4	212.0 219.6 216.0 219.6 219.6 222.2	208·2 219·0 216·5 219·0 219·0 219·6	208.0 217.2 213.6 216.0 212.0	209·4 218·4 216·5 218·0 213·0	211.0 216.0 210.0 217.0 222.0	216.6 220.0 204.0 218.6 213.2	
8 9 ^b 10 11 12 13	224.0 229.0 227.0 225.0 228.4 230.7	$\begin{array}{r} 223.4\\ 228.0\\ 226.0\\ 230.8\\ 229.0\\ 234.4 \end{array}$	222.0 228.0 228.0 232.0 232.0 232.8	221.8 222.8 226.4 236.0 228.4 234.8	220.0 226.0 235.5 230.0 238.3	219·3 217·0 226·0 238·0 236·0 237·0	$\begin{array}{c} 224.0 \\ 223.0 \\ 229.0 \\ 236.0 \\ 241.0 \\ 236.0 \end{array}$	215.0 213.6 226.5 232.0 238.0 232.0	213.0 210.0 222.5 229.1 229.6 226.4	$\begin{array}{c} 214.0 \\ 209.6 \\ 218.2 \\ 222.8 \\ 225.4 \\ 225.2 \end{array}$	$\begin{array}{c} 212.6\\ 207.4\\ 214.5\\ 222.4\\ 223.5\\ 225.0\\ \end{array}$	$\begin{array}{c} 216.4 \\ 218.0 \\ 200.0 \\ 222.3 \\ 224.2 \\ 226.0 \end{array}$	218.4217.5208.0222.2226.4227.0	
14 15 16 17 18 19 20 21	228.4 236.1ª 24.8 234.2 234.2 232.0ª	232.0 235.0 ^a 236.8 232.4 233.0 231.5 ^a	$\begin{array}{c} 232 \cdot 5 \\ 236 \cdot 2 \\ 242 \cdot 2 \\ 234 \cdot 7 \\ 233 \cdot 2 \\ 232 \cdot 0 \end{array}$	$\begin{array}{c} 233 \cdot 0 \\ 235 \cdot 8 \\ 238 \cdot 0 \\ 240 \cdot 0 \\ 234 \cdot 0 \\ 231 \cdot 0 \end{array}$	$\begin{array}{c} 234 \cdot 2 \\ 235 \cdot 7 \\ 238 \cdot 2 \\ 242 \cdot 1 \\ 237 \cdot 0 \\ 230 \cdot 4 \end{array}$	$\begin{array}{c} 237.5 \\ 284.4 \\ 236.4 \\ 250.0 \\ 234.5 \\ 230.0 \end{array}$	238.2 233.0 238.0 228.0 230.8 230.8 230.0	229°2 235°2 234°2 228°4 226°0 229°8	224.8 234.0 231.2 230.0 228.0 226.8	$\begin{array}{r} 224 \cdot 3 \\ 232 \cdot 0 \\ 226 \cdot 4 \\ 228 \cdot 0 \\ 227 \cdot 4 \\ 227 \cdot 0 \end{array}$	225.0 230.0 224.2 231.4 226.0 226.8	229.0 230.0 237.0 233.0 232.0 232.0 229.2	229 8 228 0 228 6 232 4 230 0 230 0	
22 23 24 25 26 27 ^b 28	230.0 230.0 232.0 310.0 ^a 225.4 	229.6 236.0 229.0 368.0 227.0 233.2°	226°0 236°4 231°0 300°0 228°0 232°0	$\begin{array}{c} 241 \cdot 4 \\ 235 \cdot 0 \\ 230 \cdot 6 \\ 254 \cdot 4 \\ 229 \cdot 2 \\ 230 \cdot 4 \end{array}$	241.4 232.2 233.0 238.0 230.0 230.0	234'0 233'0 232'0 232'7 234'0 229'4	$\begin{array}{c} 211.0 \\ 234.0 \\ 228.2 \\ 230.0 \\ 231.2 \\ 230.4 \end{array}$	210.0 226.0 223.8 228.2 227.7 231.0	214·5 224·4 220·2 226·0 227·2 226·0	227.8 222.8 220.0 222.6 227.2 225.2	230°0 220°0 220°4 226°4 226°4 226°0 227°8	230.0 226.0 224.8 228.0 227.0 232.4	232.0 228.4 233.0 230.0 228.0 228.0 228.0	
	242.4 232.0 241.0 ^a	238·2 236·0 241·4	232.0 235.2 236.0	234·2 234·4 236·0	235.0 239.3 235.8	236·4 240·8 222·0	$232.0 \\ 234.6 \\ 230.2$	$231.8 \\ 233.0 \\ 230.0 \\ 0$	228·2 232·0 227·0	222.6 232.0 222.0	223·2 232·0 222·4	227.5 232.4 230.0	$230.0 \\ 233.2 \\ 226.0$	
Sums -	5441.8	5532.5	5376.1	5346.0	5341.1	5338.6	5269.4	5214.2	5169.0	5126.5	5126.7	5165.8	5177 2	
Means -	236.60	240.54	233.74	232.43	232.22	232.11	229.10	226.70	224.74	222.89	222.90	224.60	225.10	
Diurnal Variation	}13 [:] 71	17.65	10.85	9.54	9 [:] 33	9.22	6.21	3.81	1.85	0.0	0.01	1.71	2.21	
1 2 3 4	245'0 231'6 234'4	802'1 237'8 240'8	260°8 232°0 239°0	250°4 243°5 238°2	249°6 248°0 236°0	250.0 249.6 240.4	229.6 238.2 231.0	220.0 179.8 226.0	$222 \cdot 4$ 218 \cdot 4 229 \cdot 0	230.0 224.2 219.0	220·4 226·0 222·8	222.0 226.0 226.0	$222.6 \\ 234.2 \\ 228.2$	
5 6 7 8 9 10 11	218°0 267°4 250°8 250°0 250°0 253°4	262.0 248.0 256.2 272.2 ^a 252.0 256.0	$\begin{array}{c} 252.0\\ 264.2\\ 258.2\\ 268.0\\ 250.8\\ 250.8\\ 253.2\end{array}$	$\begin{array}{c} 272.0 \\ 253.2 \\ 257.0 \\ 263.0 \\ 240.4 \\ 250.0 \end{array}$	243.0 250.0 260.0 270.2 252.2 252.2	$\begin{array}{c} 258.0 \\ 258.4 \\ 259.4 \\ 270.0 \\ 250.8 \\ 254.8 \end{array}$	$\begin{array}{c} 242.0 \\ 251.0 \\ 250.6 \\ 242.4 \\ 252.2 \\ 254.0 \end{array}$	246.0 243.4 242.2 236.0 246.0 250.4	230.0 242.4 252.8 242.0 244.0 244.0 248.2	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	232·2 239·8 230·8 210·6 248·2 242·2	233 · 2 238 · 0 238 · 4 244 · 7 250 · 2 242 · 8	234.8 242.8 228.2 246.0 250.4 243.9	
$ \begin{array}{c c} 11 \\ 12 \\ 13 \\ 14 \\ -15 \\ 16 \\ 17 \\ 18 \\ \end{array} $	244.0 247.8 244.4 256.0 248.6 259.0	$\begin{array}{c} 238 \cdot 8 \\ 252 \cdot 2 \\ 246 \cdot 0 \\ 261 \cdot 5 \\ 248 \cdot 6 \\ 256 \cdot 8 \end{array}$	$\begin{array}{c} 232 \cdot 0 \\ 250 \cdot 2 \\ 243 \cdot 6 \\ 244 \cdot 2 \\ 253 \cdot 8 \\ 256 \cdot 0 \end{array}$	$\begin{array}{c} 244.8 \\ 248.0 \\ 245.6 \\ 246.2 \\ 252.4 \\ 253.2 \end{array}$	$\begin{array}{c} 241.8 \\ 249.8 \\ 246.0 \\ 252.8 \\ 250.8 \\ 252.0 \end{array}$	$\begin{array}{c} 247 {}^{\circ}0\\ 247 {}^{\circ}4\\ 246 {}^{\circ}0\\ 250 {}^{\circ}8\\ 246 {}^{\circ}2\\ 243 {}^{\circ}2\\ 243 {}^{\circ}2\end{array}$	$\begin{array}{r} 246 \cdot 2 \\ 247 \cdot 0 \\ 245 \cdot 4 \\ 242 \cdot 8 \\ 244 \cdot 6 \\ 243 \cdot 8 \end{array}$	$\begin{array}{c} 240.6 \\ 242.2 \\ 240.6 \\ 241.8 \\ 254.0 \\ 240.4 \end{array}$	$\begin{array}{c} 236^{\circ}0\\ 238^{\circ}8\\ 242^{\circ}0\\ 239^{\circ}8\\ 245^{\circ}4\\ 243^{\circ}0\end{array}$	$\begin{array}{c} 241 \cdot 0 \\ 238 \cdot 8 \\ 239 \cdot 6 \\ 240 \cdot 4 \\ 243 \cdot 8 \\ 241 \cdot 8 \end{array}$	$\begin{array}{c} 238.8 \\ 236.9 \\ 240.0 \\ 234.6 \\ 240.2 \\ 241.2 \end{array}$	$\begin{array}{c} 240.4 \\ 240.8 \\ 241.0 \\ 234.4 \\ 240.6 \\ 241.8 \end{array}$	240.8 242.0 244.0 236.0 245.0 239.6	
$     \begin{array}{c}       19 \\       20 \\       21 \\       22 \\       23 \\       24 \\       25 \\     \end{array} $	$\begin{array}{c} 251 \cdot 2 \\ 244 \cdot 6 \\ 248 \cdot 4 \\ 238 \cdot 0 \\ 245 \cdot 0 \\ 245 \cdot 0 \\ 245 \cdot 0 \end{array}$	$\begin{array}{c} 256.4\\ 246.0\\ 256.0\\ 244.0\\ 244.0\\ 246.0\\ 245.6\end{array}$	252·2 246·6 256·8 248·2 * 248·5 246·2	$\begin{array}{c} 252.4\\ 247.1\\ 251.2\\ 245.8\\ 251.4\\ 247.0\\ 247.0\\ \end{array}$	$\begin{array}{c} 250.8 \\ 248.0 \\ 250.8 \\ 247.4 \\ 242.2 \\ 247.1 \end{array}$	$\begin{array}{c} 250{}^{\circ}0\\ 247{}^{\circ}2\\ 217{}^{\circ}6\\ 250{}^{\circ}4\\ 246{}^{\circ}8\\ 242{}^{\circ}4\end{array}$	247 · 2 242 · 8 243 · 8 248 · 2 244 · 4 241 · 0	$\begin{array}{c} 243 \cdot 0 \\ 238 \cdot 4 \\ 238 \cdot 4 \\ 244 \cdot 0 \\ 241 \cdot 8 \\ 234 \cdot 0 \end{array}$	$\begin{array}{c} 242.8\\ 238.0\\ 233.8\\ 237.0\\ 242.0\\ 235.5\end{array}$	$\begin{array}{c} 242.0\\ 239.4\\ 232.0\\ 230.0\\ 240.7\\ 236.0\end{array}$	213.8 235.8 229.2 230.6 239.6 239.6 237.2	243.8 239.5 233.0 234.3 240.4 239.4	$\begin{array}{c} 244.6\\ 241.2\\ 234.0\\ 240.2\\ 240.2\\ 240.6\\ 240.0\end{array}$	
26 26 27 28	$246.0 \\ 252.6 \\ 240.0$	240.2 251.6ª 218.8	$253.8 \\ 249.4 \\ 244.5$	258°0 246°3 223°5	$250.2 \\ 246.0 \\ 248.0$	$242.0 \\ 248.4 \\ 252.0$	$242.0 \\ 243.8 \\ 250.4$	241.6 240.8 257.7	242.0 240.8 240.4	$235 \cdot 9$ $238 \cdot 8$ $217 \cdot 6$	235.0 238.2 236.0	240.0 239.8 220.0	243.0 240.0 230.0	
Sums -	5947.2	6029.6	6013.3	5980.6	5984.9	5998.8	5864.4	5729.1	5726.5	5692.8	5630.1	5690.5	5732.1	
Means -	247.80	251.23	250.55	249.19	249.37	249.95	244.35	238.71	238.60	237.20	234.59	237.10	238.84	
Diurnal Variation	}13 [:] 21	16 ^{'.} 64	15 ^{'.} 96	14.60	14.78	15 ¹ 36	9.76	4.12	4.01	2.61	0.0	2.51	4.25	
a Visible a	mora.			^b These	days ar	e omitte	ed from	the Me	ans, not	being c	omplete			

ⁿ Visible aurora.
^c Seven minutes late.
ⁱ Seventeen minutes late.

e days are omitted from the Means, not being complete. ^d Fifteen minutes late. ^e At 21^h 32^m 218 °0. ^b Nine minutes late. ^h Nine minutes late.

MAGNETICAL OBSERVATIONS.

AKE	ATHABASCA—continued.	
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months of January and February 1844.

<u>A</u>	bstract	of Ho	urly O			ade du					y ar	la rec	oruary 1	044.	
13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	51	ums.	Means.	Fort Me	nightly ans.
216.8	=	221.6	221.0	217, 0	220.8	220.0	223·0 217·8	217·2 218·0 220·0	214.0 220.0 222.0	214·4 219·2 221·4	5	250'1	218·55 218·75	]	
208.4 218.0 222.2	214·2 212·0 220·0 220·0	220.0 220.0 230.0	217'0 226'0 234'5	236'0 221'0 218'5	216.0 216.0 219.8	240.0 240.0 218.0	209.4 223.0 195.0ª	184`0 223`2 219`5 228`0	252.0 218.0 226.0 228.4	274.0 211.0 228.0 226.2	5 } 5	266°2 389°7 380°7 5312°3	219.42 224.57 224.20 224.85		24.46
218·0 220·0 220·0 229·6	221.8 216.4 225.2 214.0 232.2	225·8 226·4 228·8 232·0	230.4ª 226.0 228.4 232.4	225 · 6 * 227 · 2	218.0 224.4 214.2 228.0 233.0 228.4	$\begin{array}{c} 222 \cdot 4 \\ 224 \cdot 2 \\ 244 \cdot 2 \\ 230 \cdot 0 \\ 259 \cdot 0 \\ 228 \cdot 7 \end{array}$	246.0 ^a 224.0 230.4 234.2 232.8 230.2	226·2 227·0 234·2	223 4 224.0 226.0 232.6 230.4	$222 \cdot 2$ $226 \cdot 4$ $226 \cdot 0$		5376·3 5479·1 5566·7 5538·1	221.42 224.01 228.30 231.95 230.75		
228.2 228.5 231.0 228.4 232.6	230.0 230.0 230.0 233.2 236.0	232.0 229.5 230.0 233.5 236.0	232·0 234·0 234·0 236·0	232·6 231·0 234·0 235·0	230·2 230·0 234·0 239·0*	232·0 230·8 232·2 235·0	$232 \cdot 2$ $228 \cdot 2^{n}$ $222 \cdot 4$ $232 \cdot 0^{n}$	230.2 222.4 232.0 223.0 223.0 225.0	231.8 230.0 231.2	235.2 234.0 230.4 230.0		5526.5 5578.2 5581.1 5612.4 5546.6	$\begin{array}{c} 230 \cdot 27 \\ 232 \cdot 42 \\ 232 \cdot 55 \\ 233 \cdot 85 \\ 331 \cdot 11 \end{array}$		
226.0 230.0 229.4 229.0	224.1 229.8 230.0 230.8 224.8	220.0* 230.0 227.3 230.0	229.6ª 200.0 226.2 231.0 233.0ª	227.8 ⁿ 228.0 230.0 ^g 230.0 218.0 ⁿ	230.0 ^a 229.0 229.0 232.0 219.4 ^a	$230.6^{\circ}$ $226.0^{\circ}$ $222.0$ $232.0$ $236.4$	234·4 ⁿ 229·0 ^a 228·4 ⁿ 223·0 246·6	230.8	228.4 206.0 231.2 300.0	a 228.0 a 212.0 233.8 a 233.4	a 3	5500.7 5414.0 5517.8 5605.2	229°20 225°58 229°91 233°55		, 231 · 84
228'4 226'4 227'0 229'0 229'0	224.8 228.0 230.5 228.0 232.4	225.0 227.3 235.0 229.2 233.0	$233.0^{\circ}$ 226.4 227.4 227.4 $233.0^{\circ}$	218°0" 226°0 240°0" 230°0 232°8	234.4 230.0 231.0 230.0	237.0 232.0 226.0 232.4	225·2 230·0 231·0 230·0	225.2 229.0 234.4 234.0	228. 219.5 236. 234.	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	а }	5801.4 5510.3 			
229 0 233 · 2 232 · 2 5195 · 7		232.8 231.5 5246.9	231 · 2 232 · 2	$233 \cdot 2$ $228 \cdot 0$	230.0ª 230.0ª 5217.4	229·2 226·0 5309·2	224.6 204.0 5178.8	236.0 217.0 5236.9	230	0 236.0	<u>  -</u>	5611.0 5498.7 26432.0	229.11		
225.90	226.77	228.13			226.84	230.83	225.17	227.69	231.9	9 231.2	5	5497 ° 02	229.04		
<u>ś</u> ·01	3.88	5.24	<u>6.80</u>	6.22	3.92	7.94	2.28	4.80	9.1	0 8.3	•	 \	6.1		بىدى. بىدىيە بېرىمىدى
226·4 219·8 216·0	230°0 224°0 229°7	228·8 230·0 227·4	230°0 215°2 223°0	224.0m 230.0 230.9	226°0 216°4 230°0	258°0 227°0 231°0	n 228.3 216.4 231.0	220.0	3 230	0 232	8	5663 ( 5447 ( 5473 (	$3   226.9' \\ 228.0'$		
232.8 244.0 240.0 245.3 249.0	255°0 246°8 244°0 244°0 251°2	243.0 241.1 256.4 249.8	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	250°0 253°8 250°0 250°0	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	243.0 235.0 241.6 249.8 248.2	249.8	262 242 233 236 253	8 <i>£59</i> 0 244 2 246 6 252	$\begin{array}{c cccc} 6 & 248 \\ 0 & 246 \\ 4 & 251 \\ 0 & 250 \end{array}$	8	5871 ( 5925 ( 5920 ( 6022 ( 5966 (	$egin{array}{c c} 8 & 246 \cdot 9 \\ 3 & 246 \cdot 6 \\ 6 & 250 \cdot 9 \\ 6 & 248 \cdot 6 \end{array}$		240.4
247.0 242.0 240.2 242.6 242.0	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 243.0 \\ 240.4 \\ 245.0 \\ 242.4 \end{array}$	243.2	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	252.6 235.6 242.0 247.6 243.2	240°6 254°0 245°0	239.0 240.2 243.8 237.4	254   243   239   239   226   242	$egin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0ª 8 2 8	6033 5801 5836 5841 5850 5956	$\begin{array}{c c}7 & 241 \cdot 7 \\ 2 & 243 \cdot 1 \\ 0 & 243 \cdot 3 \end{array}$	4	
246.0 237.3 242.0 240.6 234.2	235 (	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	a 240.0 243.0 250.0 236.0	246.0 242.0 238.2	243 0 243 0 241 8 237 2	243.8 240.2 240.2 240.6 241.2	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	) – 244 0 236 0 236 0 242 4 241	$\begin{array}{c c} 8 & 246 \\ 6 & 242 \\ 0^a & 246 \\ 0^a & 246 \\ 0^a & 244 \\ \end{array}$	·4 249 ·2 240 ·8 248 ·2* 243	7 0 0 6 ⁿ	5900 5875 5829 5764	0 245 8 4 244 8 4 242 8 4 242 8	19	242*
240.0 241.0 240.0 240.0 241.0	240.0 240.4 240.0		242.6	242.0 239.0 245.2	242.8	3 244 ( 5 241 ( 3 246 (	$244 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 \cdot 241 $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0 240 2 240 8 240	- 246	•0 •4	5813 5844 5784 5859 5778	·9 243· ·9 241· ·7 244· ·8 240·	54 )4 15	
242.0	238.	3 240 ( ) 224 (		a 209.8	a 240.0	) 228.0	0 1 239.	0 a d254	·0ª 22	)'0a 248	<u>.</u> 0   -	5635 139694	4 234		
5733.4						_					-	5820	_	52	
238·89 4·30										·33 11				93	
k A( 1 Th	) , 0 ^h 20 ^m uree min 1	232 · 2. nutes la ncreasi	te. ag numb	, oers den		ght mir ° Ty			late. end of				ites late. is the Ea	st.	

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FORT SIMPSON.

Abstract of Hourly Observations made during the months of April and May 1844.

Date. Gött.					Decl	ination	Magnet	ometer.					
Mean Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1 2 3 4 5	896°0 346°0 354°6 899°6	354.0 353.0 344.0 368.0	382.4 358.0 352.2 368.0	308.0 361.4 360.0 368.4	362·4 377·2 450°0 368°0	376.0 371.0 <i>376.6</i> 351.0	871.7 371.6 382.0 362.0	348.0 364.0 378.0 360.8	352.0 348.4 346.0 361.0	343·5 847·0 345·0 353·0	334.0 330.9 341.6 348.6	342°0 330°0 338°8 346°0	$333.6 \\ 342.0 \\ 342.4 \\ 348.0$
6 7	353.4	358.8	354.0	354.0	361.5	363.0	363.0	352.0	854.0	375.0	352.0	339.8	342.0
8 9 10 11 12 13 14	353 · 2 357 · 1 374 · 8 363 · 1 364 · 7 368 · 4	357.0 395.8 374.0 372.2 390.8	358·4 361·5 370·8 380·0 5 376·8	358:4 362:0 397:8 372:0 372:4 376:0	359 ⁺ 8 362 ⁻ 8 370 ⁻ 8 374 ⁻ 6 377 ⁻ 0 377 ⁻ 0	$\begin{array}{r} 362 \cdot 8 \\ 365 \cdot 0 \\ 368 \cdot 0 \\ 374 \cdot 0 \\ 373 \cdot 0 \\ 378 \cdot 0 \end{array}$	356°0 364°8 368°0 371°0 364°0 376°8	$\begin{array}{r} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\$	346.0 358.0 358.0 365.0 368.0 368.0 371.2	354.0 352.5 351.5 363.0 362.0 369.0	347 ° 0 354 ° 0 355 ° 5 356 ° 0 360 ° 5 366 ° 0	349.0 353.0 354.0 358.2 361.5 366.6	$\begin{array}{r} 349.8\\ 355.2\\ 352.1\\ 362.0\\ 364.4\\ 366.0\end{array}$
14 15 16 17	380.8	342.0	458.0	421.0 388.0	388·2 398·0	385·0 405·5	382:0 389:0	380.4 378.4	374.0 378.0	368.0 373.2	364·0 372·6	362·0 369·5	366.2 366.0t
18 19 20	449°0 386°0 394°6	424.0 396.0 416.4	460'0 388'0 387'6 410'0	$400^{\circ}4$ $381^{\circ}0$ $392^{\circ}2$ $396^{\circ}2$	429'0 391'8 386'8 394'2	483.5 393.0 389.2 391.0	442'5 383'5 399'5 388'4	442.5 380.0 392.0 391.0	375.0 378.0 388.4 384.0	862.0 374.0 384.8 881.0	368.0 364.8 382.6 377.5	333 ° 0 374 ° 2 378 ° 4 374 ° 6	348·2 372·0 378·1 378·4
21 222 233 24 255 26 27 28 27 28	400.8 422.0 385.8 414.2 422.0 372.4	400.6 403.7 429.0 590.4	$\begin{array}{r}$	308.6 416.0 302.0 526.2 417.8	$\begin{array}{r}$	$\begin{array}{r}$	$\begin{array}{r}$	$\begin{array}{r}$	389 *8 378 *6 385 *8 368 *2 378 *0 394 *0	$\begin{array}{r}$	382.6 371.9 378.0 384.0 378.2 386.8	$\begin{array}{r}$	380·3 374·3 374·0 376·0 379·6 376·0
28 29 30	396°0 420°4	416°0 397°8	509°0 402°2	442°0 402°0	485·3 408·8	426.0 402.2	404.0 400.0	394°0 385°6	390·0 385·5	385.0 366.7	380.0 377.0	382.6 350.0	390·2 354·8
Means -	386.02	382.72	399.03	397.97	396.22	388.43	385.63	380.75	369.52	367.13	363:13	360.46	361.97
Diurnal Variation	} 25.26	22.20	38-57	37.51	35•76	27 • 97	25.17	20.29	9.08	6.67	2.67	0.0	1.21
1 2 3 4	406°4 397°2 398°0	392.8 395.8 405.2 400.0	$\begin{array}{r} 413.5 \\ 420.0 \\ 404.0 \\ 404.0 \end{array}$	$396.0 \\ 412.2 \\ 420.0 \\ 411.0$	410°0 403°6 458°0 409°2	407.0 418.0 444.0 411.8	415°0 407°5 408.4 409°0	404.0 392.0 406.0 408.0	$\begin{array}{c} 396.6 \\ 403.6 \\ 399.0 \\ 401.2 \end{array}$	$\begin{array}{c} 394.6 \\ 400.0 \\ 386.2 \\ 396.5 \end{array}$	356°0 390°0 387°5 392°0	386.0 300.0 386.0 386.0	384.0 384.0 390.0 386.7
5 6 7 8 9 10 11	408'8 415'8 408'4 404'0 397'8	419.6 400.0 	402.8 411.6 434.0 427.8 407.2 412.4	407'8 418'0 435'0 451'8 414'0 435'2	$\begin{array}{r} 425.4 \\ 421.6 \\ 429.6 \\ 459.0 \\ 421.4 \\ 420.0 \end{array}$	$\begin{array}{c} 426.0 \\ 420.0 \\ 439.0 \\ 443.2 \\ 434.0 \\ 417.0 \end{array}$	419.0 412.2 418.0 413.6 413.0 413.0 416.0	$\begin{array}{c} 402.0 \\ 417.0 \\ 412.2 \\ 402.0 \\ 408.0 \\ 412.2 \end{array}$	401.6 402.0 404.0 403.9 400.8 409.6	396.6 398.0 386.0 404.0 400.0 402.0	393·9 397·0 391·5 401·0 400·0 400·8	399.8 392.0 388.4 404.0 393.6 386.4	$\begin{array}{r}$
12 13 14 15 16 17 18 19	409.0 419.0 419.2 438.4 416.0 417.2	412.0 421.0 423.0 423.0 422.0 422.6	411.8 444.0 430.2 436.5 422.0 427.0	428.0 446.0 430.0 454.4 430.0 428.0	$\begin{array}{r} 421 \cdot 2 \\ 428 \cdot 0 \\ 438 \cdot 0 \\ 451 \cdot 0 \\ 430 \cdot 8 \\ 425 \cdot 8 \end{array}$	$\begin{array}{r} 418.0 \\ 430.0 \\ 438.8 \\ 433.2 \\ 426.0 \\ 432.0 \end{array}$	$\begin{array}{r} 412.0 \\ 426.0 \\ 425.0 \\ 425.0 \\ 431.0 \\ 420.8 \end{array}$	$\begin{array}{r} 408.0\\ 414.8\\ 420.0\\ 413.0\\ 426.0\\ 422.0\end{array}$	407.0 412.2 414.0 412.6 412.6 415.0 407.5	406.5 410.0 417.0 406.4 416.0 411.0	$\begin{array}{c} 400.0 \\ 410.0 \\ 413.6 \\ 411.4 \\ 409.0 \\ 412.5 \end{array}$	$\begin{array}{c} & & & & \\ 397.8 \\ 398.6 \\ 411.0 \\ 407.2 \\ 410.0 \\ 411.0 \\ 411.0 \end{array}$	401.6 407.5 413.0 409.3 406.0 410.9
Term Day.	424·8 419·0 445·0 439·2 Sco	422.0 426.0 496.0 496.0 440.0 484.0 torin-day	424.0 441.8 500.8 441.8 441.8 441.8 448.0 7 observa	426.0 441.0 466.0 437.8 432.0 tions.	430.0 437.0 414.6 465.0 432.2	429.0 436.0 457.0 452.8 442.4	430.0 434.2 436.0 415.8 444.0	428.0 430.0 426.0 436.0 427.0	424.0 428.0 417.6 426.2 417.0	419.0 404.2 406.0 415.2 423.0	418.0 413.0 402.8 414.2 421.8	412.0 408.0 403.0 411.8 414.2	408.0 405.9 306.2 410.2 416.0
E 27 28	1 =	=	=	=	1 =				=	=	=	=	=
29 30	=	=	=	=	=	=	=	=	=		=	=	=
<u>31</u>	414:01	415.14	421.88	427.86									
Sums - Diurnal	414.91 } 14.49	415.14	21.36	27.34	433.21 32.69	428.80	419.25	415.30	409.66 9.14	4.56	403.69	400.92	400.22 0.0
Variation Visible	e aurora			251 361.6			1 50m 43	1		t 0h 21m			1

### FORT SIMPSON.

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Abstract of Hourly Observations made during the months of April and May 1844.

		Abst	ract of	Hourly	Observ	rations	made	during	the m	onths o	of Apri	l and Ma	y 1844.	
			,			Decl	ination	Magne	tometer	·				D. 1.1.1.1
	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Mcans.
010101	39·8 44·2 46·2 333·8	332.0 340.4 844.2 341.2	335.8 334.1 343.6 344.2	330·2 338·2 359·2 346·4	334·2 ⁴ 344·1 ^a 329·2	326·2 ^a 361·4 ^a 352·1 ^a 341·8	345.6 351.4 345.2 ^a	329.0 362.8 ^a 350.2 340.4 342.8 ^a	324·2 354·4 ⁿ 349·6 343·1 ^a	322.0 337.5ª 356.4 850.0	330.4 442.1 360.2 350.2	8343.6 8505.3 8568.4 } 8467.9	347.65 354.30 357.02 352.83	353.09
	334.1 350.0 354.2 354.2 354.2 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 357.4 357.4 357.4 357.4 356.4 355.4 356.4 355.4 356.4 355.4 356.4 355.4 356.4 355.4 356.4 355.4 356.4 355.4 356.4 355.4 356.4 355.4 356.4 355.4 356.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 355.4 35	330.0           346.2           356.0           354.0           354.0           359.2           364.0           363.2           347.0           377.4           376.0           376.2           360.0           376.0           390.1           388.0           390.0           390.0	332·2           348·0           352·6           350·6           360·0           368·1           368·0           378·2           377·2           377·2           384·0           380·4           362·6           380·2           377·2           381·2           384·0           380·4           362·4           362·4           360·4           360·4           360·4           360·6	347.4 343.0 352.1 356.0 360.0 360.0 350.4 370.4 370.4 370.4 370.7 381.8 379.8 379.8 379.8 379.8 379.8 379.8 379.8 379.8 379.8 379.8 379.8 379.8 370.4 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 350.1 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370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7 370'7	342 8 350 0 359 4 ³ 356 0 356 0 356 0 356 0 356 0 356 0 356 0 356 0 354 0 374 0 374 0 354 0 359 6 ³ 359 6 ³	348:0 338:4 \$50:30 366:0 367:2 \$46:0 367:2 \$75:9 \$75:9 \$75:9 \$75:9 \$75:9 \$75:4 \$75:9 \$78:4 \$393:0 \$78:4 \$393:0 \$78:4 \$393:0 \$78:4 \$393:0 \$78:4 \$393:0 \$378:4 \$393:0 \$378:4 \$393:0 \$378:4 \$378:4 \$393:0 \$378:4 \$376:9 \$378:4 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 \$376:9 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    9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9355*3     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9663*6     9472*4     9472*4     9663*6     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*4     9472*</pre>	385.08 396.02b 392.59b 394.68 402.62	377.02
	361·51 1·05	362.03		<u>364·48</u> <u>4</u> ·02		365.61 5.15	366·44 5·98	367·18 6·72	371·96 11·50	<u>371.80</u> 11.40		-	373·85 13 ['] 39	
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400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 400 °2 40	404.0 397.8 397.8 397.3 397.0 397.2 397.0 395.2 395.2 399.5 308.2 404.0 399.5 400.2 412.0 412.4 417.0 412.4 417.0 412.4 417.0 412.6 412.6 412.8 412.8 410.2 412.6 412.8 412.8 410.2 412.6 412.8 412.8 412.8 410.2 412.6 412.8 412.8 410.2 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 412.6 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   3394*80         395*61           9         401*75           2         336*80           0         402*75           4         401*14           309*18         309*18           5         449*35           5         449*325           40*83         4417*22           417*82         417*82           417*7*22         417*82           9         417*82           4217*12         417*82           4217*12         417*82           421*17*12         417*82           9         417*62           9         417*00           10         210*01           5         410*01           7         300*70	410.64

^f Six minutes late. ^g Five minutes late. ^h Four minutes late. Increasing numbers denote a movement of the north end of the magnet towards the East. ١,

LAKE ATHABASCA. Abstract of Hourly Observations made during the month of October 1843.

5.4

Date. Gött.					Bi	filar Ma	rnetome	eter.						
Mean Time.	Noon.	1.	2.	8.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
1 2	-	_	-	_	-		-					-	=	
3	=	=	_		_	_		=	_	_	_		-	
4		-						- 1	- 1		- 1	- 1		
4 5 6 7 8	-	-									-		-	
6 7	_	_			_			_		=			=	
8		-									-	_		
9		-	-	-	-					- 1	-		-	
10 11	-	-	-				-	-		-	-	-	-	
11 12	_	_		-		_		_				_		
13		_								- 1	-	- 1		
14		_		-	-			-		- 1	- 1	-	-	
155				-		070.0	00710	075.0	005.0	00000	000.0	00410	007.0	
Term Day.	$\begin{array}{r} 77^{\cdot}6^{a} \\ 261^{\cdot}3^{a} \\ 231^{\cdot}7 \\ 268^{\cdot}7 \\ 225^{\cdot}6 \\ 272^{\cdot}3 \end{array}$	244.6ª 147.6ª 260.2 273.3 268.1	\$\$77*4 \$\$475*3 254*5 270*1 266*1 270*9	$\begin{array}{c} 234 \cdot 8\\ 261 \cdot 2\\ 259 \cdot 9\\ 265 \cdot 1\\ 260 \cdot 1\\ 268 \cdot 5\end{array}$	$\begin{array}{c} x78^{\circ}8 \\ 253^{\circ}1 \\ 261^{\circ}9 \\ 267^{\circ}1 \\ 265^{\circ}9 \\ 260^{\circ}3 \end{array}$	$\begin{array}{c} 273 \cdot 0 \\ 261 \cdot 8 \\ 263 \cdot 6 \\ 257 \cdot 4 \\ 260 \cdot 4 \\ 264 \cdot 6 \end{array}$	$\begin{array}{c} 287 \cdot 3 \\ 256 \cdot 9 \\ 262 \cdot 1 \\ 275 \cdot 3 \\ 258 \cdot 6 \\ 269 \cdot 8 \end{array}$	275.6 284.9 271.6 279.2 260.9 268.9	$\begin{array}{c} 285 \cdot 7 \\ 280 \cdot 1 \\ 260 \cdot 2 \\ 250 \cdot 7 \\ 257 \cdot 3 \\ 268 \cdot 9 \end{array}$	$\begin{array}{c} 283 \cdot 9 \\ 277 \cdot 1 \\ 278 \cdot 8 \\ 258 \cdot 4 \\ 262 \cdot 3 \\ 271 \cdot 9 \end{array}$	289·3 290·1 286·1 267·0 258·6 277·5	$\begin{array}{c} 284^{\cdot}3\\ 292^{\cdot}6\\ 275^{\cdot}2\\ 263^{\cdot}1\\ 252^{\cdot}1\\ 277^{\cdot}2 \end{array}$	287.6 285.8 273.6 276.9 267.2 273.8	
22 23 24 25 26 27 28 29	209°6 214°1 229°6 111°8ª 145°1 ³ 160°2	265.6 153.6 237.0 208.7ª 63.4ª 206.1	$\begin{array}{r}$	$\begin{array}{r} 255^{\circ}3\\ 223^{\circ}3\\ 221^{\circ}0\\ 223^{\circ}7\\ 206^{\circ}5\\ 214^{\circ}1\end{array}$	261.6 244.2 229.1 217.5 218.9 218.4	266.7227.5227.9207.8213.7212.3	$\begin{array}{c}$	253.7 236.8 227.1 207.6 218.7 229.7	$\begin{array}{c}$	$\begin{array}{c} 267 \cdot 1 \\ 229 \cdot 7 \\ 235 \cdot 0 \\ 221 \cdot 7 \\ 210 \cdot 5 \\ 227 \cdot 2 \end{array}$	$\begin{array}{c} 276.9 \\ 237.3 \\ 240.2 \\ 234.6 \\ 221.4 \\ 257.8 \end{array}$	$\begin{array}{c}$	$\begin{array}{c} 263.4\\ 236.6\\ 232.8\\ 227.9\\ 217.3\\ 241.8\end{array}$	
30 31	248·1 183·6	195·0 178·3	<b>230°1</b> 242°1	276·7 279·7	$274.3 \\ 268.3$	280°6 270°0	279.6 262.3	279·9 261·1	$282.0 \\ 261.5$	268 °6 264 °9	276.0 258.8	$281.9 \\ 263.0$	276·9 259·3	
Sums -	2679.1	2701.5	3012.4	3185.8	3253.0	3226.9	3292.2	3294*8	3273.0	3294*8	3413.0	3386.1	3353 . 7	
Means -	206.08	207.81	231.72	245.06	250.23	248.22	253 • 25	253 • 45	251.77	253.44	262.54	260.47	257 . 98	
" Aurora v	isible.	a manar af i berang tekar ta ang	ь (	Omitted :	from the	Hourly	Means,	as bein	g imper	fect day	s.			

LAKE ATHABASCA. Abstract of Hourly Observations made during the month of October 1843.

						Bifilar	Magne	tometer	•				
13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Means.
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⁴ Mean of the Hourly curve (from which the 20th is excluded) 244 63. ⁴ Including October 20th. Increasing numbers denote increase of Horizontal Force.

### MAGNETICAL OBSERVATIONS.

LAKE ATHABASCA—continued. Abstract of Hourly Observations made during the months of November and December 1843.

LAKE ATHABASCA—continued. Abstract of Hourly Observations made during the months of November and December 1843.

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\cdot 4 \\ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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                                                                                                                                                                                                                                                                    | <pre>3913 • 4 4224 • 5 4061 • 0 4424 • 2 4329 • 3 4473 • 4 4456 • 0 4528 • 9 4294 • 4 3964 • 0 3863 • 5 4018 • 8 3977 • 0 </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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For<br>169.5<br>178.2<br>186.3<br>182.2<br>178.8<br>185.7<br>At For<br>163.0<br>171.4<br>159.1<br>165.7<br>169.8<br>At For<br>166.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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181^{\circ}9 \\ 180^{\circ}7 \\ 171^{\circ}7 \\ 186^{\circ}9 \\ t {\rm Chipe} \\ 166^{\circ}4 \\ 168^{\circ}1 \\ 158^{\circ}1 \\ 178^{\circ}0 \\ 169^{\circ}0 \\ 178^{\circ}0 \\ 178^{\circ}0 \\ 169^{\circ}0 \\ 172^{\circ}0 \\ 177^{\circ}2 \\ 188^{\circ}0 \\ 169^{\circ}8 \\ 160^{\circ}0 \\ 169^{\circ}8 \\ 160^{\circ}0 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 165^{\circ}9 \\ 100^{\circ}9 $                                          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169^{\circ}4\end{array}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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4456 • 0 4528 • 9 4294 • 4 3964 • 0 3863 • 5 4018 • 8 3977 • 0 </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 
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187^{\circ}0\\  | 176-6<br>180-5<br>177-6<br>191-7<br>184-4<br>203-3<br>102-2<br>175-7<br>167-4<br>175-7<br>167-4<br>170-9<br>170-9<br>170-9<br>170-9<br>172-0<br>179-3<br>163-9<br>175-6<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 144 [•] 9<br>5unday<br>165 ⁻⁵³<br>182 ^{•3}<br>182 ^{•3}<br>180 ^{•0}<br>175 ^{•9}<br>181 ^{•3}<br>176 ^{•5}<br>165 ^{•1}<br>165 ^{•5}<br>165 ^{•1}<br>165 ^{•5}<br>166 ^{•9}<br>166 ^{•9}<br>167 ^{•2}<br>167 ^{•2}                                                                                                                                                                                                                                                                                                                                                                                                     | $\begin{array}{c} 90^{\circ}4\\ \cdot\\ 167^{\circ}2\\ 173^{\circ}7\\ 740^{\circ}0\\ 179^{\circ}6\\ 183^{\circ}9\\ \cdot\\ 178^{\circ}6\\ 183^{\circ}9\\ \cdot\\ 178^{\circ}6\\ 169^{\circ}6\\ 153^{\circ}5^{\circ}\\ 162^{\circ}5\\ 169^{\circ}6\\ \cdot\\ 169^{\circ}6\\ 153^{\circ}5^{\circ}\\ 162^{\circ}5\\ 163^{\circ}4\\ 163^{\circ}4\\ 164^{\circ}6\\ \cdot\\ 162^{\circ}8\\ 163^{\circ}4\\ 171^{\circ}1\\ 170^{\circ}8\\ 163^{\circ}4\\ \cdot\\ 174^{\circ}4\\ 168^{\circ}0\\ \cdot\\ 77^{\circ}3^{\circ}a\\ 174^{\circ}4\\ 174^{\circ}4\\ 174^{\circ}4\\ \cdot\\ 1$ |
<pre>3913.4<br/>4924.5<br/>4961.0<br/>4424.2<br/>43229.3<br/>44232.4<br/>4425.0<br/>44224.2<br/>4425.4<br/>4425.4<br/>4425.4<br/>4425.4<br/>4425.4<br/>4425.4<br/>3864.5<br/>4018.8<br/>3897.0<br/>4070.5<br/>3318.1<br/>4074.3<br/>4082.4<br/>4074.3<br/>4082.4<br/>4125.4<br/>4082.4<br/>4082.4<br/>4074.5<br/>4082.4<br/>4125.4<br/>4082.4<br/>4092.4<br/>4092.4<br/>5<br/>4092.4<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>5<br/>4092.4<br/>4092.4<br/>4092.5<br/>3<br/>4092.4<br/>4092.5<br/>3<br/>4092.4<br/>4092.5<br/>4<br/>4092.4<br/>4092.5<br/>4<br/>4092.4<br/>4092.5<br/>4092.4<br/>4092.5<br/>4092.4<br/>4092.4<br/>4092.5<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.5<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4092.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>4002.4<br/>40</pre> | 163.06<br>176.02<br>184.34<br>180.39<br>186.39<br>186.39<br>185.67<br>180.37<br>178.93<br>165.17<br>160.98<br>167.45<br>167.45<br>167.45<br>167.45<br>167.45<br>169.76<br>174.02<br>169.76<br>174.02<br>169.76<br>174.02<br>169.76<br>174.93                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| Dec. 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>9<br>20<br>17<br>20<br>22<br>23<br>24<br>22<br>22<br>25                                                                   | 141'8           167:4           171:1           127:1           187:3           180:6           182:4           187:3           170:6           165:2           173:6           165:7           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:7           167:7           173:0           168:7           173:0           169:3           129:0a           124:7           120:5                                                                                                                                                                                                             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    179.0           179.6           168.2           165.2           165.2           165.2           165.2           165.2           167.6           177.1           164.8           173.7           169.8           175.5           175.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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87.6           169.1           169.4           777.8           186.6           186.7           157.5           179.3           171.4           168.3           169.4           777.8           167.5           179.3           171.4           168.3           162.9           163.4           169.3           170.7           176.8           166.1           177.3           187.0           164.6           179.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 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{\rm 181}{}^{9} \\ {\rm 181}{}^{1} \\ {$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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wyan.<br>169-9<br>174-2f<br>179-0<br>180-3<br>164-1<br>185-3<br>164-1<br>185-8<br>164-1<br>175-4<br>178-4<br>178-4<br>178-4<br>178-8<br>165-8<br>165-8<br>165-8<br>164-2<br>179-0<br>164-2<br>179-0<br>164-2<br>179-0<br>164-2<br>179-0<br>164-2<br>179-0<br>164-2<br>179-0<br>164-1<br>179-0<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-6<br>165-6<br>165-6<br>165-6<br>165-6<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>1 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172\cdot 3\\ 180\cdot 6\\ 166\cdot 3\\ 182\cdot 3\\ 166\cdot 9\\ 182\cdot 6\\ 183\cdot 8\\ 182\cdot 3\\ 168\cdot 3\\ 181\cdot 3\\ 188\cdot 3\\ 181\cdot 3\\ 168\cdot 5\\ 181\cdot 3\\  | $\begin{array}{c} 172^{\circ}0\\ 177^{\circ}2\\ 175^{\circ}4\\ 169^{\circ}0\\ 186^{\circ}7\\ 179^{\circ}8\\ 201^{\circ}2\\ 187^{\circ}0\\ 191^{\circ}7\\ 155^{\circ}5\\ 157^{\circ}9\\ 105^{\circ}4\\ 187^{\circ}5\\ 173^{\circ}9\\ 165^{\circ}8\\ 173^{\circ}9\\ 173^{\circ}9\\ 178^{\circ}5\\ 178^{\circ}5\\ 186^{\circ}7\\ 166^{\circ}7\\ \end{array}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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177'9\\ 175'8\\ 192'2\\ 189'2\\ 220'4\\ 188'3\\ -88'3\\ 184'2\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'3\\ 172'2\\ 183'1\\ 168'3\\ 175'3\\ 172'0\\ -88'3\\ 174'0\\ 180'7\\ 183'3\\ 174'0\\ 180'7\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 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177-5           188:5           175-3           175-3           175-3           175-3           175-3           175-5           188:5           177-5           185:3           175:0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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\cdot 9 \\ 173 \cdot 9 \\ 173 \cdot 9 \\ 173 \cdot 9 \\ 173 \cdot 9 \\ 173 \cdot 9 \\$ | $\begin{array}{c} 183.7\\ 179.9\\ 176.3\\ 220.0\\ 0\\ 183.4\\ 767.5\\ 191.0\\ 194.1\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 167.4\\ 175.0\\ 163.4\\ 174.4\\ 174.4\\ 187.1\\ 187.1\\ 187.1\\ 168.7\\ 183.1\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 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| 174-9<br>180-6<br>176-0<br>188-9<br>182-6<br>187-0<br>182-0<br>192-6<br>177-4<br>151-5<br>163-6<br>170-2<br>169-0<br>752-3<br>170-4<br>179-6<br>163-9<br>174-8<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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                      | 144 [•] 9<br>Sunday<br>165 [•] 3<br>182 [•] 3<br>182 [•] 3<br>182 [•] 3<br>180 [•] 0<br>175 [•] 9<br>181 [•] 3<br>Sunday<br>186 [•] 5<br>176 [•] 8<br>165 [•] 1<br>165 [•] 1<br>165 [•] 6<br>165 [•] 1<br>165 [•] 6<br>177 [•] 2<br>167 [•] 9<br>162 [•] 8<br>166 [•] 9<br>177 [•] 2<br>167 [•] 9<br>162 [•] 2<br>165 [•] 1<br>162 [•] 2<br>165 [•] 1<br>162 [•] 2<br>165 [•] 0<br>177 [•] 2<br>165 [•] 0<br>177 [•] 2<br>165 [•] 0<br>177 [•] 2<br>168 [•] 0<br>177 [•] 3<br>168 [•] 0<br>179 [•] 3<br>156 [•] 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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90'4<br>167'2<br>173'7<br>170'6<br>180'6<br>183'9<br>172'8<br>175'6<br>163'6<br>153'9<br>172'8<br>175'6<br>163'6<br>163'6<br>163'6<br>163'5<br>166'6<br>162'5<br>166'6<br>162'5<br>166'6<br>162'5<br>166'4<br>163'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>166'5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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<pre>3913.4<br/>4067.4<br/>4224'5<br/>44067.4<br/>4424'2<br/>4422'2<br/>4422'3<br/>4423'3<br/>4425'3<br/>4425'4<br/>4425'4<br/>4425'4<br/>4425'4<br/>4425'7<br/>4015'8<br/>3977.0<br/>3918'1<br/>4479'5<br/>3918'1<br/>4479'5<br/>3918'1<br/>4479'5<br/>3918'1<br/>4479'5<br/>4015'8<br/>3977.0<br/>4479'5<br/>4015'8<br/>4479'5<br/>4015'8<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4479'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>4475'5<br/>447</pre>                                                                                                             | 163°06<br>176°02<br>169°21<br>184°34<br>186°39<br>186°39<br>185°67<br>185°67<br>185°67<br>185°67<br>165°17<br>165°17<br>165°17<br>165°79<br>165°79<br>165°79<br>165°79<br>165°79<br>165°79<br>174°92<br>174°92<br>177°6<br>170°62<br>177°10<br>177°68<br>177°10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| Dec. 1<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>22<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24<br>24                                                                 | 141*8           167:4           171*1           127*7           180:6           187:3           179:6           165:2           173:4           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           167:5           169:3           429:70*           174:7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 730.9         - 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        -         -         -         -         - <td>\$7'6           169'1           169'4           77'8           186'3           186'3           157'5           179'3           171'4           160'1           162'9           163'4           169'1           160'1           162'9           163'4           169'1           162'9           163'4           169'1           162'9           163'4           169'1           162'9           163'4           169'1           162'9           163'4           169'1           162'9           163'4           169'3           170'7           176'8           187'3           187'3           187'0           184'6</td> <td>65° S           170'1           182'7           183'7           183'7           183'7           185'7           183'0           151'8           175'6           175'6           175'6           164'2           170'8           166'0           168'0           164'2           170'8           166'0           168'0           163'1           170'8           166'0           163'3           183'3'6</td> <td>$\begin{array}{c} {\rm At}\ {\rm For}\\ 169^{-5}\\ 178^{+2}\\ 186^{+3}\\ 182^{+2}\\ 178^{+8}\\ 185^{+7}\\ {\rm At}\ {\rm For}\\ 163^{+0}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{$</td> <td>$\begin{array}{c} \text{tChipe} \\ 169\cdot4 \\ 175\cdot7 \\ 181\cdot9 \\ 180\cdot7 \\ 171\cdot7 \\ 186\cdot9 \\ 166\cdot9 \\ 166\cdot4 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 168\cdot1 \\ 178\cdot0 \\ 177\cdot0 \\ 180\cdot0 \\ 160\cdot8 \\ 169\cdot0 \\ 172\cdot0 \\ 182\cdot0 \\ 182$</td>
<td>wyan.<br/>169-9<br/>174-2f<br/>179-0<br/>180-3<br/>164-1<br/>185-3<br/>164-1<br/>185-8<br/>164-1<br/>175-4<br/>178-4<br/>178-4<br/>178-4<br/>178-8<br/>165-8<br/>165-8<br/>165-8<br/>164-2<br/>179-0<br/>164-2<br/>179-0<br/>164-2<br/>179-0<br/>164-2<br/>179-0<br/>164-2<br/>179-0<br/>164-2<br/>179-0<br/>164-1<br/>179-0<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-8<br/>165-6<br/>165-6<br/>165-6<br/>165-6<br/>165-6<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>165-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>172-7<br/>1</td> <td>$\begin{array}{c} 168:8\\ 181:6\\ 171:1\\ 176:3\\ 179:2\\ 178:7\\ 168:7\\ 182:9\\ 175:6\\ 158:6\\ 158:6\\ 165:4\\ 163:8\\ 165:4\\ 162:4\\ 178:3\\ 162:4\\ 178:3\\ 162:6\\ 178:3\\ 162:6\\ 178:3\\ 162:6\\ 178:6\\ 178:6\\ 178:6\\ 178:6\\ 178:6\\ 180:6\\ 180:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 160:6\\ 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174'7\\ 176'7\\ 177'9\\ 175'8\\ 192'2\\ 189'2\\ 220'4\\ 188'3\\ -88'3\\ 184'2\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'2\\ 171'4\\ 189'3\\ 172'2\\ 183'1\\ 168'3\\ 175'3\\ 172'0\\ -88'3\\ 174'0\\ 180'7\\ 183'3\\ 174'0\\ 180'7\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 183'3\\ 174'1\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 184'2\\ 18$</td> <td>$\begin{array}{c} 173 \cdot 3 \\ 175 \cdot 9 \\ 175 \cdot 9 \\ 175 \cdot 9 \\ 174 \cdot 2 \\ 192 \cdot 4 \\ 199 \cdot 5 \\ 193 \cdot 8 \\ 182 \cdot 0 \\ 193 \cdot 4 \\ 169 \cdot 6 \\ 165 \cdot 2 \\ 176 \cdot 1 \\ 175 \cdot 8 \\ 180 \cdot 2 \\ 168 \cdot 4 \\ 169 \cdot 6 \\ 165 \cdot 2 \\ 176 \cdot 1 \\ 175 \cdot 8 \\ 187 \cdot 2 \\ 178 \cdot 8 \\ 175 \cdot 2 \\ 178 \cdot 0 \\ 187 \cdot 6 \\ 177 \cdot 6 \\$</td> <td>$\begin{array}{c c} 181 \cdot 9 \\ 174 \cdot 6 \\ 185 \cdot 9 \\ 174 \cdot 8 \\ 190 \cdot 3 \\ 180 \cdot 8 \\ 190 \cdot 3 \\ 180 \cdot 8 \\ 191 \cdot 0 \\ 192 \cdot 3 \\ 190 \cdot 4 \\ 170 \cdot 8 \\ 164 \cdot 2 \\ 176 \cdot 2 \\ 176 \cdot 7 \\ 176 \cdot 2 \\ 176 \cdot 7 \\ 176 \cdot 7 \\ 176 \cdot 7 \\ 176 \cdot 7 \\ 176 \cdot 7 \\ 175 \cdot 7 \\ 175 \cdot 7 \\ 182 \cdot 5 \\ 180 \cdot 0 \\ 185 \cdot 3 \\ 185 \cdot 3 \end{array}$</td>
<td>186:2<br/>1774:2<br/>199:2<br/>199:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>195:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>172:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2<br/>173:2</td> <td>176-1           174-0           178-3           181-6           178-3           191-7           181-3           191-4           197-1           101-5           183-8           165-3           165-5           170-0           166-3           177-5           177-5           178-8           177-5           188-5           177-5           188-5           177-5           188-5           177-5           188-5           177-5           188-5           175-3           175-3           175-3           175-5           188-5           170-5           180-3           180-3           180-3           180-3</td> <td>182.6<br/>187.7<br/>175.4<br/>177.7<br/>194.5<br/>175.0<br/>189.9<br/>194.8<br/>179.6<br/>179.6<br/>160.0<br/>172.8<br/>167.6<br/>166.5<br/>173.5s<br/>173.5s<br/>173.5s<br/>173.5s<br/>178.1<br/>169.0<br/>169.0<br/>169.6<br/>178.1<br/>169.0<br/>169.8<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>182.6<br/>183.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>194.8<br/>185.7<br/>185.7<br/>194.8<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>194.8<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>194.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>185.7<br/>17.7<br/>185.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>17.7<br/>1</td> <td>$\begin{array}{c} 181 \cdot 0 \\ 185 \cdot 0 \\ 177 \cdot 2 \\ 177 \cdot 3 \\ 197 \cdot 4 \\ 178 \cdot 3 \\ 195 \cdot 9 \\ 193 \cdot 3 \\ 195 \cdot 9 \\ 193 \cdot 3 \\ 181 \cdot 7 \\ 166 \cdot 9 \\ 170 \cdot 2 \\ 169 \cdot 1 \\ 165 \cdot 4 \\ 176 \cdot 4 \\ 165 \cdot 4 \\ 176 \cdot 4 \\ 166 \cdot 9 \\ 174 \cdot 8 \\ 176 \cdot 4 \\ 184 \cdot 4 \\ 184 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 6 \\ 178 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 6 \\ 178 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 6 \\ 178 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\
188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\$</td> <td>$\begin{array}{c} 188 \cdot 0 \\ 177 \cdot 3 \\ 176 \cdot 9 \\ 214 \cdot 6 \\ 179 \cdot 5 \\ 190 \cdot 3 \\ 190 \cdot 3 \\ 194 \cdot 0 \\ -191 \cdot 7 \\ 174 \cdot 2 \\ 165 \cdot 2 \\ 168 \cdot 0 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ -179 \cdot 0 \\ 169 \cdot 1 \\ 176 \cdot 4 \\ 173 \cdot 8 \\ 168 \cdot 6 \\ 174 \cdot 5 \\ -179 \cdot 3 \\ 186 \cdot 0 \\ 183 \cdot 9 \\ 172 \cdot 8 \\ 172 \cdot 8 \\ -179 \cdot 3 \\ 186 \cdot 0 \\ 183 \cdot 9 \\ 172 \cdot 8 \\ -172 \cdot$</td> <td>$\begin{array}{c} 183.7\\ 179.9\\ 176.3\\ 220.0\\ 0\\ 183.4\\ 767.5\\ 191.0\\ 194.1\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 167.4\\ 175.0\\ 163.4\\ 174.4\\ 174.4\\ 187.1\\ 187.1\\ 187.1\\ 168.7\\ 183.1\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\$</td> <td>176-6<br/>180-5<br/>177-6<br/>191-7<br/>184-4<br/>2058-2<br/>102-2<br/>105-4<br/>175-7<br/>167-4<br/>170-9<br/>169-5<br/>169-5<br/>169-5<br/>169-5<br/>169-5<br/>169-5<br/>169-7<br/>172-0<br/>172-0<br/>172-0<br/>172-0<br/>172-0<br/>173-9<br/>175-7<br/>163-5<br/>163-9<br/>175-7<br/>163-5<br/>163-9<br/>175-7<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>163-5<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>172-6<br/>1</td> <td>$\begin{array}{c} 174^{\circ}9 \\ -186^{\circ}6 \\ 176^{\circ}0 \\ 188^{\circ}9 \\ 182^{\circ}6 \\ 187^{\circ}0 \\ 182^{\circ}0^{n} \\ 192^{\circ}6 \\ 177^{\circ}4 \\ 151^{\circ}5 \\ 163^{\circ}6 \\ 177^{\circ}2^{n} \\ 161^{\circ}1 \\ 169^{\circ}0 \\ 770^{\circ}2^{n} \\ 1770^{\circ}2^{n} \\ 169^{\circ}5 \\ 195^{\circ}3 \\ 195^{\circ}3 \\ 181^{\circ}1 \\ 173^{\circ}2 \\ 154^{\circ}2 \\ 154^{\circ}2 \\ 154^{\circ}2 \end{array}$</td> <td>723'6         165'3         1           165'3         174'6         77'3         183'9           174'6         190'3         5         5           78'7         183'9         1         149'2           167'7         167'7         167'7         165'9e           700'167'7         163'4         165'9e         166'3           161'7'8         161'7'8         161'7'8         167'8           167'8         166'8         166'8         166'8           176'8         140'0         5         5</td> <td>444'9 Sundayi 165'3 3'<br/>188'3 96'6' 188'0 96'7'<br/>181'3 188'3 96'6' 189'0 189'0 189'0 181'3 3<br/>181'3 3'40'189'18'18'18'18'18'18'18'18'18'18'18'18'18'</td> <td>$\begin{array}{c c} 90^{\circ}4\\ \hline 167^{\circ}2\\ 173^{\circ}7\\ 740^{\circ}0\\ 179^{\circ}6\\ 183^{\circ}9\\ 172^{\circ}8\\ 178^{\circ}6\\ 169^{\circ}6\\ 153^{\circ}5^{\circ}\\ 169^{\circ}6\\ 153^{\circ}5^{\circ}\\ 162^{\circ}5\\ 164^{\circ}6\\ 163^{\circ}4\\ 70^{\circ}7\\ 164^{\circ}6\\ 164^{\circ}6\\ 171^{\circ}1\\ 171^{\circ}1\\ 170^{\circ}8\\ 168^{\circ}0\\ 77^{\circ}3^{\circ}\\ 174^{\circ}4\\ 165^{\circ}2\\ 752^{\circ}0\\ \end{array}$</td> <td>$\left.\begin{array}{c} 3913.4\\ 4924.5\\ 4966.4\\ 4924.2\\ 4922.3\\ 4922.3\\ 4425.4\\ 4425.4\\ 4425.4\\ 4425.4\\ 4425.4\\ 4425.4\\ 4924.4\\ 3964.4\\ 3964.4\\ 3964.4\\ 3964.4\\ 3964.4\\ 3964.4\\ 3964.4\\ 3964.4\\ 3964.4\\ 3964.4\\ 4984.3\\ 4082.4\\ 4079.5\\ 3977.0\\ 4079.5\\ 3918.1\\ 4079.5\\ 3918.1\\ 4079.5\\ 3918.1\\ 4079.5\\ 3918.1\\ 4079.5\\ 3918.1\\ 4028.5\\ -95468.2\\ -95468.2\\ -95468.2\\ -95468.2\\ -95468.2\\ -95468.2\\ 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<td>163.06<br/>176.02<br/>109.21<br/>184.34<br/>186.39<br/>186.39<br/>185.67<br/>180.37<br/>178.93<br/>165.17<br/>169.98<br/>167.45<br/>165.71<br/>169.98<br/>163.25<br/>174.92<br/>169.76<br/>174.92<br/>169.76<br/>174.93<br/>169.76<br/>174.93<br/>169.76<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>174.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>177.93<br/>17</td> <td></td> | \$7'6           169'1           169'4           77'8           186'3           186'3           157'5           179'3           171'4           160'1           162'9           163'4           169'1           160'1           162'9           163'4           169'1           162'9           163'4           169'1           162'9           163'4           169'1           162'9           163'4           169'1           162'9           163'4           169'1           162'9           163'4           169'3           170'7           176'8           187'3           187'3           187'0           184'6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 65° S           170'1           182'7           183'7           183'7           183'7           185'7           183'0           151'8           175'6           175'6           175'6           164'2           170'8           166'0           168'0           164'2           170'8           166'0           168'0           163'1           170'8           166'0           163'3           183'3'6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | $\begin{array}{c} {\rm At}\ {\rm For}\\ 169^{-5}\\ 178^{+2}\\ 186^{+3}\\ 182^{+2}\\ 178^{+8}\\ 185^{+7}\\ {\rm At}\ {\rm For}\\ 163^{+0}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 170^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\ 180^{+6}\\
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wyan.<br>169-9<br>174-2f<br>179-0<br>180-3<br>164-1<br>185-3<br>164-1<br>185-8<br>164-1<br>175-4<br>178-4<br>178-4<br>178-4<br>178-8<br>165-8<br>165-8<br>165-8<br>164-2<br>179-0<br>164-2<br>179-0<br>164-2<br>179-0<br>164-2<br>179-0<br>164-2<br>179-0<br>164-2<br>179-0<br>164-1<br>179-0<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-8<br>165-6<br>165-6<br>165-6<br>165-6<br>165-6<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>165-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>172-7<br>1 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                                                                                                                                                                                                                                                                                                                                              | $\begin{array}{c c} 172^{\circ}0\\ 177^{\circ}2\\ 175^{\circ}4\\ 169^{\circ}0\\ 186^{\circ}7\\ 179^{\circ}3\\ 201^{\circ}2\\ 137^{\circ}0\\ 125^{\circ}5\\ 157^{\circ}9\\ 165^{\circ}5\\ 157^{\circ}9\\ 167^{\circ}5\\ 167^{\circ}5\\ 167^{\circ}5\\ 168^{\circ}6\\ 182^{\circ}0\\ 168^{\circ}8\\ 173^{\circ}9\\ 108^{\circ}9\\ 108^{\circ}5\\ 188^{\circ}7\\ 188^{\circ}7\\ 188^{\circ}7\\ \end{array}$                                                     
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\\ 184 \cdot 2 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 178 \cdot 6 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\ 188 \cdot 2 \\$ | $\begin{array}{c} 188 \cdot 0 \\ 177 \cdot 3 \\ 176 \cdot 9 \\ 214 \cdot 6 \\ 179 \cdot 5 \\ 190 \cdot 3 \\ 190 \cdot 3 \\ 194 \cdot 0 \\ -191 \cdot 7 \\ 174 \cdot 2 \\ 165 \cdot 2 \\ 168 \cdot 0 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ -179 \cdot 0 \\ 169 \cdot 1 \\ 176 \cdot 4 \\ 173 \cdot 8 \\ 168 \cdot 6 \\ 174 \cdot 5 \\ -179 \cdot 3 \\ 186 \cdot 0 \\ 183 \cdot 9 \\ 172 \cdot 8 \\ 172 \cdot 8 \\ -179 \cdot 3 \\ 186 \cdot 0 \\ 183 \cdot 9 \\ 172 \cdot 8 \\ -172 \cdot $                                                                                  | $\begin{array}{c} 183.7\\ 179.9\\ 176.3\\ 220.0\\ 0\\ 183.4\\ 767.5\\ 191.0\\ 194.1\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 167.4\\ 175.0\\ 163.4\\ 174.4\\ 174.4\\ 187.1\\ 187.1\\ 187.1\\ 168.7\\ 183.1\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 168.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\ 188.7\\$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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176-6<br>180-5<br>177-6<br>191-7<br>184-4<br>2058-2<br>102-2<br>105-4<br>175-7<br>167-4<br>170-9<br>169-5<br>169-5<br>169-5<br>169-5<br>169-5<br>169-5<br>169-7<br>172-0<br>172-0<br>172-0<br>172-0<br>172-0<br>173-9<br>175-7<br>163-5<br>163-9<br>175-7<br>163-5<br>163-9<br>175-7<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>163-5<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>172-6<br>1 | $\begin{array}{c} 174^{\circ}9 \\ -186^{\circ}6 \\ 176^{\circ}0 \\ 188^{\circ}9 \\ 182^{\circ}6 \\ 187^{\circ}0 \\ 182^{\circ}0^{n} \\ 192^{\circ}6 \\ 177^{\circ}4 \\ 151^{\circ}5 \\ 163^{\circ}6 \\ 177^{\circ}2^{n} \\ 161^{\circ}1 \\ 169^{\circ}0 \\ 770^{\circ}2^{n} \\ 1770^{\circ}2^{n} \\
169^{\circ}5 \\ 195^{\circ}3 \\ 195^{\circ}3 \\ 181^{\circ}1 \\ 173^{\circ}2 \\ 154^{\circ}2 \\ 154^{\circ}2 \\ 154^{\circ}2 \end{array}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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172^{\circ}8\\ 178^{\circ}6\\ 169^{\circ}6\\ 153^{\circ}5^{\circ}\\ 169^{\circ}6\\ 153^{\circ}5^{\circ}\\ 162^{\circ}5\\ 164^{\circ}6\\ 163^{\circ}4\\ 70^{\circ}7\\ 164^{\circ}6\\ 164^{\circ}6\\ 171^{\circ}1\\ 171^{\circ}1\\ 170^{\circ}8\\ 168^{\circ}0\\ 77^{\circ}3^{\circ}\\ 174^{\circ}4\\ 165^{\circ}2\\ 752^{\circ}0\\ \end{array}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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175:7}
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9 \\ 174 \cdot 6 \\ 185 \cdot 9 \\ 174 \cdot 8 \\ 190 \cdot 3 \\ 180 \cdot 8 \\ 191 \cdot 0 \\ 192 \cdot 3 \\ 190 \cdot 9 \\ 199 \cdot 4 \\ 199 \cdot 4 \\ 170 \cdot 8 \\ 164 \cdot 2 \\ 175 \cdot 2 \\ 175 \cdot 2 \\ 175 \cdot 7 \\ 170 \cdot 7 \\ 170 \cdot 7 \\ 170 \cdot 7 \\ 172 \cdot 2 \\ 175 \cdot 7 \\ 170 \cdot 7 \\ 170 \cdot 7 \\ 185 \cdot 5 \\ 180 \cdot 0 \\ 185 \cdot 3 \\ 174 \cdot 2 \\ 174 \cdot 2 \\ 175 \cdot 3 \\ 174 \cdot 2 \\ 175 \cdot 3 \\ 174 \cdot 2 \\ 175 \cdot 3 \\ 174 \cdot 2 \\ 175 \cdot 3 \\ 174 \cdot 2 \\ 175 \cdot 3 \\ 174 \cdot 2 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 \cdot 3 \\ 175 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<td>183.7<br/>179.9<br/>176.3<br/>220.0<br/>183.4<br/>767.6<br/>194.1<br/>177.1<br/>169.2<br/>169.4<br/>177.5<br/>161.7<br/>173.4<br/>167.4<br/>175.0<br/>180.6<br/>163.4<br/>174.4<br/>187.7<br/>168.7<br/>183.1<br/>168.5<br/>165.1<br/>156.1</td> <td>176'6<br/>180'5<br/>177'6<br/>191'7<br/>184'4<br/>203'5<br/>102'2<br/>105'4<br/>171'3<br/>169'4<br/>171'3<br/>169'4<br/>171'3<br/>169'4<br/>171'3<br/>169'7<br/>170'9<br/>169'7<br/>172'6<br/>179'3<br/>163'9<br/>175'6<br/>175'6<br/>175'6<br/>179'6<br/>179'6<br/>179'6<br/>166'8</td>
<td>174'9<br/>180'6<br/>176'0<br/>188'9<br/>182'6<br/>187'0<br/>192'6<br/>177'4<br/>151'5<br/>163'6<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2⁸<br/>170'2</td> 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169\cdot76\\ 174\cdot02\\ 174\cdot02\\ 174\cdot02\\ 169\cdot76\\ 169\cdot76\\ 174\cdot02\\ 174\cdot02\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 169\cdot76\\ 174\cdot02\\ 184\cdot02\\ /math></td> <td></td> | 182°6<br>180°2<br>175°4<br>177°7<br>194°5<br>175°0<br>189°9<br>194°8<br>179°6<br>189°9<br>194°8<br>167°6<br>166°5<br>173°5 ^s<br>167°6<br>166°5<br>173°5 ^s<br>173°5 ^s<br>1 | 181:0         185:0         185:7    
    177:3         177:3         197:4         177:3         197:4         180:9         181:7         166:9         174:4         176:4         168:4         167:9         174:8         178:4         184:7         187:4         187:4         184:4         184:4         184:4         184:4         184:4         184:4         184:4         184:4         184:4         184:4         184:4         184:4         184:7         178:4         185:7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| Dec. 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>8<br>20<br>21<br>22<br>22<br>25<br>26<br>27<br>29<br>30<br>31<br>Sums | 141'8           167'4           171'1           127'1           180'6           182'4           187'3           170'6           105'7           173'4           165'7           167'5           166'7           168'7           161'2           168'7           168'7           173'0           161'2           168'7           173'0           169'3           174'7           170'4                                                                                                                                                                                                                                                                                                                                                                                                              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87.6           169.1           169.4           77.78           186.6           186.75           179.3           171.4           168.75           169.6           169.71           168.65           179.3           171.4           168.76           169.71           162.9           163.4           169.3           170.7           176.8           166.1           179.5           187.3           187.3           187.3           162.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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\\ 4364 \cdot 3 \\ \end{array}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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In5\cdot1} \\ {\rm In5\cdot1} \\ {\rm In6\cdot6} \\ {\rm In5\cdot1} $                                                                                      | $\begin{array}{c} \text{wyan.} \\ 169 \cdot 9 \\ 174 \cdot 2^{\text{f}} \\ 179 \cdot 0 \\ 178 \cdot 0 \\ 188 \cdot 3 \\ 164 \cdot 1 \\ 188 \cdot 8 \\ 164 \cdot 1 \\ 185 \cdot 8 \\ 164 \cdot 1 \\ 178 \cdot 4 \\ 177 \cdot 4 \\ 165 \cdot 8 \\ 169 \cdot 5 \\ 169 \cdot 5 \\ 169 \cdot 5 \\ 168 \cdot 6 \\ 157 \cdot 8 \\ 169 \cdot 5 \\ 168 \cdot 6 \\ 157 \cdot 8 \\ 169 \cdot 5 \\ 168 \cdot 6 \\ 169 \cdot 5 \\ 168 \cdot 6 \\ 169 \cdot 5 \\ 164 \cdot 0 \\ 167 \cdot 6 \\ 162 \cdot 7 \\ \text{wyan.} \\ 179 \cdot 6 \\ 163 \cdot 1 \\ 172 \cdot 6 \\ 163 \cdot 1 \\ 172 \cdot 6 \\ 163 \cdot 1 \\ 172 \cdot 6 \\ 163 \cdot 1 \\ 171 \cdot 65 \\ 171 \cdot 65 \\ 100 \cdot 100 \cdot 100 \\ 100 \cdot 100 \cdot 100 \\ 100 \cdot 100 \cdot 100 \\ 100 \cdot 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 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\\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 \\ 100 \cdot 100 $                                                                                                                                   | $\begin{array}{c} 168:8\\ 181\cdot 6\\ 181\cdot 6\\ 171\cdot 1\\ 176\cdot 3\\ 179\cdot 2\\ 178\cdot 7\\ 168\cdot 7\\ 182\cdot 9\\ 175\cdot 4\\ 158\cdot 6\\ 158\cdot 7\\ 168\cdot 4\\ 163\cdot 6\\ 185\cdot 6\\ 185\cdot 6\\ 163\cdot 4\\ 173\cdot 3\\ 162\cdot 4\\ 173\cdot 3\\ 162\cdot 4\\ 173\cdot 3\\ 162\cdot 6\\ 185\cdot 6\\ 180\cdot 4\\ 133\cdot 6\\ 180\cdot 4\\ 130\cdot 6\\ 180\cdot 4\\ 130\cdot 6\\ 180\cdot 4\\ 130\cdot 6\\ 180\cdot 4\\ 130\cdot 6\\ 180\cdot 6\\ $ | 170.6<br>178.6<br>174.6<br>174.6<br>174.6<br>182.9<br>180.7<br>170.6<br>180.7<br>170.6<br>180.8<br>177.9<br>162.5<br>169.8<br>177.9<br>162.5<br>166.7<br>166.4<br>172.3<br>180.6<br>182.3<br>180.6<br>182.3<br>180.6<br>174.6<br>182.3<br>180.6<br>174.7<br>183.8<br>181.5<br>165.0<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 172°0<br>177°2<br>175°4<br>169°0<br>186°7<br>179°3<br>201°2<br>187°0<br>187°5<br>191°7<br>155°5<br>157°9<br>165°4<br>165°6<br>182°0<br>173°9<br>108°9<br>178°5<br>178°5<br>178°5<br>178°5<br>166°8<br>106°2<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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174.7<br>176.7<br>176.7<br>175.8<br>192.2<br>180.5<br>220.4<br>188.5<br>220.4<br>188.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>189.2<br>174.4<br>100.0<br>187.3<br>184.7<br>172.2<br>180.5<br>189.2<br>174.4<br>100.0<br>187.3<br>184.7<br>172.2<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>180.5<br>172.5<br>180.5<br>172.5<br>180.5<br>172.5<br>180.0<br>180.7<br>180.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>175.5<br>174.5<br>174.5<br>175.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>174.5<br>175.5<br>175.5<br>175.5<br>175.5<br>175.5<br>175.5 | 173:3<br>175:9<br>181:3<br>174:2<br>192:4<br>177:4<br>199:5<br>193:8<br>182:0<br>193:4<br>183:4<br>169:6<br>165:2<br>176:1<br>175:8<br>180:2<br>168:4<br>173:8<br>175:2<br>168:4<br>173:8<br>175:2<br>181:5<br>178:0<br>187:6<br>171:8<br>161:4<br>178:22                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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                                                                                                                                                            | 186::           177::           174::           197::           197::           197::           197::           195::           195::           195::           195::           195::           195::           195::           195::           195::           195::           195::           195::           174::           170::           174::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::           177::          
177::           177::           177::           177::           177::           177::           177::           177::           177:: </td <td>176-1           174-0           181-6           178-3           191-7           181-3           191-4           197-1           101-5           187-8           180-7           191-4           197-1           191-5           185-8           165-5           175-3           175-8           175-1           175-1           175-2           175-0           185-3           162-1           4455-3           178-21</td> <td>182°6         180°2           175°4         177°7           194°5         177°7           194°5         175°0           189°9         194°8           179°6         180°0           172°8         167°6           166°5         173°5^k           174°6         178°1           169°0         169°8           182°6         182°6           182°6         182°6           182°6         182°6           182°6         158°6           173°6         155°6           44417°1         176°63</td> <td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td> <td>$\begin{array}{c} 188 \cdot 0 \\ 177 \cdot 3 \\ 176 \cdot 9 \\ 214 \cdot 6 \\ 179 \cdot 5 \\ 190 \cdot 3 \\ 199 \cdot 3 \\ 194 \cdot 0 \\ 179 \cdot 5 \\ 190 \cdot 3 \\ 194 \cdot 0 \\ 179 \cdot 5 \\ 168 \cdot 0 \\ 168 \cdot 0 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ 179 \cdot 0 \\ 168 \cdot 0 \\ 173 \cdot 8 \\ 160 \cdot 5 \\ 174 \cdot 5 \\ 179 \cdot 3 \\ 186 \cdot 0 \\ 183 \cdot 9 \\ 172 \cdot 8 \\ 160 \cdot 5 \\ 179 \cdot 3 \\ 186 \cdot 0 \\ 182 \cdot 9 \\ 172 \cdot 8 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 180 \cdot 5 \\$</td> <td>$\begin{array}{r} 183.7\\ 179.9\\ 176.3\\ 220.0\\ 183.4\\ 767.5\\ 191.0\\ 194.1\\ 197.1\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 167.4\\ 175.0\\ 163.4\\ 177.4\\ 167.4\\ 175.0\\ 180.6\\ 163.4\\ 174.5\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 156.1\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 168.7\\ 187.1\\ 187.1\\ 168.7\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 187.1\\ 18$</td> <td>$\begin{array}{c} 176^{\circ} \cdot 6 \\ 180^{\circ} 5 \\ 177^{\circ} 6 \\ 191^{\circ} 7 \\ 184^{\circ} 4 \\ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$</td> <td>$\begin{array}{c} 174 \cdot 9 \\ 180 \cdot 6 \\ 176 \cdot 0 \\ 188 \cdot 9 \\ 182 \cdot 6 \\ 187 \cdot 0 \\ 182 \cdot 0^n \\ 192 \cdot 6 \\ 177 \cdot 4 \\ 151 \cdot 5 \\ 163 \cdot 6 \\ 170 \cdot 2^n \\ 161 \cdot 1 \\ 169 \cdot 0 \\ 752 \cdot 3 \\ 170 \cdot 4 \\ 179 \cdot 6 \\ 163 \cdot 9 \\ 170 \cdot 4 \\ 179 \cdot 6 \\ 163 \cdot 9 \\ 170 \cdot 4 \\ 179 \cdot 5 \\ 195 \cdot 3 \\ 181 \cdot 1 \\ 173 \cdot 2 \\ 154 \cdot 2 \\ - \\ 4364 \cdot 3 \\ \end{array}$</td> <td>723'6         165'3           167'3         179'8           77'3         183'9           174'6         190'3           5         705'5           178'7         167'4           169'2         167'7           169'2         167'7           169'2         165'3           161'7         165'4           166'2         166'3           166'5         176'8           186'6         176'8           186'6         176'8           140'5         186'6           176'8         140'5'8           180'0'1         100'5'8</td> <td>444 ; 9 ; 5 ; 5 ; 5 ; 5 ; 5 ; 5 ; 5 ; 5 ; 5</td> <td>90'4<br/>167'2<br/>173'7<br/>170'6<br/>183'9<br/>172'8<br/>178'6<br/>163'6<br/>163'6<br/>163'6<br/>163'6<br/>163'6<br/>163'6<br/>163'6<br/>163'6<br/>163'4<br/>164'4<br/>164'4<br/>164'4<br/>164'4<br/>164'4<br/>164'4<br/>164'6<br/>163'5<br/>164'4<br/>164'4<br/>165'7<br/>164'6<br/>163'5<br/>164'6<br/>163'4<br/>164'4<br/>165'7<br/>164'6<br/>163'4<br/>164'4<br/>165'7<br/>164'6<br/>163'4<br/>164'6<br/>164'6<br/>164'6<br/>164'6<br/>164'6<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'6<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>164'7<br/>165'7<br/>165'7<br/>164'7<br/>165'7<br/>165'7<br/>164'7<br/>165'7<br/>165'7<br/>164'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>165'7<br/>155'7<br/>155'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157'7<br/>157</td>
<td><pre>3913.4<br/>4924.5<br/>49261.0<br/>4924.2<br/>49229.3<br/>4422.4<br/>4422.4<br/>4424.2<br/>4424.2<br/>4425.0<br/>4428.9<br/>4425.0<br/>4428.9<br/>4428.4<br/>3964.0<br/>83663.5<br/>4018.8<br/>3977.0<br/>4079.5<br/>3918.1<br/>4074.3<br/>4082.4<br/>4074.3<br/>4082.4<br/>4028.3<br/>4082.4<br/>4028.3<br/>4082.4<br/>4028.5<br/>4028.4<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>4028.5<br/>40029.5<br/>40029.5<br/>40029.5<br/>40020</pre></td> <td>163.06<br/>176.02<br/>169.21<br/>184.34<br/>180.39<br/>186.39<br/>185.67<br/>178.93<br/>165.17<br/>178.93<br/>165.17<br/>178.93<br/>165.17<br/>176.93<br/>165.71<br/>169.76<br/>170.10<br/>170.62<br/>177.02<br/>169.76<br/>177.03<br/>178.89<br/>178.89<br/>178.89<br/>178.89<br/>177.85<br/>167.75<br/>163.75<br/>177.85<br/>167.75<br/>163.75<br/>177.85<br/>167.75<br/>163.75<br/>177.85<br/>167.75<br/>167.75<br/>172.95</td> <td></td> | 176-1           174-0           181-6           178-3           191-7           181-3           191-4           197-1           101-5           187-8           180-7           191-4           197-1           191-5           185-8           165-5           175-3           175-8           175-1           175-1           175-2           175-0           185-3           162-1           4455-3           178-21                                                                                                                                                               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\cdot 9 \\ 214 \cdot 6 \\ 179 \cdot 5 \\ 190 \cdot 3 \\ 199 \cdot 3 \\ 194 \cdot 0 \\ 179 \cdot 5 \\ 190 \cdot 3 \\ 194 \cdot 0 \\ 179 \cdot 5 \\ 168 \cdot 0 \\ 168 \cdot 0 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ 179 \cdot 0 \\ 168 \cdot 0 \\ 173 \cdot 8 \\ 160 \cdot 5 \\ 174 \cdot 5 \\ 179 \cdot 3 \\ 186 \cdot 0 \\ 183 \cdot 9 \\ 172 \cdot 8 \\ 160 \cdot 5 \\ 179 \cdot 3 \\ 186 \cdot 0 \\ 182 \cdot 9 \\ 172 \cdot 8 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 172 \cdot 5 \\ 160 \cdot 5 \\ 180 \cdot 5 \\$ | $\begin{array}{r} 183.7\\ 179.9\\ 176.3\\ 220.0\\ 183.4\\ 767.5\\ 191.0\\ 194.1\\ 197.1\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 169.2\\ 169.4\\ 177.1\\ 167.4\\ 175.0\\ 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| Dec. 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>Xef (20)<br>II<br>21<br>22<br>22<br>25<br>26<br>27<br>28<br>29<br>30<br>31<br>Sums<br>Differences<br>$\Delta X > 2$             | 141'8           167'4           171'1           127'1           180'6           182'4           187'3           179'6           165'2           173'4           165'7           167'3           161'2           166'7           168'7           168'7           169'3           123'0''           161'2           168'7           173'0           164'0                                                                                                                                                                                                                                                                                                                                                                                                                                            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                                                                                                                                                                                                                                                                                                                | $\begin{array}{c} 188 \cdot 0 \\ 177 \cdot 3 \\ 177 \cdot 3 \\ 176 \cdot 9 \\ 214 \cdot 6 \\ 179 \cdot 5 \\ 190 \cdot 3 \\ 199 \cdot 3 \\ 199 \cdot 0 \\ -191 \cdot 7 \\ 174 \cdot 2 \\ 165 \cdot 2 \\ 168 \cdot 0 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ -179 \cdot 0 \\ 168 \cdot 1 \\ 176 \cdot 4 \\ 173 \cdot 8 \\ 166 \cdot 6 \\ 174 \cdot 5 \\ -1 \\ 176 \cdot 4 \\ 173 \cdot 8 \\ 166 \cdot 5 \\ -1 \\ 176 \cdot 4 \\ 173 \cdot 8 \\ 166 \cdot 5 \\ -1 \\ 176 \cdot 24 \\ -1 \\ 178 \cdot 24 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ 136 \\ -1 \\ -1 \\ 136 \\ -1 \\ -1 \\ 136 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -1 \\ -$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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                                                                                                    | $\begin{array}{c} 174'9\\ 180'6\\ 176'0\\ 188'9\\ 182'6\\ 187'0\\ 192'6\\ 192'6\\ 177'4\\ 151'5\\ 163'6\\ 177'4\\ 151'5\\ 163'6\\ 177'4\\ 179'6\\ 163'9\\ 174'8\\\\ 169'5\\ 195'3\\ 181'1\\ 173'2\\ 154'2\\\\ 4304'3\\ 174'57\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 17'69\\\\ 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163°06<br>176°02<br>169°21<br>184°34<br>186°39<br>186°39<br>185°67<br>185°67<br>180°37<br>178°93<br>165°17<br>165°17<br>169°76<br>165°17<br>169°76<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>174°92<br>172°95                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |
| Dec. 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>.xeq [20]<br>Has 22<br>24<br>25<br>26<br>27<br>28<br>29<br>30<br>31<br>Sums<br>Differences                                      | 141'8           167'4           167'4           171'1           127'7           180'6           182'4           187'3           179'6           165'2           173'4           165'7           165'7           167'3           161'2           167'5           168'7           173'0           164'0           174'7           170'5           170'4                                                                                                                                                                                                                                                                                                                                                                                                                                              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87.6           169.1           169.4           77.78           186.3           157.5           179.3           157.5           179.3           160.6           186.3           188.7           160.6           169.9           163.4           169.6           170.7           176.8           160.6           170.7           176.8           160.7           187.3           187.0           187.3           162.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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\\ 167 \cdot 9 \\ 176 \cdot 4 \\ 167 \cdot 9 \\ 176 \cdot 4 \\ 167 \cdot 9 \\ 176 \cdot 4 \\ 167 \cdot 9 \\ 176 \cdot 4 \\ 167 \cdot 9 \\ 176 \cdot 4 \\ 167 \cdot 9 \\ 176 \cdot 4 \\ 167 \cdot 9 \\ 176 \cdot 4 \\ 167 \cdot 9 \\ 177 \cdot 4 \\ 184 \cdot 2 \\ 178 \cdot 6 \\ 157 \cdot 7 \\ \hline \\ \hline \\ 177 \cdot 4 \\ 20 \cdot 52 \\ \hline \\ 007285 \end{array}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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\cdot 0 \\ 179 \cdot 5 \\ 194 \cdot 0 \\ 179 \cdot 5 \\ 161 \cdot 2 \\ 168 \cdot 0 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 161 \cdot 5 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 170 \cdot 6 \\ 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177.1\\ 169.4\\ 177.1\\ 169.4\\ 177.1\\ 169.4\\ 177.4\\ 167.4\\ 177.4\\ 167.4\\ 173.4\\ 167.4\\ 173.4\\ 167.6\\ 183.6\\ 163.4\\ 174.4\\ 174.4\\ 174.4\\ 156.1\\ 183.7\\ 156.1\\ 183.7\\ 156.1\\ 183.7\\ 156.1\\ 183.7\\ 156.1\\ 178.16\\ 121.28\\ 1007554 \end{array}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 176^{-6} \\ 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723'6<br>165'3<br>179'8<br>77'3'<br>183'9<br>174'6<br>190'3<br>505'5<br>175'7<br>167'7<br>167'7<br>167'7<br>167'7<br>169'4<br>169'2<br>169'4<br>169'2<br>169'4<br>169'2<br>169'2<br>169'4<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'2<br>169'3<br>169'2<br>169'2<br>169'3<br>169'2<br>169'2<br>169'3<br>169'2<br>169'3<br>169'2<br>169'3<br>169'2<br>169'3<br>169'2<br>169'3<br>169'2<br>169'3<br>169'2<br>169'3<br>169'2<br>169'3<br>169'2<br>169'3<br>169'3<br>169'2<br>169'3<br>169'2<br>169'3<br>169'3<br>169'2<br>169'3<br>169'2<br>165'3<br>169'2<br>169'3<br>169'3<br>169'2<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>169'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>169'3<br>176'3<br>176'3<br>176'3<br>176'3<br>176'3<br>100'3<br>11'48<br>-0004075 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ⁿ<br>162'5<br>166'6<br>163'4<br>164'6<br>163'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'4<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>164'5<br>165'5<br>164'5<br>164'5<br>164'5<br>165'5<br>164'5<br>165'5<br>164'5<br>165'5<br>164'5<br>165'5<br>165'5<br>164'5<br>165'5<br>164'5<br>165'5<br>164'5<br>165'5<br>164'5<br>165'5<br>165'5<br>164'5<br>165'5<br>165'5<br>165'5<br>164'5<br>165'5<br>165'5<br>165'5<br>165'5<br>164'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5<br>165'5 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<pre>3913.4<br/>4061.4224.2<br/>4224.5<br/>4205.4424.2<br/>4229.3<br/>4473.4<br/>4473.4<br/>4456.0<br/>3964.0<br/>3964.0<br/>3964.0<br/>3977.0<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>3918.1<br/>4079.5<br/>4082.4<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-<br/>-</pre> 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163.06<br>176.02<br>189.21<br>184.34<br>180.39<br>186.39<br>185.67<br>180.37<br>178.93<br>165.17<br>160.98<br>167.45<br>167.45<br>167.45<br>167.45<br>169.98<br>163.25<br>174.02<br>169.76<br>174.02<br>174.02<br>174.02<br>174.93<br>169.76<br>177.95<br>178.38<br>167.65<br>172.95<br>172.95                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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### LAKE ATHABASCA—continued. A batract of Hourly Observations made during the months of January and February 1844.

### MAGNETICAL OBSERVATIONS.

### LAKE ATHABASCA—continued.

Abstract of Hourly Observations made during the months of January and February 1844.

Abs	bstract of Hourly Observations made during the months of January and February 1844.  Horizontal Force Magnetometer.														1													
Date.				Ho	rizontal I	orce Ma	gnetom	icter.												Hor	zontal ]	Force M	lagnetor	neter.			·	·
Gött. Mean. Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.		13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Means.
1 2 ^b 3 4 5 6 7	160.8 144.7 159.4 107.6 29.8	157.8 148.5° 160.6 71.6 103.1	80.8 156.4 159.1d 165.3 126.4	143 • 4 160 • 9 155 • 7 178 • 4 94 • 5	177.1 158.5 167.5 175.6 152.0	Chipew 173.0 159.6 166.7 166.3 155.8 Chipew	171.1 153.5 165.1 159.9 139.5	162·4 156·1 166·5 162·2 147·6		165 • 9 155 • 9 161 • 7 167 • 2 142 • 5	173 · 4 155 · 7 158 · 8 146 · 0 142 · 1	177 ° 0 156 ° 6 164 ° 6 164 ° 3 135 ° 8	181.9 156.8 168.5 160.3 140.4		$ \begin{array}{r}     173^{\cdot 1} \\     159^{\cdot 1} \\     175^{\cdot 2} \\     161^{\cdot 0} \\     155^{\cdot 1} \\     152^{\cdot 2} \end{array} $	157.5 179.0 158.1 145.1	161.0	168.5 159.1 \$19.2 158.7 137.4 143.3	171.8 159.0 205.0 154.6 150.8 151.9	165.3 159.1 108.5 156.2 142.8 153.5	164.2 159.1 224.0 182.7 146.5 147.3	89.9	54°7 157°8	154.3 159.7 152.7 152.7 156.6 Sunday 122.8 154.1		3756.8 3802.6 3506.1 3152.5 3329.1	162.01 156.53 158.44 146.09 131.35 138.71	
8 9 ^b 10 11 12 13	121 • 4 125 • 7 128 • 5 141 • 7 146 • 9 142 • 7	$\begin{array}{c} 121{}^{\circ}8\\ 133{}^{\circ}9\\ 127{}^{\circ}9\\ 134{}^{\circ}1\\ 148{}^{\circ}9\\ 145{}^{\circ}0\end{array}$	$\begin{array}{c} 125 \cdot 7 \\ 129 \cdot 8 \\ 126 \cdot 9 \\ 112 \cdot 4 \\ 152 \cdot 4 \\ 143 \cdot 8 \end{array}$	128 2 138 9 130 9 144 0 150 4 146 1	$\begin{array}{c c} 129 \cdot 3 \\ 145 \cdot 9 \\ 135 \cdot 1 \\ 146 \cdot 4 \\ 150 \cdot 0 \\ 146 \cdot 3 \\ \end{array}$	133 9 140 1 140 4 144 5 156 2 144 7	$\begin{array}{c} 125 \cdot 4 \\ 128 \cdot 8 \\ 140 \cdot 2 \\ 141 \cdot 5 \\ 144 \cdot 0 \\ 143 \cdot 7 \end{array}$	$\begin{array}{c} 133 \cdot 0 \\ 143 \cdot 1 \\ 138 \cdot 1 \\ 136 \cdot 8 \\ 142 \cdot 4 \\ 141 \cdot 5 \end{array}$	$136.5 \\ 138.1 \\ 142.8$	$122.6 \\ 140.5 \\ 143.0 \\ 144.9 \\ 144.2 \\ 142.6 \\$	$134 \cdot 2 \\ 142 \cdot 5 \\ 138 \cdot 1 \\ 146 \cdot 1 \\ 143 \cdot 0 \\ 144 \cdot 4$	$154.6 \\ 135.0 \\ 157.1 \\ 145.3 \\ 153.3 \\ 146.5$	$\begin{array}{c} 152 \cdot 1 \\ 157 \cdot 1 \\ 154 \cdot 8 \\ 147 \cdot 9 \\ 149 \cdot 5 \\ 146 \cdot 3 \end{array}$		148.4 139.9 151.4 152.5 147.7	144.1 150.5 148.5 147.4 155.3 147.6	147.1	147.4 150.7 155.4 144.2	145.5 ^a 140.7 149.1 155.0 142.6	$144 \cdot 1 \\ 141 \cdot 4 \\ 150 \cdot 4 \\ 159 \cdot 8 \\ 147 \cdot 1 \\$	146.2 148.9 150.0 163.6 141.6	-	e 141 · 9 144 · 7 145 · 0 138 · 3	131 · 3   137 · 1   143 · 0   143 · 2 Sunday   140 · 4	$ \begin{array}{c} 125.7\\138.1\\148.4\\141.6\\140.7\\140.7\end{array} $	3368.6 3461.9 3607.2 } 3468.9	140.71 140.30 144.25 150.30 144.54	> 146.70
14 15 16 17 18 19 20	143.6 156.3ª 123.5 137.3ª 134.3 148.9ª	142°5 157°0ª 135°3 137°9 135°5 141°2ª	142.9156.8147.8136.7132.7137.1	$ \begin{array}{r}     141 \cdot 5 \\     156 \cdot 4 \\     150 \cdot 4 \\     131 \cdot 6 \\     131 \cdot 0 \\     139 \cdot 3 \end{array} $	At For 142.3 155.5 147.7 123.5 127.7 140.8	$     \begin{array}{r}       141 \cdot 6 \\       155 \cdot 3 \\       145 \cdot 7 \\       127 \cdot 7 \\       128 \cdot 4 \\       143 \cdot 1 \\     \end{array} $	$140.0 \\ 153.4 \\ 144.3 \\ 137.9 \\ 128.9 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.2 \\ 187.$	$140.5 \\ 152.5 \\ 142.4 \\ 132.8 \\ 131.9 \\ 137.6$	$\begin{array}{r} 138 \cdot 2 \\ 148 \cdot 8 \\ 139 \cdot 8 \\ 139 \cdot 3 \\ 134 \cdot 9 \\ 135 \cdot 0 \\ 150 \cdot 5 \end{array}$	$\begin{array}{r} 140 \cdot 4 \\ 148 \cdot 6 \\ 139 \cdot 7 \\ 135 \cdot 7 \\ 134 \cdot 1 \\ 136 \cdot 4 \end{array}$	$\begin{array}{r} 141 \cdot 5 \\ 151 \cdot 2 \\ 144 \cdot 4 \\ 139 \cdot 9 \\ 132 \cdot 3 \\ 138 \cdot 7 \end{array}$	$143.7 \\ 153.1 \\ 143.1 \\ 133.8 \\ 128.8 \\ 133.4 \\ 133.4 \\$	$\begin{array}{c} 142 \cdot 0 \\ 152 \cdot 4 \\ 144 \cdot 7 \\ 144 \cdot 1 \\ 133 \cdot 6 \\ 129 \cdot 1 \end{array}$		144'6 153'6 146'3 140'8 141'2 131'4	147.6 152.8 145.6 145.5 147.8 131.2		153.2 152.7 140.5 140.7 153.4 ^a 134.9	133.4	154·9º 131·1	157.3 152.4 141.5 135.8 155.8 132.6 a	138.5 160.3ª	154.0ª 145.6ª 124.9 104.5ª	142.5 132.5 121.1 Sunday	137.5 143.5ª	3304.5	143.35 136.00 137.69 134.33	
21 22 23 23 24 25 26 27	112.3 138.4 112.6 46.4 127.4 h115.6	112·1 131·3 117·6 24·5 130·0 111·3ª	$ \begin{array}{r}     114.1 \\     128.1 \\     115.9 \\     66.9 \\     124.0 \\     116.3 \end{array} $	$     \begin{array}{r}             109.4 \\             125.5 \\             118.5 \\             129.3 \\             129.3 \\             123.2         \end{array}     $	At For 110.2   127.3   119.3   140.4   125.5   118.1	t Chipew 108·4 124·7 118·6 141·4 125·3 116·4	$102.3 \\ 124.7 \\ 115.9 \\ 134.5$	$\begin{array}{r} 120.7\\ 126.3\\ 117.2\\ 130.8\\ 127.8\\ 112.7\end{array}$	$\begin{array}{r}$	$\begin{array}{r}\\ 130 \cdot 5\\ 132 \cdot 2\\ 121 \cdot 4\\ 142 \cdot 3\\ 125 \cdot 7\\ 117 \cdot 1\end{array}$	134.7134.7125.4145.1128.4113.3	$133.7 \\ 132.2 \\ 125.4 \\ 141.7 \\ 125.3 \\ 117.5$	$\begin{array}{r}$		$134.7 \\ 133.1 \\ 128.8 \\ 135.7 \\ 127.4 \\ 118.1 \\$	$132.1 \\ 133.0 \\ 127.8 \\ 132.4 \\ 125.6 \\ 122.7 \\$	181.8 181.1 139.9* 127.2 125.7 121.1	$137 \cdot 1 \\ 127 \cdot 1 \\ 147 \cdot 3^{a} \\ 128 \cdot 4 \\ 127 \cdot 7 \\ 125 \cdot 5 \\$	142.1s 128.5 74.0a 120.1 119.8a 126.0	$126.5 \\ 119.1 \\ 131.8$	$142.8 \\ 124.8 \\ 112.0 \\ 125.1 \\ 124.9 \\ 135.5 \\$	156.8* 126.5 52.6 128.5 122.8* 108.3	51.7* 123.0 120.1	59.2" 123.8 "82.3" Sunday	126.0 90.8ª	2609.8	130.65 128.46 108.74 120.97 123.03 120.18	130-94
28 29 30 31	119 1 139.6 138.6ª	136·1 148·3 140·1	135·0 149·0 138·4	136·0 150·3 139·2	At For 137.0 147.3 137.6	t Chipev 124.0 146.4	vyan. 135°0	$134.6 \\ 147.4 \\ 139.7$	133°2 151°8 138°5		$131 \cdot 8 \\ 148 \cdot 6 \\ 135 \cdot 0$	$133^{\circ}2 \\ 146^{\circ}7 \\ 142^{\circ}2$	$139.8 \\ 147.9 \\ 143.2$		$   \begin{array}{r}     138.0 \\     147.4 \\     140.4 \\     \overline{3455.6}   \end{array} $	137.8 151.5 139.0 3455.0	137.7	140.8 149.6 139.2 3506.5	$   \begin{array}{r}     141 \cdot 0 \\     151 \cdot 1 \\     143 \cdot 9 \\     \overline{3428 \cdot 0}   \end{array} $	140.5 159.4ª 157.4ª 3511.4	$     \begin{array}{r}       145 \cdot 3 \\       157 \cdot 6 \\       137 \cdot 2 \\       3545 \cdot 2     \end{array} $	$ \begin{array}{r} 145.5 \\ 147.2 \\ 139.9 \\ 3320.5 \end{array} $	143.6 117.7 × 159.5m	143.8 137.3 144.3 ⁿ	106·3 138·6 112·2 ^m	3246.8 3527.1 3353.2 79636.5	135°28 146°96 133°72	
Sums -	3016.6	3062.2	3210.1	3300.0	3360.9		3301.5				3353.4				143.98	143.96			142.83		147.72	138.35	·[	132.80		138.26		
Means -	125.69	127.59	133.75	137.50	140.04		137.56			139.19		142.16	-		26.70	26.68			25.55	29.03	30.44	21.07	12.42	15.52	0.00			
Differences	8.41	10.31	16.47	20.22	22.76	22.44	20.28	21.02	22.78	21.91	22.44	24.88	25.48															
$\left  \frac{\Delta X}{X} \right\}$	·002986	•003660	·005847	•007178	·008080	•007966	•007199	007462	•008087	•007778	·007966	008832	2 .009045		009478	3 009471	009876	010231	009070	010306	010806	007480	004409	005510	000000		-	
Jan. 31 Feb. 1 2 3 4	$49^{\cdot7}$ 133 · 7 145 · 0	3:4 130:0 133:8	82.8 132.1 137.8	109'7 132'5 138'2	120.5 117.3 137.5 At For	112.4 138.6 t Chipe	132.4 67.0 132.0 wyan.	- 1	139·5 139·2 144·4		135.6 152.0 151.0	{	158°0 139°3		147.9 154.4 158.0 176.3	142.9 154.5 168.6 178.4	165.4 173.7 180.4	137.0 161.7 156.0 193.7 144.8	155.8 ⁿ 155.7 143.1 214.8 ⁿ	163.0 170.4 145.1 195.4	178.4	201.0 159.3	140.8	Sunday   149.4   80.7	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	3085.9 3556.3 3482.2 3395.6	128.58 148.18 145.09 141.48	146.08
5 6 7 8 9 10	$\begin{array}{c} -48.0 \\ 67.4 \\ 445.0 \\ 74.5 \\ 162.1 \\ 162.5 \end{array}$	69°0 151°5 139°2 111°5ª 164°3 155°8	160.9 140.3 134.1 123.8 162.3 153.6	124·4 142·4 142·8 133·1 162·7 153·9	109.0 145.9 148.9 122.2 161.4 152.6 At For	$137.4 \\ 148.5 \\ 79.3 \\ 161.3$	145.1 136.9 161.8 153.3	$135.8 \\ 143.1 \\ 146.3 \\ 154.7 \\ 161.0 \\ 155.6 \\$	$153.9 \\ 161.9$	$155.0 \\ 117.8 \\ 149.1 \\ 155.3 \\ 163.3 \\ 148.4 $	$150^{\cdot}3 \\ 146^{\cdot}0 \\ 178^{\cdot}9 \\ 165^{\cdot}8 \\ 163^{\cdot}6 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 \\ 162^{\cdot}4 $		177.0 151.4 154.9 169.1 162.4 179.4		$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	146°6 167°1 175°2 162°3 163°0 	156°6 173°0 162°2	172.7 162.5 158.3 158.4	$   \begin{array}{c}     162.4 \\     163.5 \\     162.9 \\     156.8 \\   \end{array} $	$ \begin{array}{r} 162.6\\ 154.8\\ 165.8\\ 172.9\\ 158.1\\\\ 153.6* \end{array} $	-	153.0 164.2 166.3 162.4 161.2 108.1	117.24	162.2 163.3 131.3 Sunday 133.8	128.1	3428.8 3703.3 3507.9 3886.1 3641.6 3442.2	142.87 154.30 148.66 161.92 151.73 143.42	
11     12     13     14     15     16     17	140'8 134'5 150'2 126'3 174'6 164'9	142.5 149.1 149.7 143.2 172.4 177.4	$143.7 \\ 150.8 \\ 148.1 \\ 157.8 \\ 162.8 \\ 179.2$	$\begin{array}{r} 141 \cdot 4 \\ 152 \cdot 5 \\ 147 \cdot 2 \\ 151 \cdot 7 \\ 164 \cdot 2 \\ 184 \cdot 2 \end{array}$	$142.8 \\ 140.4 \\ 144.7 \\ 147.6 \\ 180.4 \\ 180.3$	$139.4 \\ 138.7 \\ 145.2 \\ 143.9 \\ 174.2 \\ 175.6 \\ 175.6 \\ 175.6 \\ 175.6 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 \\ 1000 $	140°8 136°6 146°3 149°0 173°5	$\begin{array}{r} 144.7\\ 138.3\\ 147.2\\ 156.3\\ 163.6\\ 180.5 \end{array}$	$141^{\cdot}4\\139^{\cdot}7\\147^{\cdot}8\\154^{\cdot}0\\176^{\cdot}4\\182^{\cdot}1$	154.6 178.3	$\begin{array}{r} 143 \cdot 3 \\ 139 \cdot 7 \\ 151 \cdot 2 \\ 157 \cdot 5 \\ 176 \cdot 6 \\ 185 \cdot 6 \end{array}$	1107	153.0 142.7 148.4 167.7 176.0 194.3		145°9 148°6 172°7 184°8 197°6	145.5 149.3 173.3 187.5 201.9	$ \begin{array}{c} 147.5 \\ 148.2 \\ 177.9 \\ 189.2 \\ 202.6 \\ \end{array} $	148.6 181.4 185.6 204.6	181.6 193.5ª 189.9	149.3 161.8 182.1 200.2 189.7	154.6* 172.6 182.6 184.1 183.0	158.4 159.3ª 166.4 183.6ª 178.5 164.6	179.1	150.4 147.6 177.0 157.9 Sunday	150.8 150.0 174.5 171.7ª	3493 · 9 3633 · 9 3936 · 0 4260 · 2 4459 · 6	$ \begin{array}{r} 145.58\\151.41\\164.00\\177.51\\185.82\end{array} $	
18 19 20 . 21 22 0 23 0 23 0 24	179°0 184°2 158°2 200°6 197°3 188°6	180·2 183·8 166·4 192·4 194·9 187·9	$ \begin{array}{r}    $	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	At Foi 183.6 181.0 181.0 192.3 200.2 182.3	182.7 180.2 179.1 187.1 199.6 183.6	vyan. 182.4 179.8 178.2 184.5 197.3 183.2	181.6 173.3 176.2 184.4	1 197 - 9	199.4	185°1 191°8 179°3 193°7 198°3 183°8	187.8 191.6 180.4 193.2 198.6 183.0	188.0 194.7 183.0 194.1 201.8 181.4		190.7 196.6 180.1 198.1 204.0 181.4		1 107.0	102.6	187.1 192.6 189.7 196.4 199.8 181.0		1.0 1	1.0 1	186.8 192.5 186.7 186.6 196.7 196.7	Bunuay	179.2 172.6 178.6 202.2 189.1	\$ 4361.8	198.20 181.74	177-22
E 26 27 28	176·7 163·6	162.6 174.2ª	157.3	179·9 180·4	At For 181.9 176.0	t Chipe 181 8 174 4	wyan.   179°6   174°2 	177.6 171.4	181·4 173·6	178·9 173·2	187·9 176·0	190·2 175·9			190·4 175·8	173.4	174.1	191·9 170·9	195.9 167.0		198·3 172·2	202.9	191·7	a	100'3	4362.1	181.75 172.91	J
Sums -	3258.4	3428.4	3612.1	3660.5	3629.8	3551.6	3595 . 9	3655 • 5	3749.1	3727.4	3855.4	3881.8	3925 • 3		3957·4		-	3969·9 172·60		4035.7	4044.1			3625.4	3578.2	90385.1	163.74	
Means -	141.67	149.06	157.05	159.15	157.82	154.42	156.34	158.93	· · · · · · · · · · · · · · · · · · ·	162.06					30.39			30.93			34.16	29.57			13.90	3929 79	103 74	
Difference	0.00	7.39	15.38	17.48	16.12	12.75	14.67	17.26	21.33	20.61	25.96	27.10	29.00			-	-		-		1							
$\frac{\Delta X}{X}$	·000000	002623	005460	006205	005733	004526	•005208	3 .000127	007572	1	<u> </u>	1	010295		!	8)•011229	1	ie.	1	0 1	hree mi	 inutes la	l ate.	1	3 004934	l	-	
⁴ Visible ⁴ Fifteen	aurora.	lata		tted from t 21 ^h 30 ⁿ	1 the Mea	ns, as b	eing inc	omplete n minut	es late.	c	Seven n s Ten n	ninutes ninutes	late.		÷."			4	Increas	ing nur	bers de	note inc	crease of	f Horiza	ontal Fo	rco.		

^d Fifteen minutes late. ^b Twenty minutes late. Multed from the Means, as being incomplete. Seven minutes late. • At 2U 30m 132.7 Seventeen minutes late. • Nine minutes late. If Ten minutes late. ~

### FORT SIMPSON. ٢

# FORT SIMPSON.

	Abstract	; of Hor	rlv Obs		FORT 15 made			onths o	f April	and M	ay 184	.4.	τ.,			Ab	stract o	of Hou	rly Obs	ervatio	ons mad	le duri	ng the 1	nonth	s of Ap	ril and M	ay 1844.	•
Date.	Abstract						gnetom						1		1					Ho	orizonta	l Force	Magneto	meter.				
Gött. Mean Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	Ĩ	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Means.
1 2 3 4 5	112'4 235'6 233'6 124'7	180.9 234.5 250.8 176.5	140.2 231.0 248.6 222.5	146.9 210.3 226.1 224.8 248.3	203·2 191·0 125·3 219·8 244·0	208.4 213.1 115.9 255.5 228.8	193·7 182·0 243·0	210.6 243.9 211.6 241.5 254.3	219·2 230·2 248·2 265·5 246·5	221.5244.9245.8241.8241.8246.3	246·4 233·6 252·5 243·1 237·4	228.4 235.1 246.7 242.8 250.3	235·3 238·8 252·9 251·8 298·0		245.6 235.1 242.0 254.7 522.2	262.0 244.3 254.3 249.3 263.8	253·7 245·9 263·6 257·3 283·0	255·3 260·7 276·8 253·5 286·1	266.5ª 248.7ª 261.3ª 300.8 291.4	253.6ª 276.3ª 278.6ª 294.9  281.1ª	248.9 284.7 262.8 281.9ª \$72.2	240.3 241.6ª 251.2 273.7 265.0ª	238.5*	163.5 160.0 199.3 229.1 244.5 235.4	233.2 199.4 79.3 214.3 236.3 244.4 ^a	614·4 5120·6 5490·1 5625·1 5837·9 6130·6	213·36 228·75 234·38 243·25 255·44	234-14
6 7 9 10 11 12 13	240.7 247.1 249.9 229.3 243.2 ^a 221.3 225.5	237.8 253.1 203.8 221.3 225.5 233.5	$\begin{array}{r} 243 \cdot 1 \\ -245 \cdot 8 \\ 247 \cdot 0 \\ 218 \cdot 0 \\ 188 \cdot 9 \\ 238 \cdot 2 \\ 230 \cdot 0 \end{array}$	248 5 247 2 251 5 187 6 229 7 236 3 233 5	242·1 246·7 223·0 243·6 237·4 232·0	248.7 247.2 242.5 237.1 233.8 228.0	$248.9 \\ 251.8 \\ 238.6 \\ 239.2 \\ 228.3$	245.9245.7234.8233.7228.8224.0	245.0296.4234.9229.9226.8218.2	$\begin{array}{r}$		$244 \cdot 2 \\ 244 \cdot 7 \\ 227 \cdot 8 \\ 224 \cdot 5 \\ 223 \cdot 8 \\ 219 \cdot 2$	245.7 245.5 251.7 231.8 229.8 220.2		249.6 246.0 219.0 219.8 223.6 222.7	254.6 240.5 240.8 224.3 229.3 222.5	250.4 251.3 234.0 229.4 226.3 222.3	248.7 256.9 232.9 226.2 221.1 229.3	256·3 250·1 239·9 244·8 216·5 232·1	253°0 249°9 236°7 ⁿ 243°2 226°1 233°1	237 · 0* 221 · 9 229 · 8*	216.7 223.5ª	262-8 241-6 ^a +15-8 ^a 220-2 231-8	253 · 3 195 · 6* 186 · 6 231 · 3 210 · 4	254·3 187·8 242·2 230·9* 221·6	5897.9 5356.4 5512.0 5417.1	250 °01 245 °75 223 °18 229 °67 225 °71 226 °09	
10	214.87	221.77	223.03	222.02	218.97	223.55	225.59	234.05	241.89	235 • 38	235.51	235-23	245.59		237.30	244:97	247.02	249.86	255.31	256-95	252.33	244 87	220.92	209.91	213.06	-	-	
14 15 16 17 18 19 20	270.6 159.0 238.5 191.1	127.4 -60.8 ^h 253.0 199.6		215 ° 6 264 ° 6 125 ° 0 277 ° 0 222 ° 0 251 ° 8	279·8 252·6 757·4 273·8 270·1 266·4	291.9 252.4 108.5 266.5 263.6 270.8	282.0 260.2 131.8 272.0 256.5 270.8	275°5 271°8 226°7 280°5 263°8 271°5	275°6 269°3 254°6 272°4 261°8 263°8	276.0 248.0 294.1 271.9 260.8 260.8	276.5 269.3 316.7 259.3 260.6 263.0	282'8 280'1 325'7 283'4 260'2 261'8	274.0 286.6 333.2 261.8 267.8 263.7		284 '4 298 '2 343 '9 260 '8 265 '6 258 '0	285·3 354·6 294·9 281·7 259·1 263·3	289.6 377.6 262.7 262.7 260.6 263.3	262.9	271.6 286.6a 268.5 262.4 265.6 262.4	282.8 193.8 270.9 268.8 269.3 269.3	276.8ª 274.0 272.2 272.5 271.5	202.7 ^a 286.4 269.4 ^a 269.1 ^a 267.2 ^a	137'8 ⁿ 280'9 268'9 ⁿ 260'8 ⁿ 264'5	270 * 8 286 * 6 130 * 0 ⁿ 281 * 6 ⁿ 265 * 3 ⁿ 244 * 7 ⁿ 251 * 0 ⁿ	255.1 161.5 244.0ª	841.6 6287.3 5575.9 6129.6 6136.4	261 • 97 255 • 88 232 • 33 270 • 23 255 • 40 255 • 68	256•21
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	221.1 178.3 267.3 182.7 26.8 137.8	216.6 207.3 93.0 247.3	243°4 229°1 272°8 90°4 215°3 258°3 258°3	$ \begin{array}{c c}$	268°3 252°9 275°6 224°0 187°0 291°8 163°0	269·1 270·3 275·5 255·3 122·3 270·0 210·8	265.4 271.6 271.4 243.6 219.2 232.8 	268.8 273.4 269.2 226.6 259.5 250.2 261.2	277 • 4 271 • 5 269 • 8 286 • 0 263 • 4 263 • 5 258 • 0	265.3 266.6 268.6 278.2 271.3 268.5 261.5	260.5 268.0 269.6 257.0 269.5 263.0 263.3	259.8 268.3 272.1 289.6 275.1 279.9 275.7	262·4 266·0 273·2 316·9 292·1 279·9 		270.6 265.9 273.0 288.8 296.8 287.6 259.3	269 [•] 4 270 [•] 5 275 [•] 1 266 [•] 1 297 [•] 1 283 [•] 2 260 [•] 3	265.7 273.3 270.9 257.3 280.3 276.6 285.1	309·2 273·6	266 ^{.9} 278 ^{.0} 286 ^{.2} 283 ^{.5} 277 ^{.4} 287 ^{.6} 262 ^{.5}	268*3 282*4 292*7 265*3 200*9 260*4 281*5 278*6	268.6 274.1 304.2 269.9 <i>486.3</i> 289.2 268.3 265.3	270.9 266.1 288.6 239.4 290.9 170.9 261.3 246.1		267.8 278.5 266.6 255.1 255.8 255.8 225.0 261.1 118.2	228'3 240'5 256'3	6203·2 5821·4 } 6154·6 5870·2 5845·0	275.84 242.56 230.65 256.44 244.59	254.81
29 30	251.0 143.0	186°0 173°6	137°0 250°6	174.8 260.0	162.0 256.8	253.9	258.8	237.8	250.1	251.5	249.7	254.6	277.4		.280.4	326.4	324'9	308.7	308.9	278.6	205 5	240 1	300	778 x	189.7	0040 0	240 04	7 204 01
1 2 3 4 5 6 7 8	219°5 262°0 263°9 249°6 237°8 247°7	243°2 207°8 256°7 256°7 229°6 248°9	$\begin{array}{c c} 259^{\circ}2 \\ 266^{\circ}5 \\ 258^{\circ}3 \\ - \\ 262^{\circ}6 \\ 225^{\circ}6 \\ 182^{\circ}1 \end{array}$	267 · 2 232 · 1 249 · 7 269 · 0 248 · 9 176 · 1	243'7 234'3 231'6	221.6	220'4 267'4 243'2 260'0 245'6 249'3	270.5 268.6 260.4 262.0 263.7 253.3 271.0	266.0 259.8 257.4 262.9 261.1 250.6 269.0	253·4 260·9 255·6 253·0 262·0	251.9 260.8 256.5 264.7 256.1 259.6 259.3	264.9 261.6 258.7 265.2 259.1 290.9 273.1	$\begin{array}{c} 263.4 \\ \\ 257.6 \\ 268.1 \\ 298.4 \\ 275.2 \end{array}$		288.0 303.6 260.3 208.7 262.7 258.6 306.7 270.3 258.6	280°8 296°0 264°1 267°0 258°6 269°2 286°2 259°5 260°6	287·3 336·4 264·2 267·4 268·9 275·8 294·3 276·1 281·8	271.2 269.2 277.3 272.5 294.4 263.9	288.2 309.2 266.4 278.6 277.6 300.3 284.4 264.4 264.5	$\begin{array}{c} 265 \cdot 3 \\ 298 \cdot 6 \\ 261 \cdot 6 \\ 285 \cdot 7 \\ \hline \\ 270 \cdot 6 \\ 272 \cdot 4 \\ 298 \cdot 3 \\ 262 \cdot 6 \\ 269 \cdot 5 \\ \end{array}$	242.5 \$39.6" 267.6 286.7" 271.3 275.1 286.5 255.2 280.1	269.4	279·7 259·9 267·6 238·5 276·7 254·7 226·3 262·1 267·7	263.7 226.9 267.3 215.4 280.7 467.9 241.7 254.8 253.4	240·3 259·8 257·3 241·4 253·8	6402.4 5969.2 6247.6 6264.8 6146.8 5998.0 6245.7	268.94 248.72 260.32 261.03 256.12 255.58 249.92	
9 10 11 12 13 14 15 16 17 18	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	215.8	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	267 ( 263 S 267 ( 278 S 256 S 250 S	$\begin{array}{c ccccc} & -& -& -& -\\ & 260^{\circ}5 \\ & 264^{\circ}5 \\ & 243^{\circ}0 \\ & 247^{\circ}9 \\ & 257^{\circ}4 \end{array}$	261.0 259.5 267.3 259.8 259.8 259.8 254.6 254.6	$\begin{array}{c c c} 258.5 \\$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	263.5 267.0 256.5 245.3 249.8 253.0	255°2 267°1 266°0 275°5 254°6 263°9 254°2		264·3 269·9 307·3 291·8 251·8 258·4 269·9	262·9 269·7 325·7 266·1 257·6 248·4 251·8	267.9 271.3 281.7 268.3 255.6 245.2 249.1	261 [•] 3 268 [•] 2 284 [•] 0 268 [•] 4 259 [•] 9 250 [•] 9 257 [•] 1	272·1 292·5 282·1 257·8 248·6 248·1 274·9	262°3 325°6 280°2 263°2 256°8 252°4 283°3	266'3 305'1 273'4 262'4 262'4 261'9 253'0 262'3	267 · 9 207 · 0 260 · 4 256 · 7 267 · 5 262 · 4 258 · 9 259 · 8	274 · 1 273 · 7 241 · 4 262 · 8 245 · 9 246 · 6 	268°6 247°1 259°2 240°4 240°6 248°2 245°4 245°4	$\begin{array}{r} - \\ 267.6 \\ 270.6 \\ 270.1 \\ 236.9 \\ 253.9 \end{array}$	$\left.\begin{array}{c} - \\ 6465 \cdot 9 \\ 6458 \cdot 5 \\ 6242 \cdot 1 \\ 5932 \cdot 6 \\ 6043 \cdot 0 \\ 6151 \cdot 5 \\ 6102 \cdot 6 \end{array}\right.$	260.79 269.41 269.10 260.09 247.19 251.79 251.79 256.31	257-57
19 20 21 22 23 24 25 26	255 · 6 229 · 5 229 · 5 212 · 1 	264.	0 224 0 112 1 203	8   100°0 8   208°0 8   215°0 	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	266. 262. 237.	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$5   248 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   257 \cdot 3   $	$   \begin{array}{c cccccccccccccccccccccccccccccccccc$	$5   242 \cdot 1$ $3   233 \cdot 1$ $7   265 \cdot 4$	237·3	271.3 $253.4$ $260.1$	4   308.9 L   241.0		250°3 278°9 252°9 260°7 279°5	251.6 267.9 325.4 251.9 285.3	205°5 258°6	264.7 267.5 252.9	251·1 259·4 225·6 261·7 260·3	254·8 251·4 257·7 260·7 	249.9 232.7 268.8	254.9 282.4 251.4	251.7 246.2 242.8 239.8 — — —	259·2 233·2 248·3 243·4	254.8 140.5 247.3 244.9	6053 · 6 5761 · ( 5916 · 5 	3 252·23 235·38 240·04	
27 28 29								1 -			-								-							Ξ		243.54
30 31 Mean 15 th Ap to 24 th M		50 212.5			20 238.7								3 272.49			3 276.94			3 272.45	267:20	266.60	258.07	248.30	245.3	245.18		-	
10,278-10		1	1								oh 90m 1								Thoreas	ing nur	nhers de	enote ar	n increas	e of H	rizontal	Force		

Visible aurora.
 ^b Beyond the zero of the scale.
 ^c At 3^h 30^m 123[•]5.
 ^d At 1^h 30^m 193[•]0.
 ^c Taken at 1^h 20^m.

Increasing numbers denote an increase of Horizontal Force. Q

 $\mathbf{224}$ 

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a service a sublicity of the first sector of the service of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the sector of the

# LAKE ATHABASCA.

# Abstract of Hourly Observations made during the month of October 1843.

Date. Gött. Mean		· · · ·			. It	duction	Inclino	meter.		4			·····	.]
Time.	Noon.	1.	2.	3.	4.	5.	6,	7.	8.	9.	10.	11.	12.	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 10 21 23 24 25 26 27 28 20 30 31 Sums -	2007	244-6° 137-0 115-5 239-2 247-0 523-2 248-3 248-3 284-8n	$\begin{array}{c} \$\$7.7\\ 131.5\\ 120.2\\ \hline 232.0\\ 237.3\\ \hline 248.1\\ \$59.7\\ 252.5\\ 257.6\end{array}$	241.4 252.4 252.4 255.5 249.8 265.3 265.3 265.3 265.3 265.3 265.3 265.3 265.3 265.3 265.3 265.3 265.3 265.3 265.4 265.3 265.7 3095.6		123 ·9 133 ·8 120 7 123 ·9 239 ·4 245 ·1 244 ·3 253 ·9 253 ·4 244 ·3 253 ·9 253 ·4 245 ·1 244 ·3 253 ·9 257 ·3 262 ·6 266 ·0 257 ·3 3052 ·7	141.6 118.6 116.7 241.1 185.0, 246.1 245.1 250.4 253.0 278.9 269.7 266.3				133:77 130:47 120:48	123.8 127.0 120.9 1249.4 249.4 249.4 249.4 249.4 252.2 3261.8 252.7 0 268.9 264.4	12. 	
Teans -	264.54	257 • 92	234 ⁱ •36	221.11	217.28	218.05	210.97	215.79	217.86	218.43			215.87	*

Visible aurora,

226

^b Not included in the Mean at the foot, being imperfect days.

# MAGNETICAL OBSERVATIONS.

### Francisco a manager a de la company

化氯化化物化 化丁基苯基化化物物物 化酸化物等物化物 化化化合物化合物化合物 化硫酸盐 法收益

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	 L'		3		.'		n Na Sa Na		-		t se		よい時に、 、2013年1月 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日日 1月1日 1月1日日 1月1日日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月11日 1月111日 1月111日 1月111日 1月111日 1月111日 1月1111 1月11111 1月11111 1月11111111
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# LAKE ATHABASCA.

# Abstract of Hourly Observations made during the month of October 1843.

			,		1	nductio	on Inclin	ıometer	•			÷ .	
13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Means.
 	121.*8 138.*0 126.*4 115.*2 242.*5 233.*0 241.*9 240.0 244.*9 244.*9	119·4 129·8a 122·8 122·3 120·1 233·4 254·3 254·3 244·1 244·7	134-00 122:5a 115:9 109-1 238:9 233:8 253:55 247:7 250:4 246:14	122:5 122:5 122:5 122:5 123:9 236:9 236:9 236:9 236:9 239:5 254:4 244:7 255:4 244:7 255:4 244:2 244:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 245:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 255:2 25	115·1ª //3·8ª 110·4 110·4 110·4 1234·6 227·0 253·4 253·4 258·1	184'1" 	233 	118:94 163:94 163:94 163:94 192:0 225:24 225:22 243:8 2269:6 3/0':0 ⁴ 307'0 ²	246:3 246:4 277:6 277:6			214:53 142:62 146:61 121:15 140:76 240:246 240:246 233:33 250:32 254:95 233:00 388:93	
256·3 259·8 264:4 255·6	253·8 256·5 258·9 259·4	258·8 252·0 262·9 260·9	256.8 254.1 261.5 259.7	251.6 260.7 270.6 255.8	254.5 268.9 ^s 259.8 277.3 ^s	264.7 266.5ª 261.4 290.5	264 8 287 8 2 264 8 261 4	276.9* 271.5 316.7	279·7* 273·3 847·7	266·0 285·0 390·2	6472.5 6445.2 6812.1 5710.8	269.69 268.55 283.84 276.144	<u>.</u>
	2985 · 9 213 · 28	<u> </u>			2959·7 211·41				3482·0 248·71	3515·0 251·07	75326·8 5398·90	224 98 224 95	

 $^{\rm c}$  Means by the observations forming complete 8-hourly services,  $$\mathbf{Q}$-}\mathbf{2}$ 

### LAKE ATHABASCA-continued.

Abstract of Hourly Observations made during the months of November and December 1843.

Date. Gött.					Indu	ction Inc	linome	ter.						
Mean Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	
1 2 3 4 ^b	106.0 100.4 222.0	115·2 93·7 124·6	133·3 98·8 106·9	97.1 97.0 103.9d 99.8	$98.1 \\94.8 \\99.9 \\102.9$	$\begin{array}{r} 91.5\\ 102.3\\ 104.5\\ 103.1 \end{array}$	96'1 106'4 106'7 104'0	100·3 107·3 110·8 103·5	101.8 107.4 114.3 108.0	105.8 110.2 113.1 109.5	105.2 99.6 109.2 114.2	105.8 96.7 112.7 108.5	102.8 95.4 110.9 112.4	
5 6 7 8 9 10 11 12	223'4 113'1 120'4 135'9 113'9 144'1	127'9 104'7 124'8 01'8 109'2 125'4	122.9 103.4 114.3 102.5 119.4 109.0	111·2 110·4 129·9 106·1 121·6 109·8	$\begin{array}{r} 102.6\\119.3\\122.2\\107.3\\124.2\\113.2\end{array}$	118'9 121'6 110'1 115'9 120'2 122'7	109.8 115.5 111.8 120.1 114.5 128.1	115.8 125.9 117.3 120.5 115.7 125.2	113.0 113.4 114.7 122.2 119.3 123.2	109.0 101.2 122.5 122.1 133.4 121.4	110.6 110.8 129.8 118.9 124.0 120.1	115·3 109·6 114·0 115·0 118·8 118·4	114.9 110.8 106.0 122.7 115.8 118.5	
13 14 15 16 17 18	123.8 117.9 123.9 118.4 122.3 124.7	113.9 119.9 136.0 121.1 123.8 122.7	$\begin{array}{r}$	$     \begin{array}{r} 138 \cdot 5 \\     118 \cdot 2 \\     151 \cdot 1 \\     117 \cdot 2 \\     126 \cdot 9 \\     121 \cdot 8 \\     \end{array} $	$\begin{array}{r}$	150.1 112.5 115.9 119.7 121.8 122.0	188.7 119.1 120.4 127.1 125.8 131.3	$     \begin{array}{r}             104.9 \\             121.5 \\             119.3 \\             132.2 \\             122.0 \\             131.4         $	119.6119.4118.2128.9123.8125.8	$\begin{array}{c}$	118.6123.9118.3134.1118.8124.4	$126 \cdot 2 \\125 \cdot 8 \\121 \cdot 8 \\112 \cdot 8 \\123 \cdot 1 \\115 \cdot 8$	132·4 114·1 120·9 117·1 125·0 118·1	
19 20 21 22 23 24 25 20 25 20	$\begin{array}{r}$	132·4 120·4 146·7 124·1* 285·5 136·3	$\begin{array}{r}$	$\begin{array}{r}$	$\begin{array}{r}$	129.1126.7137.8127.2130.9133.0	$\begin{array}{r}$	$124.1 \\ 137.7 \\ 132.3 \\ 137.8 \\ 127.5 \\ 138.3$	$\begin{array}{r} 125 \cdot 7 \\ 137 \cdot 9 \\ 129 \cdot 4 \\ 135 \cdot 2 \\ 135 \cdot 3 \\ 142 \cdot 0 \end{array}$	$\begin{array}{r}$	$180.7 \\ 133.4 \\ 127.5 \\ 132.5 \\ 136.0 \\ 134.7$	131.8 129.2 131.9 133.0 128.8 133.7	127·3 128·9 129·0 128·3 130·7 130·0	
24 25 20 27 28 29 30	140.0     143.7     145.4     138.9	151.0 139.4 182.2* 139.8	$141.3 \\ 139.2 \\ 165.4 \\ 136.5 $	$139.2 \\ 139.5 \\ 159.0 \\ 138.7$	$     \begin{array}{r}             137:8 \\             139:0 \\             152:2 \\             134:7         \end{array}     $	139·5 136·5 135·9 134·7	$     \begin{array}{r}             144.2 \\             153.6 \\             135.2 \\             144.8 \\             144.8 \\             \end{array}     $	$141.7 \\ 137.1 \\ 141.2 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.6 \\ 141.$	133.7141.7143.2146.8	136'3143'4146'5152'4	137.6151.0146.9148.2	141.1146.1142.9142.8	187.4132.9142.3134.7	
Sums -	3367.7	3269.1	3148.5	3142.6	3160.8	3086.6	3153.2	3128.7	3135.4	3171 • 1	3142.8	3092-9	3046.9	
Means -	134.71	130.26	125.94	125.70	126.43	123.46	126.13	125.15	125.42	126.84	125.71	123.72	121.88	
1 2 3	149'7 190'3	163·8 193·0	145 • 3 253 • 1	148·9 \$71·7	139 <b>·4</b> 177 <b>·</b> 8	$139.8 \\ 138.5$	132·0 134·1	143·7 134·4	135 2 150·1	134·5 149·6	145·9 149·0	147·25 145·9	140·3 147·5	
4 5 6 7 8 9	157°0 158°1 492°5 161°2 155°9 150°8	159.0 157.4 <i>205.0</i> 155.6 151.0 154.6	158·2 157·0 <i>151·8</i> 146·6 154·3 181·4	$158.0 \\ 143.5 \\ 141.9 \\ 151.7 \\ 156.3 \\ 185.5$	153.5149.4141.9150.1158.3158.7	155'4151'9146'7149'6155'5146'9	$\begin{array}{r} 155 \cdot 8 \\ 147 \cdot 6 \\ 153 \cdot 9 \\ 154 \cdot 8 \\ 178 \cdot 5 \\ 159 \cdot 9 \end{array}$	157°1 150°3 156°7 156°7 178°9 151°9	$\begin{array}{r} 155 \cdot 3 \\ 150 \cdot 1 \\ 159 \cdot 2 \\ 154 \cdot 8 \\ 194 \cdot 0 \\ 155 \cdot 1 \end{array}$	$\begin{array}{r} 155.7 \\ 152.7 \\ 153.2 \\ 154.5 \\ 161.8 \\ 151.0 \end{array}$	$\begin{array}{r} 154^{\circ}5\\ 152^{\circ}7\\ 148^{\circ}3\\ 154^{\circ}8\\ 117^{\circ}1\\ 156^{\circ}8\end{array}$	151.4 155.2 151.7 155.4 142.7 158.8	149·3 152·8 151·1 150·6 158·5 156·0	
10 11 12 13 14 15 16	$\begin{array}{c c} & \\ 162 \cdot 5 \\ 177 \cdot 6 \\ 162 \cdot 4 \\ 188 \cdot 3^{n} \\ 173 \cdot 8 \\ 172 \cdot 9 \end{array}$	$     \begin{array}{r}$	105·9 165·3 171·8 172·0 175·5 170·6	$ \begin{array}{r}$	$\begin{array}{r} 173.4 \\ 160.4 \\ 167.1 \\ 174.4 \\ 169.1 \\ 166.8 \end{array}$	$ \begin{array}{r}$	$ \begin{array}{c}     150.5 \\     167.5 \\     178.4 \\     180.3 \\     170.0 \\     179.6 \end{array} $	150°3 170°0 183°6 174°1 177°3 177°6	$\begin{array}{r}$	149.7 161.1 183.4 176.7 167.8 169.8	$\begin{array}{c} 160.8 \\ 146.1 \\ 175.7 \\ 178.7 \\ 169.9 \\ 171.9 \end{array}$	$\begin{array}{c} & \\ 157 \cdot 5 \\ 151 \cdot 3 \\ 156 \cdot 7 \\ 174 \cdot 4 \\ 171 \cdot 2 \\ 176 \cdot 1 \end{array}$	136·2 145·7 172·2 174·1 170·1 181·2	
17 18 10 20 21 22 23 24	179·3 164·8 181·0 163·2 166·0	166.0 171.2 189.1 166.4 160.6 165.7	$ \begin{array}{r} - \\ 166 \cdot 9 \\ 166 \cdot 1 \\ 172 \cdot 7 \\ 154 \cdot 2 \\ 160 \cdot 4 \\ 167 \cdot 5 \\ - \\ \end{array} $	159'9 167'0 164'5 ^h 155'5 167'0 169'8	$ \begin{array}{r} 167.0 \\ 162.7 \\ 160.0 \\ 158.6 \\ 162.0 \\ 172.0 \\$	$ \begin{array}{c c}     153 \cdot 1 \\     159 \cdot 6 \\     158 \cdot 5 \\     157 \cdot 3 \\     165 \cdot 9 \\     175 \cdot 0 \\   \end{array} $	163.0 159.9 160.9 167.5 173.7 173.6	166°0 170°6 161°3 171°4 167°2 175°6	170°8 173°3 157°7 164°1 168°3 173°8	171.0 170.8 166.7 164.7 164.5 171.9	173·3 169·3 167·2 159·8 165·3 169·6	165.1 109.6 165.8 164.7 167.2 162.8	165.2 165.6 165.4 168.3 167.8 167.8 164.9	
25 26 27 28 29 30 31	182.8 223.3 174.5 174.5 165.6	$ \begin{array}{c}    $	$   \begin{array}{r}     156.5 \\     155.2 \\     164.3 \\     167.0 \\     179.6 \\     \hline   \end{array} $	163.0 155.9 229.5 164.9 172.7	164'8 158'8 143'7 165'6 171'7	$ \begin{array}{r}     161:3 \\     175:8 \\     146:8 \\     165:8 \\     174:6 \\     \\   \end{array} $	163°2 173°8 166°1 176°5 178°2	173.0 186.2 168.9 174.8 182.1	173 ^{.2} 179 ^{.9} 172 ^{.2} 173 ^{.4} 176 ^{.5}	171·7 171·3 174·0 182·8 173·0	171.6 172.7 171.9 172.0 181.4	170.8 173.1 167.6 175.9 178.2	172·5 168·6 167·3 163·2 170·8	
Sums -	4309.8	4264.8	4179.2	4212.6	4034.7	4000.0	4099.3	4159.7	4159.1	4103.9	4056.3	4056.3	4325.2	
Means -	172.39	170.59	167.17	168.50	161.39	160.00	163.97	166.39	166.36	164.16	162.25	162.25	161.01	

Visible aurora.
 ^b This day is omitted from the Mean at the foot as being imperfect.
 Means by the observations furnishing complete 8-hourly series. ^d Takon eight minutes late.

# MAGNETICAL OBSERVATIONS.

# LAKE ATHABASCA-continued.

Abstract of Hourly Observations made during the months of November and December 1843.

					I	nductio	n Inclir	ometer.					
13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Means.
102·2 81·1 107·5 112·4	101.9 96.9 107.5 107.5	97.1 101.6 105.2 102.2	83.6 95:3ª 108.1 102.5	83.8 97.6ª 107.1 108.0	81.6 100.8 108.1 105.5	97.8 134.4 111.6 111.0	98.5 173.9 109.1 117.1	133·4ª 186·9ª	117:6 453:8ª	102.8 255.3ª	2459·3 2796·6 2918·1 — }	102·47 116·52 117·45° 119·90°	
$\begin{array}{r} 112.6\\ 107.2\\ 105.3\\ 121.0\\ 114.4\\ 114.3 \end{array}$	$118.0 \\104.5 \\99.5 \\113.5 \\115.9 \\104.3$	108.4 108.3 .90.8 122.7 116.8 112.9	$\begin{array}{r} & - \\ 107 \cdot 1 \\ 104 \cdot 0 \\ 117 \cdot 2 \\ 116 \cdot 1 \\ 116 \cdot 0 \\ 120 \cdot 6 \end{array}$	$105.7 \\ 102.8 \\ 101.5 \\ 119.9 \\ 116.2 \\ 123.1 $	110°2 105°9 70°7 115°7 115°9 114°9	114.7 114.8 104.4 117.3 114.4 93.3	116.1 115.5 106.3 107.7 123.9 94.1e	159·4 110·9 111·3 139·4 116·4 408·2 113·9	115.3 112.3 187.2 191.5 142.3 113.6	131.7 113.4 217.2 134.6 125.3 113.2	2845.5 2659.7 2876.7 2877.4 2919.3 } 2797.3	$118.56 \\ 110.82 \\ 119.86 \\ 119.89 \\ 121.64 \\ 116.55$	
119.0 121.1 112.0 118.4 123.2 120.2	$\begin{array}{r}$	$\begin{array}{r}$	$100.5^{\circ}$ $110.3$ $117.3$ $120.2$ $121.9$ $120.0$	$\begin{array}{r}$	$\begin{array}{r} & - \\ 122 \cdot 0 \\ 114 \cdot 5 \\ 120 \cdot 1 \\ & 84 \cdot 2 \\ 123 \cdot 4^{*} \\ 125 \cdot 0 \end{array}$	118:4* 102.9 112:9 97:8 120:1* 125:0	770'0" 113'6 120'1 121'2 115'8 131'5	113 9 149.5 112.6 131.4 119.8 124.0	113 0 735 3 117 9 119 0 118 3 124 9 128 2	113 2116.8115.8133.4123.4123.4123.8	3102·2 2834·3 2916·9 2846·0 2945·6 2973·9	129.26 118.10 121.54 118.58 122.73 123.91	220.15
$128 \cdot 2 \\ 128 \cdot 8 \\ 127 \cdot 0 \\ 129 \cdot 9 \\ 133 \cdot 1 \\ 131 \cdot 2$	125.4127.8127.3129.5128.5129.4	$126.3 \\ 133.4 \\ 129.2 \\ 126.5 \\ 126.1 \\ 134.8 $	$\begin{array}{r}$	$\begin{array}{r}$	$\begin{array}{r}$	$121.5121.9129.1^{\circ}126.2136.9136.0$	129.7 132.8 126.24 131.5 132.9 133.1	145.6 132.6 130.1 * 127.9 135.9	124·4 131·8 138·4 131·1 140·0 133·7	$ \begin{array}{r} 125 \cdot 0 \\ 125 \cdot 0 \\ 131 \cdot 0 \\ 142 \cdot 0 \\ 129 \cdot 1 \\ 135 \cdot 7 \\ \\ 135 \cdot 5 \end{array} $	3073 · 1 3155 · 5 3178 · 1 3117 · 3 3302 · 1 3231 · 0	$\begin{array}{c} 128 \cdot 05 \\ 131 \cdot 48 \\ 132 \cdot 42 \\ 129 \cdot 80 \\ 137 \cdot 59 \\ 134 \cdot 62 \end{array}$	
142°4 131°4 134°6 134°7	139·9 139·3 135·4 145·1	138.3137.5131.7142.0	137.7140.7137.3140.7140.7	139.9144.3135.9150.3	$137.7 \\ 144.9 \\ 132.1 \\ 133.1$	133°6 138°8¤ 144°3¤ 137°1	136'3" 148'6" 136'5" 134'9	142.3 138.8ª 167.4ª 137.5	141.8	137·2 141·6 140·1* 141·9	3347 ·9 3387 ·3 3512 ·0 3372 ·7	$\begin{array}{r} 139 \cdot 50 \\ 141 \cdot 14 \\ 146 \cdot 33 \\ 140 \cdot 53 \end{array}$	139.55
3000·8 120·03	2991 · 1 119 · 64	2980.4 119.22	3000.7 120.03	3014·9	2935 · 1 117 · 40	3005·2 120·21	3159•8 126•39	3391·7 135·67	3445 • 1 137 • 80	3474·7 138·99	75445.8	125.74	-
145·9 146'3	151.7 148.6	142.7 142.6	143.6 141.3	137·5 142·4	128·8 136·6	131.8	131·1 145·7	208.9 149.7	194.3	279°6 155°7	3661.6 3850.5 3687.3	152.57 160.44 153.64	
149.5 156.6 142.9 151.1 153.3 156.7	148.5 149.5 150.0 152.8 152.2 151.9	155.9 148.3 145.8 157.8 152.6 148.4	$\begin{array}{c} 155 \cdot 1 \\ 149 \cdot 3 \\ 142 \cdot 9 \\ 154 \cdot 4 \\ 139 \cdot 9 \\ 129 \cdot 2 \end{array}$	$   \begin{array}{r}     151 \cdot 7 \\     147 \cdot 6 \\     124 \cdot 5 \\     151 \cdot 1 \\     155 \cdot 2 \\     148 \cdot 0   \end{array} $	150.8 149.5 117.9 154.0 459.5 151.9	150°6 151°3 147°6 151°0 433°4 150°1	152.6 151.5 150.3 149.7 152.2 151.7*	146.4 155.6 155.6 150.8 151.1	150.9 237.9 159.1 159.8 158.4	153·1 225·0 160·6 155·4 156·0	3657 5 3802 1 3651 1 3684 3 3726 6 3716 4	158.42 152.13 153.51 155.27 154.85	,
130 7 141·2 142·9 172·4 171·9 164·5	132.4 144.4 174.9 172.1 168.8	152.6 161.0 158.9 176.8 170.3	147.0 160.6 168.7 165.8 167.2	143.0 167.9 163.9 169.9 166.0	144'0 162'6 171'8 171'0 166'1	147.1 163.3 171.5 169.1 169.6	147.4 161.8 191.0 173.9 169.8	145.4 160.3 169.9 190.9 167.6 171.5	$\begin{array}{c} 155 \cdot 1 \\ 165 \cdot 4 \\ 167 \cdot 3 \\ 178 \cdot 0 \\ 167 \cdot 1 \\ 172 \cdot 7 \end{array}$	160.6 160.5 163.4 179.0 169.0 172.8	5 3710 ± 3705 9 3875 6 4161 8 4173 9 4086 5	154·41 161·48 173·41 173·91 170·27	} 161.19
170-2 163-7 165-4 162-7 167-3 165-0 169-2	172.0 161.2 163.2 167.7 165.9 163.7 163.7 168.9	171.4 163.0 ^k 162.8 171.7 159.0 163.1 165.0	170.8	172.5 155.3 166.8 165.3 162.9 165.1 163.3	$\begin{array}{c} 168^{\cdot}5 \\ 163^{\cdot}9 \\ 166^{\cdot}8 \\ 105^{\cdot}4 \\ 159^{\cdot}5 \\ 170^{\cdot}5 \\ 162^{\cdot}5 \end{array}$	166·3 164·0 164·0 170·4 161·5 172·7 166·3	168.5 164.6 184.5 172.3 162.5 172.7 163.8	170.0 106.8 172.0 176.4 179.8 176.7	167.6 165.9 241.3 172.6 177.2 165.9	177 · 8 169 · 4 255 · 8 170 · 9 168 · 3 167 · 5	<pre>{ 4124·4</pre>	$ \begin{vmatrix} 165 \cdot 28 \\ 173 \cdot 95 \\ 167 \cdot 99 \\ 164 \cdot 92 \\ 166 \cdot 57 \end{vmatrix} $	
169°2 169°3 165°2 168°1 171°5 173°7	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	165°0 166°2 162°9 166°6 171°0 176°3	163 5 173 5 161 0 166 3 167 3 177 6	169.9 169.9 162.7 165.8 172.0 175.9	162 9 163 6 148 4 167 9 172 1 174 1	173·3 173·3 143·6 170·1 168·2 158·4	182.7 153.4 169.8 172.2 180.1	178.8 197.7 167.8 167.4 201.1 188.3	177.9 252.3 169.9 191.9 276.8 189.6	180.9 200.2a 172.6 181.1 187.8 189.9	$\begin{array}{c c} & 4008 & 3 \\ & - \\ & 4311 \cdot 7 \\ & 4031 \cdot 4 \\ & 4098 \cdot 9 \\ & 4252 \cdot 6 \\ & 4233 \cdot 5 \end{array}$	179.65 167.98 170.79 177.19	169*80
4006·5	3996·1 159·84	4012.7	3956·2 158·25	3966·2 158·65	3947·7 157·91	3959°6 158°38	4075·8 163·03	4267·8	4572.6 182.90		99033·5 3961·33		-

⁴ Taken thirty minutes late. ⁵ Fifteen minutes late. ^h Five minutes late.

* Twelve minutes late.

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 $i \rightarrow i$ 

LAKE ATHABASCA - continued

### LAKE ATHABASCA -- continued.

A	bstract o	f Hourl	y Obser	vations	made d	uring th	ie mont	the of J	January	and I	februa	<b>y</b> 1844	l.		Abst	ract of 1	Hourly	Obser	vations	made d	luring		nths of	•	y and Fe	bruary	1844.
Date. Gött.					In	duction	Inclino	meter.								1 )			•	Induct	ion Inc	linomet	er.			· · ·	· · · ·
Mean Time.	Noon.	1.	2.	8.	4.	5,	6.	7,	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18,	19.	20.	21.	22.	; 23.	Sums.	Means.	Fortnightly Means.
1 2 ^b 3 4 5 6 7	190·1 198·1 196·3 249·9 328·4	192°3 186°8d 191°7 267°9 232°6	281.6 183.3 188.5 <i>181.9</i> 921.2	204·2 179·8 190·5 167·8 215·1	$ \begin{array}{r}                                     $	175°8 181°6 175°5 196°5 183°5	180·2 187·8 182·9 180·1 188·1	189.0 191.2 180.9 185.3 189.3	199·7 191·5 188·7 213·6 182·3	188.7 190.9 185.7 189.1 190.3	183.7 190.9 187.5 204.1 199.1	178·3 189·8 174·1 177·4 204·9	169°8 184°6 173°6 181°1 195°6	185*9 186*1 180*5 178*2 176*8	185.4 173.0 179.0 184.3	170°8 177°4	180.0 186.7 128.5 180.1 193.1	172:4 187·7 <i>1</i> 80·4 182·9 176·2	180:4 182:3 182:3 181:9 185:8	173·1 185·1 185·1 152·0 177·9	167 5 189 6 164 2 ^k 184 5 181 4	188.3 185.6 193.5 358.9 180.4	189/6 182.6 198.4 226.7 177.9 212.0	478°9 380°3	4263 · 0 4502 · 1 4650 · 1 4716 · 8 4781 · 2	185.73 187.59 193.75 196.53 199.22	
8 9 ^b 10 11 12 13 14	209·9 210·4 202·3 195·2 196·4 198·4	209·5 215·1 199·3 207·1 190·5 198·7	205.6 210.9 205.3 236.9 184.5 200.0	196·9 208·8 198·7 190·6 190·6 199·1	194.8 191.3 193.7 187.1 187.7 208.3	192·9 186·2 186·1 189·2 186·5 203·9	206·5 222·5 203·6 196·1 191·4 200·4	198.6 195.2 200.4 204.4 198.1 202.6	175.8 190.2 202.6 212.9 203.8 205.2	176:0 197:0 205:6 199:3 198:7 206:4	196°1 202°3 191°4 198°5 213°2 203°0	190°4 208°7 185°0 187°9 194°0 199°0	179°5 164°5 184°1 203°5 194°5 194°9	191.5 189.3 185.4 191.2 194.9 189.7	189'5 164'0 179'7 189'2 188'8 193'5	175.9 190.0 187.5 189.8	183 · 1 188 · 6* 187 · 4 184 · 6 188 · 1 189 · 7	184'1 195'3" 198'5 186'5 138'3 189'6	195 1	189.7 190.5 238:1 195.0 178.1 187.1	205'4" 159'5 206'9 195'4 185'9 194'6	224.2 196.1 205.3 201.1 211.7	185.9 210.5 199.2 198.3 205.7 205.6	220.6 189.5 218.0 197.5 195.1 213.5 202.6	4656°6 4490°5 4732°0 4728°2 4599°8 }4766°6	194.02 195.95 197.17 197.01 191.66 198.61	194.65
15 16 17 18 19 20 21	198.0 190.4ª 253.5 208.4ª 206.1 201.5ª	197.1 196.5ª 211.1 213.9 202.9 206.1ª	201·4 206·1 207·6	198°1 195°8 199°1 214°3 199°6 200°1	196°1 194°8 209°5 207°4 205°3 201°3	196°1 192°4 201°8 204°3 206°8 207°2	196°5 193°5 202°2 201°5 206°2 216°8	198.6 191.3 207.3 207.5 211.7 205.5	196.8 208.5 210.3 201.7 207.3 202.5	215·1 200·3 207·6 204·2 208·2 199·4	215.0 193.8 203.0 212.0 206.5 207.4	201·1 195·0 205·2 208·5 206·3 210·0	194·3 196·3 200·3 208·2 211·7 210·2	196 ^{•5} 192 ^{•0} 198 ^{•7} 204 ^{•1} 209 ^{•7} 202 ^{•1}	195·4 192·4 197·5 211·5 208·5 197·8	194.5 194.4 216.3 211.8*	196.8 192.0 199.0 200.4 211.1a 198.2	193.8 193.6 205.2 201.8 213.0 ^a 202.6	199°5 195°8ª 205°6ª	193.8 196.7 201.1 210.8 204.0 ⁿ 198.8 ⁿ	196.7*	201.48 191.1ª 198.7ª 220.2 262.8ª 210.3ª	207.5ª 213.1 234.9ª 207.9ª	210.6*	4766 * 7 4688 * 5 4875 * 0 4987 * 0 5063 * 6 4896 * 4	198.61 195.85 203.13 207.79 210.98 204.02	
22 23 {24 25 26 27 28	209°0 194°6 208°5 343°6 ⁿ 202°1 n212°6 ^a	212.8 207.2 212.7 392.9 205.4 206.9a		218·8 211·1 200·5 215·7 208·2 207·0	225.5 211.3 205.8 303.8 211.3 206.5	217.8 212.5 214.3 194.1 215.5 212.4	261·3 211·1 219·8 215·5 205·4 215·6	229·5 211·2 215·1 214·2 211·8 209·5	212·2 203·5 208·9 211·2 211·3 208·0	204·3 198·9 212·7 205·9 204·2 209·9	203.7 205.7 202.3 192.0 207.3 205.3	198.8 207.3 209.8 209.9 219.1 201.7	204·2 204·7 204·7 206·1 209·2 198·7	200°3 200°0 203°6 205°8 210°1 201°9	210·9 210·5 206·7	204.5 195.9ª 210.3 201.7	204.8 207.8 203.3 ⁿ 207.8 198.8 204.5	310.4ª 204.8	212.4 218.3 206.5 196.5	190.4 199.5 247.8 221.1 199.2 193.2	173.6 ⁿ 212.2 381.2 214.1 203.0 ⁿ 219.2	202.1	181 3ª 208 0 325 0ª 201 9 254 3 ^k	208.5 375.5 ^a 199.0 247.9 ^a	4894·7 4044·9 5755·0 5417·7 5042·7 }4960·6	203 95 206 04 239 79 225 74 210 11 206 69	200.74
29 30 31	228°2 203°0 208°1ª	205·2 196·5 209·2	200°9 193°6 206°9	200.0 191.1 213.3	207·2 198·9 203·9	199·7 199·5 203·9	203 · 9 203 · 3 205 · 5	198.7 203.4 208.2	204·7 199·1 214·6	204·9 201·8 212·9	203.5 201.3 209.9	204.6 199.6 202.9	197.0 204.7 198.1	204·5 199·7 197·4		195.0	190·7k 199·0 191·1	195·5 199·8 189·0	206.5 183.1ª 167.7ª	191.0	194·3 178·4 201·2	195.0 229.7ª 175.0	196·4 206·6 191·3	206·3 219·4	4878 • 4 4777 • 2 4823 • 7	203·27 199·05 200·99	
ums - Ieans -	5623·0 216·27	5561 · 9 213 · 92	5472·8 210·49	5214·8 200·57	5093·9 195·92		5297·7 203·76			Ì	5238·5 201·47	5169·3 198·82	5074·1 195·16	5075 ·9 195 · 23				1	5014·1 192·85		5204·2 200·16	5410.0 216.40	5434·2 209·01		125659 0 4848 80	202.03	
1 2 3 4 5 6 7 8 9	$\begin{array}{c} so2 \cdot 7\\ 214 \cdot 1\\ 196 \cdot 1\\ 494 \cdot 8\\ 285 \cdot 5\\ 186 \cdot 1\\ 294 \cdot 6\\ 185 \cdot 3\end{array}$	853.8 214.1 194.7 291.8 182.3 204.0 239.4 ^a 188.6	247.8 205.6 193.5 177.6 195.9 208.5 232.9 187.6	223.4 205.9 195.2 190.2 189.6 197.7 205.3 184.6	207.1 222.3 196.7 165.5 183.0 184.0 226.8 189.5	$\begin{array}{r} 231 \cdot 9 \\ 214 \cdot 6 \\ 197 \cdot 9 \\ \hline \\ 203 \cdot 0 \\ 202 \cdot 7 \\ 184 \cdot 0 \\ 265 \cdot 1 \\ 185 \cdot 1 \end{array}$	213·4 276·7 203·4 194·2 199·2 190·1 207·7 193·1	201·3 219·6 224·8 213·0 189·0 186·2 190·9 188·7	208.2 218.9 200.5 	222.5 195.2 192.3 174.7 184.2 192.4 184.5 186.8	212.8 183.3 192.3 189.2 191.2 170.1 186.9 187.2	211.4 191.9 187.9 163.7 194.4 187.8 177.1 187.6	196°3 183°4 193°9 163°2 181°9 186°1 177°0 185°2	185*7 185*7 168*9 157*9 180*5 192*0 169*3 184*8	151.6 189.3 180.2 177.3	171.3 163.6 147.3ª 185.3 191.5 171.9	202.7 170.7 189.6 	176.3	474.7 184.1 452.2 171.2 190.1 182.8	145.4 ^m 143.3 170.5 	150°5 160°5 220°6 175°3 189°4 187°1 192°4	189.1 103.8 187.9 <i>309.8</i> 180.6 152.9 192.1 174.0	190°2 195°4 178°6 298°9 184°7 178°8 183°8 124°8	216.0 195.5 190.3 213.0 189.1 231.9 186.4 173.2	5029·3 4714·0 4519·1 5008·4 4825·2 4506·7 4799·5 4390·6	209.55 196.42 188.30 208.68 192.63 187.78 199.98 182.94	} 195⋅83
10 11 12 13 14 15 16 17	$   \begin{array}{r}     179 \cdot 5 \\     \hline     225 \cdot 7 \\     204 \cdot 7 \\     192 \cdot 9 \\     224 \cdot 1 \\     195 \cdot 9 \\     215 \cdot 7   \end{array} $	184.5 194.2 188.8 190.4 204.8 194.8 194.8 197.0	188.2 196.5 189.7 195.3 189.8 203.2 199.5	$ \begin{array}{r} 186.7\\ 198.1\\ 192.5\\\\ 192.9\\ 199.4\\ 194.3 \end{array} $	191.4 196.8 198.0 204.1 201.4 193.7 201.6	192.2 206.4 201.8 209.1 209.5 202.1 209.0	187.8 202.4 201.2 210.5 204.8 199.0 200.4	192.8 194.4 196.5 204.3 201.6 218.0 196.3	198.7 197.6 200.5 207.0 206.7 197.9 200.3	203·3 196·9 190·9 205·6 202·3 196·1 197·5	189.9 196.2 189.7 206.1 204.4 197.6 199.1	184.6 196.8 191.8 202.6 200.7 197.7 184.2	172·3 196·0 199·2 199·5 197·7 190·9 190·3	191.7 195.5 194.5 204.6 197.6 190.6 190.6	180°8 191°5 192°2 200°4 199°5 180°9	188°8 190°5 190°1 196°5 194°0 184°7	188.4 187.6 192.7 200.9 194.4 181.1 185.7	188.7 187.8 197.5 201.2 194.3 174.7	189.5 185.4 192.2 193.1 194.8 181.0	190.5 183.1 190.3a 167.5 191.9	246.3 179.5 184.9 170.1 188.6	235 ³ 211 ⁴ 192 ⁴ 178 ⁰	205°8 259°5 ⁸ 191°6 204°5 197°8 211°3 ⁸ 199°6	215.7 205.9ª 196.7 196.6 194.0	4673 4 4775 5 4660 4 4540 2 4782 1 4700 1 4700 1 4715 8	194.72 198.98 194.18 198.58 199.25 195.84 196.49	
$     \begin{array}{r}       18 \\       19 \\       20 \\       21 \\       22 \\       22 \\       22 \\       22 \\       22 \\       25 \\     \end{array} $	205·5 190·0 232·6 186·2 190·9 199·5	201·7 194·0 213·0 192·8 196·8 198·2	200·3 194·4 206·1 194·9 193·1 197·4	$200.7 \\ 193.8 \\ 202.5 \\ 193.1 \\ 192.8 \\ 199.0$	200°0 195°8 199°8 196°3 192°7 203°1	196.7 204.1 196.0 201.3 178.1 193.6	199.7198.3188.2202.8192.2191.2	200.7 201.9 199.5 205.8 199.0 194.5	$\begin{array}{r} 202 \cdot 7 \\ 202 \cdot 2 \\ 196 \cdot 6 \\ 208 \cdot 1 \\ 195 \cdot 6 \\ 203 \cdot 1 \end{array}$	$108 \cdot 2 \\ \cdot 200 \cdot 5 \\ 199 \cdot 3 \\ 209 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 196 \cdot 6 \\ 202 \cdot 5 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 106 \cdot 6 \\ 10$	200·2 194·4 193·9 199·8 196·0 200·4	194.2193.8198.1196.2194.7200.3	196.6 190.4 198.9 199.5 194.0 201.0	195°0 191°2 199°1 194°2 189°5 196°5	$189^{\circ}2$ $194^{\circ}3$ $188^{\circ}7$ $189^{\circ}7$	190.8 192.5 193.9 191.2	$ \begin{array}{r}     191.4 \\     193.3 \\     191.5 \\     189.3 \\     187.9 \\     194.2 \\ \end{array} $	191·7 190·1	n 192.0 185.1 195.1 197.3	192.5 195.0 187.7 193.4 194.1 199.4	196°1 189°9ª 199°3ª 192°5 195°6 197°8	197 · 1 191 · 1 ⁿ 193 · 9 ⁿ 204 · 5 191 · 2	$ \begin{array}{c} 205 \cdot 1 \\ 207 \cdot 4 \\ 203 \cdot 6^n \\ 193 \cdot 4 \\ 191 \cdot 5 \\ \\ 202 \cdot 6 \end{array} $	196.0 215.3 198.9 ⁿ 188.8 192.9 201.5	4750 · 2 4701 · 9 4765 · 7 4712 · 0 4623 · 2 4771 · 4	197 •93 195 •91 198 •57 196 •33 192 •63 198 •81	} 197-14
26 27 28 29	199 · 9 208 · 0 208 · 0 346 · /*	216:4 199:3ª 199:3 225:2ª	210°0 196°5 202°0 198°7 ^d	194'1 192'0 193'0 208'2	193 · 9 193 · 1 193 · 0 193 · 4	206·2 188·2 195·5	211.0	200.6 211.7 215.2		197.2	190.7 200.9 183.8 201.6	197·2	201·3 191·3 201·3 194·6	198	2 190°0 169°4 195°8	192·2 158·0 194·4	193.6 210.2 187.0	144.8	201·5 168·4 189·4	192·1 160·1ª 190·2	209·4 186·8 193·4	205·7 183·0 207·6 •261·4*	205°3 232°2 277°0ª	218'8 304'0	4751.4 4807.3 4795.4 4279.4	199.81 204.62 197.09	ע י י
ms -	5764.4	5259.9	5005.0	4724.7		5062.6					1857.7					5 4631.1						4918·4 204·93	.]	5009.6 208.73	117396.2	197.02	
c Th	230.58 a V tis portion Taken se	210.40 fisible au of a day ven mint	is includ	196•86 led unde	r the san	202·50 he hours fteen mi	b j for Dec	Day om cember	tted as	incomp the nu	lete.	mplete.	<u> </u>	199.1	.) s Se	3 185 24 eventeen velve mi	minute	s late.		`h <b>T</b>	en min	utes late inutes la	<u> </u>	k	Taken nin Twenty n	ne minute	es late.

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Date. Gött. Mean Time.

Sums Means

Term Day.

Sums

Means

FORT SIMPSON.

Abstract of Hourly Observations made during the months of April and May 1844.

Date. Gött.					In	duction	Inclino	meter.		,			1	1	•1			<u> </u>		Inducti	on Incli		r.				
Mean Time.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	⁻ 19.	20.	21.	22.	23.	Sums.	Means.	Fortnightly Means.
1 2 3 5 6 7 8 9 10 11	$\begin{array}{r} 394^{\circ}1\\ 144^{\circ}0\\ 235^{\circ}9\\ 368^{\circ}1\\\\ 145^{\circ}9\\\\ 148^{\circ}2\\ 137^{\circ}6\\ 191^{\circ}6\\ 425^{\circ}4 \end{array}$	$\begin{array}{c} 251 \cdot 4 \\ 139 \cdot 8 \\ 120 \cdot 2 \\ 274 \cdot 4 \\ 148 \cdot 5 \\ - \\ 136 \cdot 6 \\ 216 \cdot 1 \\ 142 \cdot 2 \end{array}$	$268.1 \\ 138.1 \\ 123.1 \\ 180.9 \\$	$ \begin{array}{r} 291.6\\ 183.3\\ 159.7\\ 170.3\\ \hline 132.4\\ 153.0\\ 138.5\\ 272.2\\ 130.6\\ \end{array} $	$\begin{array}{c} 255 \cdot 6 \\ 219 \cdot 5 \\ 368 \cdot 2 \\ 142 \cdot 6 \\ \hline \\ 136 \cdot 9 \\ \hline \\ 141 \cdot 2 \\ 146 \cdot 1 \\ 250 \cdot 5 \\ 199 \cdot 6 \end{array}$	137.6170.0337.1123.4167.1150.7145.9112.2	135.7 140.0 150.5 128.1 120.0	132.0 101.1 181.2 137.8 120.5 194.7 133.2 124.0	100.0 153.7 121.9 127.0 131.1 163.2 138.9 120.3	100.0 108.7 127.8 137.5 112.1 153.7 140.6 127.7	84·4 136·3 120·2 144·3 150·1 158·9 144·6 125·0	$100^{\circ}2$ $122^{\circ}4$ $129^{\circ}5$ $128^{\circ}5$ $130^{\circ}3$ $146^{\circ}2$ $142^{\circ}7$ $124^{\circ}0$	$ \begin{array}{c} 107 \cdot 2 \\ 123 \cdot 7 \\ 124 \cdot 0 \\ 130 \cdot 6 \\ \hline 150 \cdot 1 \\ 147 \cdot 5 \\ 138 \cdot 9 \\ 96 \cdot 8 \\ \end{array} $		65.8 108.1 124.6 129.9 105.9 143.2 138.6 113.6	78.3 119.6 116.0 115.4 81.6 136.7 138.1 124.6	71.9 88.0 86.6 111.1 63.0 	$\begin{array}{r} 61 \cdot 2^{s} \\ 113 \cdot 5^{s} \\ 107 \cdot 4^{u} \\ 84 \cdot 9 \\ \hline 95 \cdot 9 \\ \hline 132 \cdot 5 \\ 128 \cdot 6 \\ 126 \cdot 6 \end{array}$	67.2* 62.5* 83.4* 69.7 * 69.7 * 45.6 135.1 * 26.8*	81.6 58.0 116.8 73.0* 100.0* 149.8 133.4 115.7	68.9 117.5 ⁿ 135.7 80.0 104.6 ⁿ 141.4 139.2 130.7	279'1 166'7" 135'4 152'4" 151'5 133'5 769'7" 280'1"	138.5 158.0 129.3 240.0 188.7	177.4 144.6 152.9* 138.6 264.0 130.7	3768 °6 3597 °2 3772 °9 3428 °4 3033 °1 3392 °7 3575 °8 3702 °0	$\begin{array}{c} 157\cdot02\\ 140\cdot88\\ 157\cdot20\\ 142\cdot85\\ 126\cdot38\\ 147\cdot93\\ 148\cdot99\\ 154\cdot25\\ \end{array}$	
12     13     14     15     16     17     18     19     20     21     21	133.5 124.1 147.0 <i>330.8</i> 188.3 255.7	142 2 134:7 102:6 383:8 837:9 158:5 254:6	132 · 2 ^b 123 · 5 <i>582</i> · 7 470 · 4 129 · 1 141 · 0 199 · 0	125.4 123.5 222.3 137.6 425.5 124.9 125.7 154.8	123.4 121.8 124.3 149.9 167.0 <i>387.1</i> 118.8 127.9 134.3	$ \begin{array}{c} 127 \cdot 4 \\ 125 \cdot 6 \\ 130 \cdot 9 \\ \hline 102 \cdot 4 \\ 153 \cdot 0 \\ 432 \cdot 2 \\ 133 \cdot 4 \\ 146 \cdot 7 \\ 136 \cdot 6 \\ \hline \end{array} $	137.0 129.2 118.2 138.9 552.8 153.1 143.2 126.5	126.6 129.8 131.1 121.0 126.7 214.1 111.0 138.4 134.7	134·7 120·6 131·3 148·0 135·3 139·5 136·0	$126 \cdot 4 \\ 130 \cdot 9 \\ 135 \cdot 1 \\ - \\ 115 \cdot 3 \\ 132 \cdot 0 \\ 83 \cdot 9 \\ 127 \cdot 4 \\ 153 \cdot 5 \\ 143 \cdot 5 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$	$132.7 \\ 127.2 \\ 134.9 \\$	$ \begin{array}{c} 133.6\\ 131.6\\ 131.1\\ -\\ 107.8\\ 112.6\\ 50.8\\ 117.3\\ 164.9\\ 139.2\\ -\\ -\\ \end{array} $	$\begin{array}{c} 130 \cdot 4 \\ 124 \cdot 1 \\ 130 \cdot 9 \\ \hline \\ 120 \cdot 6 \\ 97 \cdot 9 \\ 45 \cdot 7 \\ 104 \cdot 0 \\ 128 \cdot 5 \\ 136 \cdot 2 \\ \hline \\ \end{array}$	$133^{\cdot 1} \\ 125^{\cdot 5} \\ 120^{\cdot 6} \\ \hline \\ 99^{\cdot 4} \\ 20^{\cdot 9} \\ 119^{\cdot 6} \\ 132^{\cdot 6} \\ 121^{\cdot 2} \\ \hline \\ -$	135.9126.7124.3102.8 $44.0101.1123.8131.6138.3$	124.5 132.6 126.9 100.7 29.5 144.8 125.1 140.3 137.7	$   \begin{array}{r}     117 \cdot 9 \\     126 \cdot 9 \\     133 \cdot 9 \\     \hline     115 \cdot 1 \\     s9 \cdot 2 \\     134 \cdot 3 \\     136 \cdot 4 \\     128 \cdot 4 \\     127 \cdot 3 \\   \end{array} $	115.6 126.3 122.0 124.8 133.4 122.9 126.6 123.7	114'2 124'7 115'9 117'4 237'8" 135'9 131'2 128'5 130'1	112.2ª 129.6 116.5 <i>140.2</i> <i>62.5</i> 130.9 124.7 134.6 129.4	129'2 127'7" 195'3" 251'1" 125'7	118·1 128·1*	325.8* 112.4* 133.2*	140.3 ^a 129.3 117.7 112.0 200.8 ^a 112.9 133.8 319.6 169.4	$\left.\begin{array}{c} 3162\cdot 4\\ 3093\cdot 5\\ 3018\cdot 0\\ 3574\cdot 1\\ 3092\cdot 7\\ 5116\cdot 7\\ 2805\cdot 0\\ 3574\cdot 5\\ 3597\cdot 9\end{array}\right.$	$\begin{array}{c} 131\cdot77\\ 128\cdot90\\ 125\cdot75\\ 148\cdot92\\ 140\cdot93\\ 213\cdot20\\ 127\cdot15\\ 148\cdot94\\ 149\cdot92\end{array}$	
22 23 23 24 25 26 27 28 20 30 May 1	114·3 304·8 159·8 311·3 645·9 344·6 200·1 566·8 256·9	242.9 276.0 460.1 201.5 307.0 296.8 210.7	178 · 1 246 · 0 152 · 0 456 · 5 240 · 3 193 · 7 	162.9 277.3 139.7 526.6 	154'1 184'5 147'1 229'0 357'9 123'2	$ \begin{array}{r} 135.0\\ 146.7\\ 142.1\\ 174.3\\ 390.6\\ 140.4\\\\ 251.8\\ 175.7\\ 179.1\\ \end{array} $	$195.8 \\ 185.5$	$139.7 \\ 148.4 \\ 146.3 \\ 214.4 \\ 242.5 \\ 186.4 \\ \\ 154.9 \\ 208.3 \\ 180.6$	134.7149.8153.0165.2165.5168.2163.4174.1171.5	$ \begin{array}{r} 147.0\\159.8\\153.7\\138.1\\161.3\\161.3\\161.3\\161.1\\172.6\\180.3\end{array} $	$154.0 \\ 157.6 \\ 161.7 \\ 160.2 \\ 162.1 \\ 177.2 \\ 175.2 \\ 183.3 \\ 171.9 \\ 171.9 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.6 \\ 157.$	$153.4 \\ 157.9 \\ 158.5 \\ 113.7 \\ 148.0 \\ 146.5 \\ 139.5 \\ 174.2 \\ 160.0 \\ 160.0 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.4 \\ 153.$	151.7 156.3 151.1 179.4 115.3 129.1 	137*5 157*5 153*0 119*0 108*2 115*8 156*8 143*7	$140.5 \\ 150.4 \\ 166.1 \\ 150.5 \\ 108.4 \\ 138.0 \\$	145.7145.0160.9164.9122.6169.5130.0 $84.3137.8$	131.4 141.8 155.9 88.2 149.1 85.2 134.0 117.3 156.9	$137.7 \\ 127.3 \\ 133.6 \\ 114.7 \\ 130.4 \\ 92.1 \\ \\ 152.8 \\ 148.8 \\ 139.5 \\ 139.5 \\$	$142.5 \\ 131.3 \\ 127.2 \\ 151.3 \\ 200.6 \\ 168.6 \\ 126.1 \\ 147.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.5 \\ 135.$	161.4 144.1 109.5 140.8 286.3 119.0 	$142.0 \\ 153.1 \\ 7346.3 \\ 119.6 \\ 309.8 \\ - \\ 163.6 \\ 173.5 \\ 125.2 \\ $	140.4 186.2 157.7 216.9 192.5 	146.8 139.1 160.7 176.2* 195.9 252.3 161.7 445.8	$194^{+}6$ 154^{+}9 173^{+}6 194^{+}7	$\left.\begin{array}{c} 3386\cdot 3\\ 4109\cdot 8\\ 3424\cdot 2\\ 5004\cdot 0\\ 5380\cdot 7\\ \end{array}\right\} 4213\cdot 3\\ \cdot 4596\cdot 4\\ 4834\cdot 1\\ 3968\cdot 7\end{array}$	$147.13 \\ 171.24 \\ 149.30 \\ 208.50 \\ 224.20 \\ 175.55 \\ 191.52 \\ 201.42 \\ 165.36 \\$	
												from 1s		137.8 to 1st 1	150•5 Iay incl		100.0		135.5		125-2	145 8	198.8			159.01	
Means -	240.61	215.18	217 · 34	199.87	191.47	175.69	163.74	153.02	142.27	138.13	142.45	133 • 25	128.68	125.53	121.51	121.97	116.37	120.60	132.04	128.04	151.43	181.84	183.80	190.72	160.52	-	
$ \begin{array}{c} 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 0\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 10\\ 20\\ 21\\ 22\\ 23\\ 24\\ 25\\ 26\\ 27\\ 28\\ 29\\ 30\\ 31\\ \hline \end{array} $				201 · 5 250 · 4 214 · 8 267 · 0 387 · 0 422 · 6 289 · 0 276 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 6 258 · 7 258 · 8 258 · 6 258 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 6 257 · 7 277 · 37 			250.0	223 · 0 236 · 9 241 · 0 253 · 8 253 · 8 252 · 0 252 · 0 252 · 0 244 · 0 244 · 0 244 · 0 251 · 0 251 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 255 · 0 257 · 0 256 · 0 257 · 0 264 · 0 257 · 0 264 · 0 257 · 0 264 · 0 256 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 255 · 0 264 · 0 255 · 0 264 · 0 264 · 0 264 · 0 264 · 0 255 · 0 264 · 0 255 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 264 · 0 266 · 0 266 · 0 266 · 0 266 · 0 266 · 0 266 · 0 266 · 0 266 · 0 266 · 0 266 · 0 266 ·	230°8 238°8 2440°8 242°0 233°1 245°4 245°4 245°4 245°4 245°4 245°4 245°4 244°5 255°0 246°2 255°0 246°2 255°0 244°5 255°8 266°4 243°8 266°4 243°8 266°4 266°0	238-8 247-5 243-4 249-6 261-0 235-0 262-0 244-5 233-0 244-6 244-6 244-6 244-6 246-6 252-5 265-0 249-6 303-0 246-6 274-6 296-0'	231:5 263:0 236:1 2440:5 238:0 260:2 242:0 228:0 223:2 245:0 223:2 245:6 254:7 262:2 2551:7 262:2 2551:7 262:2 255:7 326:5 8 267:3 286:5 267:3 266:8	229:0 241:0 250:0 180:1 224:5 258:4 244:5 244:5 244:5 244:5 244:6 244:6 244:6 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 244:0 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23674 24257 222971 222970 224079 24079 24079 2413 21870 24074 25577 25574 25670 25670	158'3' 222'4 194'2 227'8 218'2 181'2 251'8 241'1 234'2 734'0 205'8 234'2 734'0 205'8 235'9 240'0 245'3 219'6 219'6 219'6 219'6 219'6 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5 219'5	265:0°a 214:5 184:0° 225:6 211:0 264:2 242:0 2:30'5 770'2 219:9 228:0 245:0 245:0 245:0 245:0 245:0 245:2 245:4 246:2 245:4 246:2 245:4 246:2	102-87 223-5 2240-2 240-2 258-3 252-0 250-0 250-0 250-0 250-0 250-0 240-2 221-1 229-2 237-0 246-9 236-0 246-9 237-6 324-3 	208' of 217'1 285'8 219'4 234'2 230'4 258'2 230'4 258'2 230'4 208'0 274'0 231'1 260'3 252'2 243'2 260'3 256'3 252'2 243'2 261'4 293'0 295'8 	263 · 4 233 · 2 235 · 2 235 · 2 2407 · 2 2407 · 2 240 · 2 270 · 2 244 · 8 261 · 8 261 · 8 261 · 8 263 · 0 258 · 2 300 · 1 265 · 7 264 · 0 258 · 2 305 · 5 283 · 4 	232·2 269·6 251·3 245·3 269·2 262·4 269·9 235·0 229·1 226·3 257·9 245·5		$\begin{array}{c} 236 \cdot 46 \\ 252 \cdot 48 \\ 243 \cdot 90 \\ 245 \cdot 22 \\ 255 \cdot 51 \\ 261 \cdot 23 \end{array}$	
Mean 1st April to 25th May	}250.41	294.15	306.84	292.13	291.47	259.23	250.63	248 • 23	249 76	253-21	251.92	241.54	236-41	230.48	225.52	226.15	229.58	227 • 46	230 • 43	231 • 25	245.11	255.47	272.91	270.06	6100.35	254.18	
a Visible At 0h 2		ا ا ا	At 2h 2t Not inc	m. luded in	° At S the Mean	3h 30m, 20 1 at the i	)3·5. Root.	1	^d At 1 ^h 3	 30°°, 373	8, both	include	//	 1		1							<u> </u>	<u> </u>		!	

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MAGNETICAL OBSERVATIONS.

FORT SIMPSON.

Abstract of Hourly Observations made during the months of April and May 1844.

Ī	Approx.	$\left( \begin{array}{c} \phi \\ \phi \end{array} \right)$	33	1000.	.0059	.0036	C014	6000	. C044	6400	00052	2600	0061	9900.	9400.	C082	0074	- 0064	2000		00.56	0900	9400.	7010	0139	1910.	0072	1100
	Ap	<u> </u>		i	•	· ·	i	•						•	•		 			•	•	•	•	•	•	•	•	•
	meter.	Αρρτοχ. (Δ θ)	-	1.0-	5.3 7	61 0 7			0.3	. 0.8	-0.5		0 0 0 0	.0.2	-0.4	0.8	0.5	-0.05		1	9. 1	-1.2	-1.2	1.2	4.0	0.9	1.3	-
cu.	Inclinometer.	Scale cor- rected for Decl. and Bif.		129.5	147.2	146.4	1.57*8	158.0	134.7	138'4	132.7.	135 I	135.7	134.8	131.5	138.5	135°2	133.5	130.4	1 421	194.7	126'8	126.2	140.8	156'8	168.3	142.6	140.1
OCIOREN IO-I/I-CONNINACI	ar.	Approx. $\left(\frac{\Delta \mathbf{X}}{\mathbf{X}}\right)$		.0013	<b>•</b> 100.	2000.	2600.	- · c074	0040	.0063	C066	0022	.0055	. 0062	. 0068	9900.	0200.	0065	0074	#000	0087	.0084	0010.	0083	.0000	.0049	.0046	.0055
1-01 8390	Bifilar.	Scale corrected for Temp.		260.8	261.1	254.9	1.865	235.3	268.8	275.6	276.5	272.3	0.012	-275.3	277.2	276.5	277.6	276.2	278-9	0 102	1 202	981.8	286.5	281.5	274.7	271.5	270.5	273 4
	tion.	(∱	-	6.5	2.8 7	1.01	0.11	9.5	0.81	6.9	1.1	x x	0.0	5.9	6.9	8.9	1.9	<b>3</b> 5	-1.2	0.1	- - -	1 %.	, <b>1</b>	8.61	S.S	12.9	12.7	12.9
	Declination.	Scale.	ľ r i	419.5	416.1	423.4	432 1 494.9	422.5	456'3	420'2	420.4	425.1	423.0	419-2	420.2	420.1	419.4	416.8	412.1	411.3	402 0	419.5	410.0	- 410.5	416.6	426.2	426.0	426.2
	Gött.	Time.	16 D.	н. М. 9.35		45	00 22	30 8	ŝ	10	15	. 20	22	с іс ,	40	45 -	50	55	4 [.]		01	- P7	26	80	35	40.	45	20
	Arbrox.	$\left( \frac{\nabla}{\phi} \right)$		9200.	.0059	6900.	0600.	.0156	7510.	.0038	1810.	6010-	1210.	10137	.0146	{	1800	• 0044	•0004	1200.	2100.	6900		- 0049	0085	er I	,	1200.
	meter.	Approx. $(\Delta \theta)$	-	-12.8	12.0	2.01	ο α 7	- 6. 6	16.5	13.5	17.3	18.0	7.75	30.3	82.9		17.4	13.2	13.3	12.3	1.51	0 61	0.66	0.06	6.65			33.6
	Inclinometer.	Scale cor- rected for Decl. and Bif.		6.211	202.6	195.1	181-4	187.2	228.2	222.6	232.6	242°I	272.1	2.6.2	322.1	1	253*3	220.8	221.5	210.0	220.5	1 442	2.790	1.596	917.4			325*9
BER 13-11.	lar.	Approx. $\left(\frac{\Delta X}{X}\right)$		1810.	0178	0142	4200	- 0028	6119	6220	0120	- 0264	1180		- 0504	1440	0263	2120	0259	- 0206	- 0247	0700 -	10495	40401	- 0551			£190. <b>-</b>
UCTOBER	Bifilar.	Scale corrected for Temp.		005.4		215.4	235.3	8.866	213.4	6.681	195.5	2.621	164.1	0.661	109.3	7.721	180.1	193.4	1.181	8.961	184.6	100 9	2.061	8.611	04.2			6.12
	ation.	(∱ ⊅)		09.9	2.11-		8.6-	6.81	- 13.8	0.0	-2.3	-4.8	9.91-	3.61	- 27.3	6.09-	-29'8	-34.2	-22.6	-14.3		- 1.00	1.14	9.F0	75.2	2	•	2.82
	Declination.	Scale.		0.008	401.6	1	403 5	399.4	399.5	413.3	411.0	408.5	396.7	2.007	386.0	352.4	383.5	379.1	390.7	0.668	419.0	423.0	0.024	507.0	8.885	,	;	491.6
	Gött.	mean Time.		ž	22 0	S	2:	C1 06	22	<b>9</b>	35	40	45	5 1	23 0		10	15	20	25	80	00	24	ç ç	S u	16 D.		0

October, 15^d 21^h, Gött.—Faint aurora in hands from W. to F. 22^h. Fuint diffused aurora both N. and S. of the zenith, in motion. 23^h. Aurora brighter, and gathered tow corona near the zenith at 16^d 0^h. Two parallel arches of aurora in the N., brightest at the extremities E. and W., and striated. At 1^h, brightest portion of aurora to the S. of the zenith ; faint auroral bands in the E. 2^h. Very faint aurora still visible in the E. Co-ordinate mean values, declination, 413' 3; bifilar, 257' 1; inclinometer, 133' 8,  $\begin{array}{c} 0.147\\ 0.082\\ 0.082\\ 0.134\\ 0.096\\ 0.050\\ 0.025\\ 0.004\\ 0.0010\\ \end{array}$ 2000 0048 0006 .0074 ١,  $\begin{array}{c|c} +3.0\\ 119.2\\ 2225333442\\ 2225333544\\ 2225333544\\ 2225333554\\ 222533356\\ 22253333554\\ 22253333556\\ 22253333556\\ 22253333556\\ 22253333556\\ 22253333556\\ 22253333556\\ 22253333556\\ 22253333556\\ 222533356\\ 222533356\\ 222533356\\ 222533356\\ 222533356\\ 222533356\\ 22253356\\ 22253356\\ 22253356\\ 2225356\\ 2225356\\ 2225356\\ 2225356\\ 2225356\\ 2225356\\ 2225356\\ 2225356\\ 2225356\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\ 222556\\$ + 2256.7 2256.7 2256.9 2275.1 2275.1 2275.1 2275.1 353.5 353.5 253.5 253.7 253.7 253.8 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 253.7 132°5 123°9 86°9 115°1 115°1 134°1 134°1 134°1 135°5 155°6 155°6 ò 80 243 150. 0048 0054 0055 0065 0065 0025 0039 0039 0039 0057 0057 0057 · C015 - 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0 431. 419° 419° 417° 419° 419° 419° 418° 419° 418° 419° 419° 419⁴18⁴ 121 23. 448[.] 443[.] 496 457 ¢i ŗ. 0

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IRREGULAR FLUOTUATIONS.

 $\mathbf{234}$ 

ATHABASCA, 1843.

LAKE

MAGNETICAL DISTURBANCES,

IRREGULAR FLUCTUATIONS.

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16⁴ 18⁴. Bright arch of aurora in the N. 19⁴. A broad arch or band of aurora extending across the zenith; a brighter arch to the N. 20⁴. A very faint arch of aurora in the north. 21⁴. A faint auroral arch extending from N.E. to N.W., brightest at the extremities; a few faint detached patches in the N.W. 22⁴. Arch less distinct; a broad hand of aurora to the S. of the zenith. 23⁴. Appearance of aurora nearly the same as before. 17⁴ 0⁴. Auroral arch much brighter than before at its N.W. extremity. 1⁶. Faint arches or bands across the meridian in the zenith.

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1843-continued.
Athabasca,
Lake
Disturbances,
Magnetical

OCTOBER 17-continued.

OCTOBER 17-continued.

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Approx.	$\left(\frac{\phi}{\phi}\right)$			.0034	6800.	.0056	. 0056	.0046	.0045	- 0047	1010.	+0104	- 2600.	.0138	1900.	.0065	.0274	1500.	.0023	.0040	.0049	.0005		8000	- 6900.	.0003	1200.	.0028	<b>20</b> 00.	0003	- 0002	
meter.	Approx. $(\Delta \theta)$		-	1.1-	-1.2	-1.7	ö.[ –	0.1-	1.3	5. 5	12.5	19.5	19.4	25.2	21.7	20.5	20.0	9.61	19.5	20.6	21.0	20.4	}	12.5	8.8	7.3	4.8	4.8	4.6	2.8	-0.2	
Inclinometer.	Scale cor- rected for Decl. and Bif.		Div.	127.5	126.2	124.2	126.2	128.2	142.7	146.2	205.3	245.5	244.9	278.1	257.9	251'2	252.1	246.0	245.5	251.9	253.9	250'8		211.1	184.3	176.0	161.2	161.4	160.2	150.1	132.7	
lar.	Approx. $\left(\frac{\Delta \mathbf{X}}{\mathbf{X}}\right)$		,	9500.	·C041	6500.	8500.	.0048	.0043	0600	0146	0281	1620	c980	- 0368	0340	1210	0336	0362	0367	c366	0398	1	- 12555	2010	1410	- 0074	4900	9800	0058	9000	*****
Bifilar.	Scale corrected for Temp.			2.1.92	269°I	274.5	27.41	271.3	569.8	230.8	214.2	174.5	6.141	151.3	149.1	157.3	221.4	159.6	150.5	149.6	149.9	140.4	1	182.1	216.3	215.7	235.4	237.4	6.183	240.1	255.2	
tion.	(∲ ∇)		-	5. 0	1.5	2.0	1.3	2.1	6.9-	- 13.3	- 37.3	- 50'8	-57.1	-47.8	-51'1	-31.1	-12.8	- 23.7	0.12-	-23.0	- 12.9	-8.9	1	-2.8	0.3	7:2	1	9.9-	-8.3	-4.3	-3.3	
Declination.	Scale.			416'2	414.8	414.0	414.6	414.8	406.4	400.0	376.0	362.5	356.2	S65°5	362'2	382.2	400.5	389.6	392.3	390.3	400.4	4C4.4	ł	410.5	413.4	420.5		406.7	405.0	40.0.4	410.0	
Gött.	mean Time.	17 n.	H. M.	45	50	55	19 0	5	10	15	20	25	30	35	40	45	50	55	20 0	5	10	15	20	25	30	35	40	45	50	~,	21 0	
Approx.	$\left(\frac{\overline{\Phi}}{\Phi}\right)$			ō100	.0049	6500.	.0045	<b>2900</b> .	0900.	.0066	2900.	9100.	.0014	.0032	<b>1200.</b>	.0064	.0053	- 0026	0135	2800	+600	0033	- 0046	- 0039	- 0041	0013	9600	0100.	1200.	0020	<b>•</b> 0014	.0022
Inclinometer.	$\begin{array}{c} \mathbf{A}_{1} \mathbf{prox.} \\ (\Delta \theta) \end{array}$		~	8.8	7.4	5.6	5.3	4.1	3.2	5.3 7	2.3	n.0	1.3	-0.2	1.0-	-2.0	-2.1	-2.6	-6.4	-1.3	-2.5	-2.8	-3.0	-3.1	-2.9	-1.3	-2.6	9.1-	-1.2	-0.5	9.0-	9.0-
Inclino	Scale cor- rected for Decl. and Bif.			184.5	176.5	165.6	164.3	157.1	152.1	147.2	147.0	133.9	142.4	132.8	129.8	122.5	121.7	1.611	1.26	126.0	119.3	9.211	116.7	115.8	117.4	126.0	1.611	124.3	126.8	131.1	130.1	130.0
lar.	Approx. $\left(\frac{\Delta X}{X}\right)$			9800	4600	- 0032	6500	6100	0003	1200.	.0042	9100.	5100	8100.	.0035	.0103	<b>1</b> 600.	.0023	6000.	1100	£100.	.0022	\$100.	1200.	9100.	\$100.	£100.	\$100.	.0023	1200.	5100.	.0023
Bifilar.	Scale corrected for Temp.				228.6		239.7	251.5		263.2	269.3	261.7	253.7	262.4	267.4	287.1	284.7	264.4	259.9	253.8	261.6	263.7	0.195	265.0	261.9	260.8	261.4	260.9	263*9	263.3	261.4	264.0
ation.	(∱ �)		~	<b>6.</b> S	-2.3	-5.3	-2.3	-10.5	1.4-	-2.3	0.8	-3.3	-12.8	2.0	-4.3	-2.3	-3.1	27.3	34.7	32.0	33.1	36.3	89.3	35.0	25.7	14.7	13.1	2.7	-1.5	0.3	3.1	4.7
Declination.	Scale.			417.2	411.0	408.0	411.0	402.8	409.2	0.116	414.1	410.0	400.5	414.0	409.0	411.0	410.2	440.6	448.0	445.3	446.4	449.6	452.6	448.3	439'0	428.0	426.4	416.0	411.8	413.6	416.4	418.0
Gött.	mean Time.	17 D.	H. M.	2 20	25	30	35	40	45	50	55			5 0				30	35	40	45	50		18 0	5	10	15	20	25	30	35	40

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## IRREGULAR FLUCTUATIONS.

Oct, 17^d 15^h. Faint auroral arch, clevation 12°, extending from N.E. to N.W. 16^h. Arch stationary, appearance of aurora little changed. 17^h. The same as before, 18^h. Arch slightly risen, altitude 17°, and broader. 19^h. Arch rising ; at 19^h 6^m began to break up into waves in quick motion, but receded from the zenith to the N. 20^h. Detached masses of aurora resembling circous clouds in the zenith, and to the S. ard E., which disappeared before 20^h 40^m. 23^h. Faint circous aurora visible.

Magnetical Disturbances, Lake Atlabasca, 1843-continued.

OCTOBER 18. Term Day.

Ocroses 18-continued.

Gött.	Declin	Declination.	Bifi	Bifilar.	Inc	Inclinometer.		Approx.	Gött.	Declination.	ation.	Biń	Biĥlar.	Inc	Inclinometer.		Approx
mean Time.	Scale.	<u>ት</u>	Scale corrected for Temp.	Approx.	Scale cor- rected for Deel. and Bif.	P,- P.	Approx. Δ 6	\$ \$	mean Time.	Sale.	ψ Δ	Scale corrected for Temp.	Approx.	Scale cor- rected for Decl. and Bif.	P,-P.	Αρρτοχ. Δθ	\$ \$
18 р. Н. М.						Div	-		18 n. H. W.		-				Div.	`~	
10 0	408.0	+0.1	1.135	9800.	8.121	- 10.3	- 1.1 -	1500. +		407.0	-3.0	278.5	.0033	115.3	- 13.0	-2.5	- 0012
S	405.6	-2.3	289.0	<b>2600</b> .	61	- 12.7	64	6500.+	25	407.5	-2.6	268.5	9100.	125.8	-2.4	4.0-	8000.+
2	406.7	-1:3	288.7	1600.		1.91-	8	+ .0036	30	409.9	2.0-	5.1.2	9200.	8.211	-10.5	1.1-	6000
15	408.0	1.0-	276.9	.0050	115.9	- 15.7	- 2.2 -	ŧ0000	35	408.0	1.7-	568.9	4100.	1.811	6.6-	4.1-	2100
20	406.8	-1'4	279.4	8200.	_	-12.6	01	2100. +	40	407.0	-5.2	6.693	0030	116.7	1.01-	1.1-	- '0015
25	410.6	+2.3	282.4	8900.		- 16'2	- 5.8	+ .0012	45	408.0	-2.5	270.7	.0022	0.211	- 10.7	6.1-	0013
30	409.4		287.5	· 0085		-14.5	-2.2	+ .0035	50	409.5	2.0-	267.5	1100.	120.2	-7:4	1.3	- 0014
35	404.8	-3.6	289.2	1600.	ŝ	-15.5	-2.1	+ .0038	55	408.0	-2.3	268.0	5100.	0.811	4.6-	9.1-	0200
40	404.0		285.8	6400.	114.8	0.91-	-2.1	<b>4700.</b> +	13 0	410.0	\$.0-	267.0	6000.	117.5	8.6-	-1.7	0024
45	405.1	-3.5	292.5	1010.	113.5	-17.2	-3.0	+ 0042	S	411.0	1.0+	265.0	.0002	118.2	0.6-	9.1-	6700
50	409.0		285.0	9400.	120.7	8.6-	- 1.1 -	2400.+	10	414.0	9.8+	259.6	2100	120.9	-6.3	1.1-	- 0039
55	409.0		285.1	9400.	121.1	-9.3	-1.0	+ .0044	15	413.0	+2.5	253.2	6800	121.6	-5.5	6.0-	0058
11 0	409.8	6.0+	277.8	1500.	120.9	-8.3	-1.4	+ .0022	20	413.1	+2.6	249.0	0053	127.4	0.4	0.1	- 0052
5	411.0	0.6+	231.1	.0062	128.9	2.1-	-0.5	0900.+	25	414.0	+3.4	252.5	0041	125.0	6.11	10.3	- 0047
01	408.1	0.1-	279.6	.0056	113.7	- 16.3	-2.8	0000.	30	415.0	+4.4	253.2	6600	123°1	13.8	9.0-	- 0052
15	411.0	6.1-	276.5	9F00.	127.3	-2.5	-0.4	+ .0038	35	413.0	+2.3	255*8	0030	120.8	0.9-	0.1-	0051
30	407.0	-2.2	274.5	6800.	124.1	-5.6	-1.0	0200.+	40	413.0	+2.2	258.6	- 00200	118.3	-8.4	-1.4	- 0049
25	409.0	8.0-	278.5	.0052	122.4	-7.2	-1.5	+ .0027	45	413.5	+2.6	258.2	0022	121.4	-5.2	6.0-	0100
CS S	409.8	0	278.0	1200.	120.4	1.6-	-1.5	+ .0020	50	412.0	0.1+	259.7	9100	121.6	-5.0	8.0-	0033
35	410.0		273.6	.0035	114.7	- 14.7	-2.6	+100	ч.)	412.0	6.0+	259.4	4100	128.2	1.6	0.3	- 0022
40	409.3	6.0 	272.4	1600.	115.3	-14.0	-2.4 -	6100	14 0	412.0	8.0+	260'2	- 2100	126.4	0.0	0.0	0015
45	408.6		270.2	6500.	123.5	-5.6	0.1	<b>10000.</b> +	5	416.2	+ 5.0	260.2	0015	123.8	-2.6	-0.4	- 0024
50	410.0		279.6	.0255	122.3	2.9-	: -	+ .0032	10	414.4	+3.2	260.6	- 0013	121.7	-4.7	8.0-	- 0029
	410.5	8.0+	1.872	0500.	118.7	- 10.3	-1.1	£100. +	15	412.8	+1.5	258.1	- C022	120.7	-5.6	6.0-	1400
12 0	408.0	8.1-	275.4	1400.	122'3	9.9-		8100.+	20	414.0	+2.1	·····	- 0023	121.8	-4.5	8.0-	- 0038
5	409.0	6.0-	273.6	<b>*</b> 0034		9.8-	-1.5	6000. +	25	412.4	1.1+		020	123.3	-3.0	-0.5	003G
10	412.0	+2.1	281.3	0900.		- 10.7		+ .0023	30	410.0	-1.4		0023	123.1	-3.2	9.0-	- 0034
15	410.0	0.0	281.3	0900.	6.611	- 14.6	- 5.2	0030.+	35	411.0	-0.4	261.4	0100	120.4	-5.9	0.1-	0800
		-					-	=	. <u> </u>								

IRREGULAR FLUCTUATIONS.

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* Co-ordinate mean values for the term observations, declinometer, 413.35; bifilar, 257.06; inclinometer, 133.83. Impossible to see aurora.

	-																											
Approx.	\$ \$		-:0040	-:0048		600 1	8600	.0038	1700	- : 0020	- 0014	8200	6000				8000	- 0012		2000	0200	0700 -		- 10014	- 0027	- 0031	- 0058	L100
er.	Approx. $\Delta \theta$	•	-1.5	-2.1	57 C	200	) 0 0 0 0 0	- 8.1	1 8 8	- 3.7	- 8. - 8. -	6 i i i	1-2.6		0 - 0 - 1		1 000	-3.8	-3.1.	-3.3	0 0 1	1 2 8	- 2.0	-3.0	- 3.3	-4-1	-4.3	-4.3
Inclinometer.	P,-P.	Div	8.8	- 12.3	- 13.0	191	- 12.0	- 18.3	6.61-	4.12-	-22.0	- 34.0	6.18-	- 23 2	- 21 6	10 2	0.61 -	-22.0	- 18.3	- 19.3	- 19.0	16.5	-21.3	1.11-	- 19.0	-23.7	-25.1	-25.2
Ч	Scale cor- rected for Decl. and Bif.		127.4	124.7	124.9	2.611 8.611	C 771	199.3	123.2	122.0	121.5	109.5	2.111	120.5	122.2	0.001	122 9	122.0	125.8	124.9	125.3	128.4	124.2	129.1	127.8	123.8	123.0	123.6
Bifilar.	Approx. $\frac{\Delta Y}{X}$		0100		8000.	1000-	1200.	1800.	.0044	.0054	.0062	6800.	.0103	6200	0900	2000.	1000.	.0063	.0055	1900.	0046	.0037	.0057	0045	6600.	0020	*0058	6900.
Bif	Scale corrected for Temp.		2.123	254.0	256.1	258.4	1. 007	0.196	264.6	266.8	269.0	276.5	280.3	272.8	267.0	204 4	202 3	266.2	263.7	265.1	260.4	257.2	262.8	259'1	256.7	259.8	261.8	264.5
ation.	γ 4	•	2.2	2.6	9.8	10.6	0.01			3.5	4.0	9.0		14.4	-7.6	9.9	+ « 0	1.1+	9.1-	-3.3	-3.5	-4.0	-4.1	-4.6	8.0 1	, <b>L'</b> 0 +	-0.3	+0.4
Declination	Scale.	÷ ,	414.0	414.0	420.0	422.0	421 5	0.917	414.0	415.0	415.8	415.0	412.0	408.0	405.0	408.9	412 0	414.5	412.0	410'5	410.5	410.0	410.0	409.5	413.4	414.4	414.0	414.8
Gött.	mean Time.		н. 90 90		30	35	ę ;	ç; ç	55	21 0		10	15	20	25	80	40°.	45	50	55	22 0	5	10	15	20	25	30	35
Approx.	\$ \$		.0040	6100	0100	6000			+ 0002	1000	1000	1100	0023	9100	- 00200	- 0022	+ 10044	8000	- 0014	0000.	0023	6100.+	- 0123	1.0005	6200	1000.+	0064	.0106
1	Åpprox. Δθ		0.1-	0.8	-0.5	6.0-	9.0-			-2.0	.0. 1	-2.7	-2.1	-2.1	-2.4	-2.6		0.6	1 2.6	-2.2	-2.1	0.2	-7.4	5.4	1.3	6.0		<b>-2.4</b>
Inclinometer.	P,-P.		DIV.	1 1 2 4 1	-2.9	-5.4	-3.8		4.11	- 11.5	-16.9	-15°7	-12.3	- 12.2	-13.8	- 15.2	-6.3	7.II -	- 15.2	- 12.3	- 15.5	1.4	-42.6	30.8	7.5	5.4	0.9-	- 14.2
In	Scale cor- rected for Decl. and Bif.		100.4	120.4	123.3	120.8	122.3	120.2	1121 1	115.0	109.7	6.011	114.4	114.6	113.1	8.III	120.7	P.311	+.111	114.1	110.7	127.3	83.1	156.4	132.8	130.5	118.8	110.4
ifilar.	Approx.		0800.	1000	0000.	6000 ·	8100.	1800.	0041	.0039	. : 0057	.0045	.0026	.0026	0028	.0030	9900.	0000	.0038	.0043	.0030	<b>•</b> 0014	- 0023	- 0112	0055	8100	- 0042	0057
Bift	Scale corrected for Temp.			255.0	264.2	266.8	269.4	273.3	0.412	075.5	281.0	27.4	271.9	271.8	272.5	273.0	283.5	1 002	1.212	9.926	272.8	268.1	257.1	231.1	247.7	÷		
ation.	4			-1.5	14.6	-3.5	-4.2	1	9.0+	0 4 0 0	14.2	16.2	18.2	20.1	16.1	14.1	10.7	1	0.	- u H 0	0 0 0		1.3.2	-49.4		- 95.1	1 1 9 1	- 10.3
Declination.	Scale.		0.0.1	410.0	407.0	408.2	407.6	410.6	412.4	F.00F	426.0	428.0	430.0	432.0	428.0	426.0	422.6	409 6	414 4	415.4			. *	9.095	401.0	0.485	3.000	401.8
Gött.	mean Time.	18 D.	н. М.		5 202	55	15 0	5 L	9	01 00	0.20	ŝ	35	40	45	50	ŝ	16.0		2 4		10.20	20	200	00	A R	2 2	55

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Magnetical Disturbances, Lake Athabasca, 1843-continued.

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IRREGULAR FLUCTUATIONS.

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Disturbances, Lake Athabasca, 18	
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er.	Αρρτοχ. Δθ		-3.7	-3.7	1 2 2	21	0.0		- 3.0	_	9	-2.3	-23	-1.8		-1.5	-1.6		6.0-	я с о с 				+ 4 5 C		- i		1	<b>7</b> 0
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П	Scale corrected for Decl. and Bif.	1	8.611	113.7	115.9	116.7	117.5	118.1	118'3	118'0	120.5	122.2	122.1	124.9	1	126.6	125.4	128 5	129.4	153 4	0.101	0 001		1 001	101	135.4	132.9	130.8	131.3
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B	Scale corrected for Temp.		281.4	281.2	280.2	279.6	278.9	219.6	0.016	277.1	275.6	276.2	275.7	268.4	263.6	259°I	255.2	253.4	246.9	251.5	Z 612	245 9	6 017	0.542	243 9	247.1	251.5	253.9	253.9
ation.	ት <b>ላ</b>		3.6	2.4	+1.3	+0.2		1 17		1.0+	+1.4	6.0+	3.5	1.9					6,6		000								0.6
Declination.	Scale.	( 1	415.6	414.0	412.6	411.4	412.0	412.4	0.017	410.0	411.2	410.6	413.1	415.6	418.0	417.8	415.0	418.0	415.8	415.0	416 0	415.6	410 0	414-0	414 0	415.8	416.0	416.0	417.5
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ŗr.	Αρρτοχ. Δθ		-3.5	-3.3	-3.3	-3.0	-2.9	-2.6	0 0 7 0 1	1 1	1				-	-3.0	-3.0	-2.8	-4.3	-3.8	1.5.1	-2.5	071	-2.3	-2.3	12.3	-2.9	- 5.3	-2.8
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In	Scale corrected for Decl. and Bif.		118.7	119.2	118.8	120'2	120.5	121.8	122 5	1 22 1	0.161	0.011	9.061	114.0	118.8	117.7	117.2	118.2	108.6	112.0	121.6	121.1	1.611	120.0	120.0	119.7	1.911	1.611	116.2
Bifilar.	Approx <u> A</u> X X		.0034	2900.	.0057	:0034	.0052	.0056	.0354	.0036	1800.	1000	.0045	.0046	.0056	0900.	.0038	9900.	.0056		•	.0021			.C021	6100.	•0034	6800.	.0039
Bif	Seale corrected for Temp.		2.836	270.2	270.6	270.4	270.2	268.7	258.1	263-1	2 707	0.740	1.996						271.5			262.0							258.1
ation.	ΦΦ		1.0	-1.0	1.01	9.1+	+ 1.3	+ 1.3	8.1+	+1.8		0 0 5 0 +		- 10	, c , c , 4	-	- 6. - 4.	0	6.1+	-4.5	+1.5	2.0	5.8	0.9	7.2	5.4	1.9	7.8	0.8
Declination.	Scale		416.8		418.2	419.6	419.4	419.4	420'0	420.0	1.014	419 -	1007	0.107	418.0	417.0	422.0	422.0	420.0	413.4	419.2	422.5	423.0	424.0	421.0	422.0	422.5	494.0	424.0
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-3.5 -4.0 -6.7	-7.1	-3:5	-4'3	-4.5	6,0	-3.8	-3'2	-3.8	-5.8	-4.1	-5.2						-15.8	- 16' 1	-12.1-	-20.9	-0.3	32.9	53'2	52.8	47.2	_
130°0 129°4 126°5	136.1	127.5	128.6	128.3	133.6	128.7	129.3	128.6	126.4	128.0	126.9						246.7	246.4	250.4	241.6	262.2	295.4	315.7	315.3	4.608	
6000	5000	5000	1100	1000.	1000.	\$100.	0100.	2100.	.000	<b>4</b> 100.	.0020						1000.	- 0022	0200	- 0023	- 0143	0285	- 0238	7820	0241	-
255°9 255°7 258°9	257.4 253.5	258.0	256.4	260'2	260.7	264.5	264.0	264.8	262.1	265.8	267.8						235.8	228.9	229.7	228.6	193.5	6.121	165.7	166.0	164.8	
7.6 8°1 2°5	7.6 8.3	4.9	3.9	2.1	2.2	4.0	4'4	4.2	2.5	2.1	3.9						-4.3	1.0	3.7	-2.3	- 28.3	-5.1	2.2	2.0	4.7	_
416°0 416°5 410°8	415.8	413.1	412.0	410.2	410.6	412.0	412.4	412.2	410.4	410.6	411.8						412.0	416.4	420.0	414.0	388.0	411.2	424.0	417.0	421.0	
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-14.7 -16.3 -15.1	-17.2	-15.2	-12.7	-12.3	-12.8	5.11-	9.6-	-7:2	5.1-	-3.1	-3.8	9.81	-12.0	-11.4	- 10.8	-14.6	- 12.1	-12.6	2.91-	- 18.6	-19.2	-19.3	- 20.3	- 19.7	1.12-	
117.7 116.2 117.4	115.4	117.5	120.1	120.5	120.1	121.7	123.4	125.9	132.1	130.4	129.8	125'2	122.0	122.8	123'6	6.611	122.6	122.3	118.4	116.7	1.911	0.911	115.1	115.7	114.3	
.0044 .0046	.0046	.0043	6800.	.0055	00500.	0100.	\$100.	•000 <b>•</b>	0100.	1000.	.000	<i>c</i> 100.	.0022	1800.	.0036	.0053	.0054	.0056	.0062	8900.	•0084	.0083	.0082	\$600.	1600.	
269.6 267.3 268.3	270°1 270°2	269.2	267.9	264°0	262.5	259.4	260.2	257.7	253.6	256.1	258.7	259.7	262.7	265.3	2.995	271.6	271.8	272.2	274.1	275.6	230.6	280.1	280'1	283.3	282'9	_
0.6 0.2	5.9	3.5	5.6	0.4	7.4	5.7	5.4	<b>2</b> .8	5:4	2.6	+ 1.8	+1.5	5.8	3.0	4.6	6.3	5.0	9.9	5.0	3.8	4.4	4.4	3.0	-4.2	4.8	
425°0 424°0 423°2	420°2 490°4	419.6	422°I	423.6	424.0	422 4	422.2	419.6	422'0	419.0	418.0	417.5	418.6	419.6	420.0	421.4	420.0	421.6	419.6	418.2	418*4	418'0	416'2	417.0	417.2	
10	50	30	35	40	45	50	55	5 0		10	15	20	25	30	35	40	45	50	55	0 9	5	10	15	20	25	-

fainter at elevation 13°. 17b. A faint auroral arch, elevation 5°, to the East of North. 18^b. A faint auroral arch at an elevation of 37°, lightly overcast to the South. 19^b. A faint auroral arch, elevation 5°. 20^b. Aurora in heavy masses of moderate brightness, in little motion, long streamers extending to the zenith. 20^b 40^m. Two long beams nearly stationary, altitude 54° and 60°, brightest to westward of the zenith favouus masses and unconnected streamers in N.N.W. and N.E. 21^h. Aurona faint, diffused like thin vapour, in the zenith, with moderate rapid motion to the E., streamers somewhat brighter in the N, faint streamers and factous masses to the E. and N.W. 29th. Aurora very faint, streamers screely perceptible. 22^h 30^m. No aurora vibible. 27^h O.⁴ Affeeh display of antora, ising rapidly from the northern horizon and extending itself from an altitude of 20° N. to 40° S.; at 0^h 30^m. No aurora vibible. 27^h O.⁴ Affeeh display of antora, ising rapidly from the northern horizon and extending itself from an altitude of 20° N. to 40° S.; at 0^h 30^m. No aurora vibible are arous bright aurora in flexuous masses to S. and S.E. of the zenith, an arch at elevation 36° extending from N.E. to N.W. 27^d 1^h. Lightly clouded to S, and E.; patches of aurora of various brightness; at 1^h 5^m a large mass of aurora passing to the zenith, where it became faint, in flexuous streaks, without perceptible motion. 2^h. No aurora.

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# IRREGULAR FLUCTUATIONS.

IRREGULAR FLUCTUATIONS.

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Not	Bifilar.	Scale corrected for Temp.	184.7 195.4 203.4 205.0	194'6 109'8 105'6 117'0 117'0 1138'1	134.2 136.1 136.1 137.9 137.9 151.8 155.5 159.0 164.8 163.1 163.1 163.2 163.2 163.2	0.751 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767 7.767	175°1 175°1 182°1 182°1 182°1 188°2 188°2 192°7 193°7 193°1	192.7 193.77 194.5 204.7 204.7 202.8 182.5 182.5 181.0 181.0 181.0	114'0 120'2 125'6 1245'6 1245'6 1245'5 1245'5 130'4 136'3
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Magnetical Disturbances, Lake Athabasca, 1843--continued.

IRREGULAR FLUCTUATIONS.

243

Correction to declinometer differences,  $+0^{\prime}$ . 50.

Co-ordinate mean values, declinometer, 416'1'; bifilar, 207'6; in linometer, 120'4.

Clouded, with snow.

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1843 – continued.
Athabasca,
Lake
Disturbances,
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	i . , 	Approx. $\Delta \phi$ $\phi$		.000	4000.	- 0003	0200	.0034	4009.	81-00.	6900.	1770.	6900.	.0049	.0082	8900.	.0058	.0033	4100.	0000 ·	1000	2010.	2900.	5000 ·	9000.	10194	0093	5010.
	er.	Approx. $\Delta \theta$	-	4.7	5.6	1.0	5 C.	,		10.6	1 2 1	20	13.9	11.9	13.5	13.7	13.7	12.9	12.4	2.01	0.70	6.66	17.9	10.01	16.0	6.81	18.5-	15.7
	Inclinometer.	P,-P.		27.8	1.21	0.1	6.11	32.9	20.4	62.4	44	2.5	2.18	0.02	8.84	80.2	80.2	75.4	8.12	101.8	0.971	6.061	101 8	8.08	94.9	110.5	108.1	2.16
t 1–2.		Scale cor- rected for Decl. and Bif.		188.9	178.3	16.191	173.3	194.3	182.4	224.4	210 3	216.4	245.6	233.9	243.4	244.8	245.4	241.3	1.127	7.886	6.618	1.866	6.696	940.8	269.7	279.6	277.1	260.3
DECEMBER 1-2.	Bifilar.	$\frac{Approx}{\Delta X}$		1600		10003	11110	2200	0062	1910	1600.1	- 0131	- 0205	0186	- 0185	0214	0218	1770	9220 -	4680.	- 0341	- 0354	2260	- 0938	- 0222	- 0239	2720	- 0225
-	Bil	Scale corrected for Temp.		139.4	151.2	167.4	132.5	142.6	146.6	117.6	1.981	125.6	103.4	109.0	1.601	100.7	9.86 0.10	1. 16	202	67.3	6.69	57.7	80.4	61.5	- 0.96	8.06	- 1.18	94.9
	Declination.	* \$	-			2.65	- 22.5	23.7	1.71	26.6	-37.4	- 94.5	-52.5	- 37.7	- 32.6	- 14.7	17.5	200	2 01	14.1	14.7	0.0	- 19.0	16.4	-2.0	2.11-	-40.9	-35.4
	Decli	Scale.	11	417.6	415.8	386.0	0.968	442.0	435.5	445.0	381.0	324.0	366.0	380.8	386.0	403.9	412.0	0.367	440.0	434.0	434.6	420.0	401.0	413.6	418.0	407.8	378.5	384•0
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.pa	Inclinometer.	P,-P.	Div.	9.09	1.20	24.0	14.3	9.8	15.6	15.5	1.6	2.6	8.8	10.1	6.3	10.0	0 - 0		9.1	9.1	2.3	1.8	1.1	3.5	3.1		2.5	50 50
-continu	-II	Scale cor- rected for Decl. and Bif.		187.8	168.0	152.1	143'3	138.5	145.6	145.2	139.1	139.8	138.9	6.041	130.5	1.061	135.4	133.0	132.0	132.1	132.8	131.3	132.3	134.1	133.8	133.6	133.3	133.6
November 13-continued	Bifilar.	$\frac{\operatorname{Approx.}}{\Delta X}$		7120	0208	8600	- 0088	0052	9900 -	+100 -	- 0061	- 0052	- 0042	- 0042	0020	nenn -	- 0053	- 0050	- 0.046	- 0043	- 0047	640	0038	- 0043	1800	- 0030	- 0031	0028
Nov	Bi	Scale corrected for Temp.		139.2	142 0	173.8	176.2	186.5	170.6	•	183.0	185.2		187.8	102 0	185.5	183.9	184.5	185.7	186.3	184°5	185.7	186.8 -	185.4 -	188.6 -	188.4	188.1	- 188.1
	Declination.	* ↓	`	9.0-	0 8.8     8.0	-17:0	- 13.0	0.11-	4 a.01 -	- 6.6 -	0.6-	-7:4	1-5.6	21	4 11 -		-4.9	-5.8	0.9-	-5.0	-5.4	-5.2	-5.6	-5.2	0.9-	-2.6	-3.6	 27 27
	Decli	Scale.		414.4	2306.2	0.868	402.0	404-0	404.4	406.0	406.4	408.2	410.0	40/ 0	40.00F	410.4	411.3	410.6	410.4								414.8	
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	mean Time.	Scale.	\$	Scale corrected for Temp.	Approx. $\frac{Approx}{\Delta X}$	Scale corrected for Decl. and Bif.		Αρμτοχ Δθ	. <b>⊲</b>   <del>0</del>	mean Time,	Scale.	4	Scale corrected for Temp.	Approx. $\frac{Approx}{\Delta X}$	Scale corrected for Decl. and Bif.		Αρρτοχ. Δθ	₽ ₽ ₽
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	9         4054         559         1107         -0032         157         6         -0004         157         8         -0024         157         8         72         1137         8         7         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1 </td <td></td> <td>452.0</td> <td>26.5</td> <td>131.3</td> <td></td> <td>0.861</td> <td>37.8</td> <td></td> <td>2100.</td> <td></td> <td>426.4</td> <td>5.2</td> <td>177.7</td> <td>0100.+</td> <td>145.0</td> <td>-4.8</td> <td>8.0-</td> <td>7200</td>		452.0	26.5	131.3		0.861	37.8		2100.		426.4	5.2	177.7	0100.+	145.0	-4.8	8.0-	7200
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			460.6	5 6 7 6 7 6 7 6 7 6	1.021		9.12.6	47.4	- v o o	2200.	12	425 7	0.4	173.6	- 0004	153.3		9.0	8000.
	$ \begin{bmatrix} 5 & 449^{\circ} & 51^{\circ} & 51$	12	458.0	32.7	129.6	1110	203.6	48.9	7.5	0800.	88	428.6	4.1	1.101	- 0024	156.6	9.7 9	1.1	1000.
		15	449.4	24.3	134.0	¥010	198.3	39-2	2.9	.0028	36	428.4	7.2	168.7	0021	154.1	4.2	2.0	9000
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	81	446-2	21.3	137.6	+600	195.0	36.4	6.5	.0025	68	426.1	4.0	168.6	- 0021	150'9	0.1	0.5	8100
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	57	440.2	15.2	135.0	2010	202.1	44.1		1400.	4542	423 2 424.2	0.8	175.4	2100 -	148.5	0 5.I I	+ + 	- 0005
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	27	440.0	15.3	135.5	- 0103	203.4	45.4	i r	0500.	48	423.8	2.6	6.441	1100.	146.9	-3.2	-0.5	1000
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	30	447.6	23.1	125.7	- 0139	211.3	43.8	7.5	6000.	51	424.1	2.9	8.181	.0024	150.1	0.0	00.0	.0024
$36$ $444^{\circ}$ $203$ $116$ $(-0172)$ $219^{\circ}$ $54^{\circ}$ $54^{\circ}$ $54^{\circ}$ $57^{\circ}$ $12^{\circ}$ $11^{\circ}$	36 $444$ $2.0^{\circ}$ $116^{\circ}$ $-0172$ $219^{\circ}$ $57$ $423^{\circ}$ $2^{\circ}$ $117^{\circ}$ $-017^{\circ}$ $219^{\circ}$ $-117^{\circ}$ $-110^{\circ}$ $-117^{\circ}$ $-110^{\circ}$ $-1117^{\circ}$ $-1117^{\circ}$ $-1117^{\circ}$ $-1117^{\circ}$ $-1117^{\circ}$ $-111^{\circ}$ </td <td>33</td> <td>446.0</td> <td>21.7</td> <td>122.6</td> <td>1510</td> <td>0.112</td> <td>54.1</td> <td>9.5</td> <td>1600.</td> <td>54</td> <td>423.8</td> <td>2.1</td> <td>0.181</td> <td>1200.</td> <td>140.1</td> <td>0.01-</td> <td>1.1-</td> <td>- 0012</td>	33	446.0	21.7	122.6	1510	0.112	54.1	9.5	1600.	54	423.8	2.1	0.181	1200.	140.1	0.01-	1.1-	- 0012
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	36	444 6	20.3		- 0172	219.4	54.5	9.3	.0012		423.4	5.0	179.7	2100.	138.9	- 11.2	-1.9	- 0020
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	29	446.0	01.0		1610	231.6	15.2	6.71	0.0063		422.0	2 1	4.641	9100.	138.5	2.11-	-2.0	0023
48 $451.2$ $27.5$ $97.9$ $-0241$ $245.7$ $90.4$ $15.4$ $0063$ 51 $4480$ $24.3$ $102.5$ $-0226$ $237.9$ $82.6$ $1411$ $0053$ 57 $451.4$ $27.9$ $106.4$ $-0212$ $234.9$ $802$ $1377$ $0063$ $18$ $-0212$ $234.9$ $802$ $1377$ $0063$ $18$ $-0212$ $234.9$ $802$ $1377$ $0063$ $18$ $-0212$ $234.9$ $802$ $1377$ $00634$ $157$ $0064$ $157$ $-0212$ $234.9$ $802$ $1377$ $00634$ $157$ $-0212$ $234.9$ $802$ $1377$ $00634$ $157$ $-0212$ $234.9$ $802$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1027$ $1122$	48 $451.2$ $27.5$ $97.9$ $-0241$ $245.7$ $90.4$ $15.4$ $0063$ $51$ $4480$ $24.3$ $102.5$ $-0226$ $237.9$ $82.6$ $1411$ $0053$ $28.5$ $57$ $449$ $263$ $1072$ $-0212$ $234.9$ $802$ $1377$ $0064$ $15.4$ $0$ $4511$ $257$ $10072$ $-0212$ $234.9$ $802$ $1377$ $0054$ $1471$ $0$ $4511$ $257$ $10072$ $-0219$ $234.9$ $802$ $1377$ $0054$ $1675$ $0$ $4511$ $2589$ $881$ $-0219$ $23511$ $10071$ $1771$ $0053$ $120$ $0$ $4515$ $2669$ $881$ $-0287$ $26477$ $11077$ $1879$ $0087$ $20$ $0$ $4550$ $3867$ $-0287$ $26477$ $11077$ $1879$ $-0087$ $2670$ $1675$ $15$ $4550$ $3867$ $-0287$ $26477$ $11077$ $1879$ $20070$ $2670$ $15676$ $-0183$ $2667$ $388$ $6833$ $-02877$ $13477$ $2290$ $00082$ $122$ $4550$ $26576$ $-0183$ $229757$ $-01612$ $2667$ $3978$ $64570$ $3679$ $12909$ $-01612$ $22377$ $-0192$ $-0299$ $12$ $4550$ $3258$ $5711$ $-00387$ $2656$ $01018$ $129$ $45200$ $-00501$ $15975$ $-0795$ $12$ $4560$ $3258$ $57$	7 17	448.7	21.3	106.1	2660	6 / 22	6.70	1.91	6000.		A 10 0	- N 	1 401	0020	T 75T	0 01 -	1 2	0700
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	51448'024'3102'5 $-0226$ 237'982'614'1'005328'D.57449'826'3107'2 $-0212$ 234'980'213'7'0054 $-12'3$ 57451'427'9106'4 $-0212$ 235'198'315'1'0054 $-12'3$ 6451'528'980'215'1100'410'4 $-12'3$ $-2'3$ $-2'3$ 9451'528'980'316'9100'117'1'0054 $-25'4$ 16'9 $-0000$ 13451'528'986'3 $-028'7$ 28'398'3 $-028'7$ 200'4 $-25'4$ 16'9 $-0000$ 12455'730'585'9100'718'9 $0008'7$ 30'4 $45'70$ 26'013'7 $-2'3'3$ 12465'639'463'5 $-028'7$ 212'3212'2 $0003'2$ 9454'026'016'5'5 $-2'3'3$ 12465'639'463'5 $-028'7$ 110'718'9 $0003'2$ 9454'026'013'7'5 $-2'3'3'12465'639'463'5-0038'713'7'723'00003'212'2'5'5'-0005'115'5'5'-0'9'5'15456'035'845'3'7-0038'713'7'723'0'0'15'5'12'2'0'14'5'5'-0'5'1'4'5''5''5''-0'9'5''5''5''5''5''5''5''5''5''5''5''5''5$	48	451.2	27.5	6.46	- 0241	245.7	90.4	15.4	.0064		· ,							
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57 $451.4$ $27.9$ $106.4$ $-0215$ $245.1$ $1064$ $1065.5$ $1065.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $1067.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107.5$ $107$	$57$ $451.4$ $27.9$ $106.4$ $-0215$ $243.0$ $88.3$ $15.1$ $-0084$ $\mathbf{h}, \mathbf{M}$ $0$ $450.1$ $256.9$ $88.1$ $-0285$ $253.1$ $989$ $167$ $0$ $491.6$ $175.4$ $-0660$ $176.5$ $-223$ $3$ $451.5$ $283.3$ $859.5$ $-0285$ $254.1$ $110.7$ $1871$ $-0052$ $20$ $497.5$ $11229$ $-0000$ $176.5$ $-223$ $5$ $455.7$ $30$ $4778$ $-2574$ $110.7$ $1872$ $-0082$ $2597.5$ $-223$ $-223$ $12$ $465.7$ $30.7$ $110.7$ $189$ $-0052$ $20$ $369.9$ $1229.5$ $-0161$ $2557.7$ $-1038$ $12$ $465.7$ $30.7$ $110.7$ $1899$ $-0052$ $3659$ $1220.9$ $-0161$ $2557.7$ $-2036$ $12$ $4657$ $30.9$ $477.8$ $210.2$ $0050$ $1557.6$ $-0183$ $2297.5$ $-0161$ $12$ $4657$ $309.7$ $1169.2$ $2556$ $-0113$ $122$ $4250$ $-0161$ $2357.7$ $-1075$ $15$ $4550$ $329.8$ $5173$ $-0083$ $30977$ $1156.4$ $2576$ $00050$ $14578$ $-00051$ $1457.9$ $21$ $4550$ $3293$ $4759$ $-00181$ $1220$ $-01611$ $2357.7$ $-0152$ $24850$ $3297$ $1557.4$ $2576$ $00113$ $154400$ $20050$ $1459.6$ $-02056$ $21$ </td <td>54</td> <td>449.8</td> <td>26.3</td> <td>107.2</td> <td>2120</td> <td>234.9</td> <td>80.2</td> <td>13.7</td> <td>0900.</td> <td>28 D.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	54	449.8	26.3	107.2	2120	234.9	80.2	13.7	0900.	28 D.								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	-	451.4	27.9	106.4	0215	243.0	88.3	15.1	.0084	н. м.								
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	4537 $20.2$ $5637$ $1001$ $1111$ $0002$ $20$ $4004$ $1129$ $-0000$ $1063$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$ $-223$		450 1	56.9	1.88	6120	253 1	6.86	16.9	.0054	00	421-4	-6.8	175.4	0900.	176.5	I,	5.I-	0033
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		4.834	50. F	00.28	1860	4.076	1.011	1 1 1	2000.	2 0	1001 F	# 07 H	6 7011		2.000		0 0 0 0 1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	, o	462.0	8.88	8.89	- 0348	275.5	193.8	21.2	0200		465.0	6.98	6.061	1910	2.52		0.01	5000.
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	12	462.6	39.4	63.6	0365	288.4	134.7	23.0	.0092	0	454.0	26.0	135.1	- 0113	219.5	1	9.2	- 2800.
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	15	458.5	35.3	57.3	-	302.7	149.2	25.6	8100.	12	422.0	0.9-	153.5	0051	201.4	ł	4.5	6800.
$ \begin{vmatrix} 456 \cdot 0 & 38^2 \cdot 8 & 45^3 & -0453 & 309 \cdot 7 & 156 \cdot 4 & 26 \cdot 7 & 0066 & 18 & 422 \cdot 0 & -4 \cdot 7 & 188 \cdot 3 & 0050 & 148 \cdot 2 & -6 \cdot 5 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & -5 \cdot 7 & $	456.0       39.3       445.9       - 0463       500.7       156.4       26.7       00066       18       422.0       -4.7       188.3       00050       143.2      5.3       -         452.4       39.3       44.9       - 0431       291.5       188.4       23.6       0037       20       439.0       11.3       191.0       0076       141.2      5.7       -       -5.7       -       -5.7       -       -5.7       -       -5.7       -       -       -5.7       -       -       -5.7       -       -       -       -       -       -       5.7       -       -       -       -       -       -       -       5.7       -       -       -       -       -       -       5.7       -       -       -       -       5.7       -       -       -       -       -       5.7       -       -       -       -       5.7       -       -       -       5.7       -       -       5.7       -       -       -       5.7       -       -       -       5.7       -       -       -       5.7       -       -       5.7       -       -       5.7       -	18	456.0	32.8	1.05	1140	308.7	155.4	26.5	.0113	15	415.8	- 12.0	166'8	9000	169.6	1	6.0-	0023
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	Gött.	mean Time.	H.H. N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N N	, 330 42 42	19 57 57 57 57 57 57 57 6 6 6		20 55 55 57 57 57 57 57 57 57 57 57 57 57	21 0 9 6 112 112 221 221 221 221 221 221 221 22

					11	R	E	GU	JL	<b>A</b> )	R	F	LI	JC	τt	JA	T	10	N	s.												24	ę
0236	.0264	9210.	.0215	.0234	6010.	8610.	.0216	.0144	.0122	.0136	1210.	1010.	<b>1010</b>	. r046	.0054		1	1500.	.0045	0100.	- 0002	.0025	1500.	.0040	6000.	1800.	.0000	8200	·C023	.0053	2200.	.0196	
	38.8	28.6	81.13	33.0	24.4	26.3	28.4			19.8		14.3		1.11				0.4	5.9	5. 0	3.5	:	1.1	0.4		6.0	-1.1	-2.4	4.4	8.8	8.11	7.4	_
1	1	1	1	I	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	]	1	1	1	1	1	1	1	1	
455.3	437.6	877.9	393.6	403.5	352'9	364.0	376'1	352.8	357.9	325.6	1.208	0.865	284.4	274.3	265.5			249.9	243.6	226.3	226.8	214.7	213.9	209.4	204.5		196.5	0.861	230.8	256.9	273.8	249.2	
- 0531	- 0203	0392	- 0404	0419	- 0374	- 0322	0351	6680	0870	0256	0210	2810	0516	- 0163	9610			8800	0372	- 0048	9000	.000	6700.	.0032	8100.	1000.	.0039	6100.	0063	1210	0910	- 0342	
-21.4	- 13.3	19.4	15.6	1.11	24.3	38.3	30.9	34.4	51.6	58.7	72.0	80.3	89.6	85.6	93.5			9.401	112.5	9.611	6.181	134.6	142.6	143.6	9.681	149.6	146.0	140.3	116.5	9.66	88.5	35.0	_
26.5	13.1	-12.2	-2.0	-6.4	9.11-	3.6	2.9	10.2	13.4	24.4	3.0	13.5	13.7	14.4	16.4			17.8	6.81	6.6	13.1	11.5	2.3	9.8	1.8	0.8			5 6	15.0	12.3	24.3	
455.0	432.0	417.0	427.2	423.2	418.0	433.5	437.0	440.5	444.0	455.0	434.0	444.8	445.0	446.0	448.0			449.8	451.2	442.2	444.6		440.0	441.5	441.0	436.0	440.0	438.0	436.0	448.5	446.0	458.0	
12	15	18	5	24	27	30	33	36	39	42	45	48	51	54	57	ų,	м.	0	g	9	6	13	15	18	5	24	27	33	33	36	30	42	

Magnetical Disturbances, Lake Athabasca, 1844-continued.

250			IRREGULAR FLUCTUATIONS.	IRREGULAR FLUCTUATIONS. 251
1		φφ	0009 0045 0018 0018 0014 0014 0014 0014 0014 0014	0.0247         0.057         0.0013         0.0013         0.0016         0.0016         0.0016         0.0016         0.0017         0.0016         0.0017         0.0019         0.0019         0.0019         0.0026         0.0026         0.0026         0.0026         0.0026         0.0026         0.0026         0.0026         0.0026         0.0027         0.0026         0.0026         0.0026         0.0026         0.0027         0.0028         0.0028         0.0029         0.0021         0.0021         0.0021         0.0021         0.0021         0.0021         0.0021         0.0021         0.0021         0.0021         0.0021         0.0028         0.0028         0.0028         0.0028         0.0028         0.0028         0.0028<
	er.	Approx. $\Delta \theta$	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	22:22 23:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25:22 25
	Inclinometer.	P, P.		
	II 	Scale corrected for Decl. and Bif.	183' 6 177' 1 177' 5 177' 5 17	228.4 228.7 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2242.4 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2243.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223.7 2223
JANUARY 5-6.	Bifilar.	Approx.	0038       0025       0025       0027       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0055       0056       00575       00510       00511       00511       00512       00513       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514       00514   <	0354       0354       0354       0354       0354       0354       0354       0354       0354       0354       0354       0354       0354       0354       0355       0157       0157       0157       0157       0157       0157       0157       0157       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0151       0175       0175       0176       0177       0186       00196       0031       0035       0036       0037       0037       0037       0037       0037
JAN	<b>Ä</b>	Scale corrected for Temp.	161         167         167         167         167         167         167         167         167         167         167         167         167         167         166         167         17         18         19         13         13         13         13         13         13         13         13         13         13         13         14         15         16         17         18         19         19         113         12         13         14         15         15         16         17         18         19         113         113         12         13         14         15         15 <t< td=""><td>29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5      <t< td=""></t<></td></t<>	29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5         29.5 <t< td=""></t<>
<b>13</b>	Declination.	* \$		$\begin{array}{c} 120\\ 120\\ 120\\ 120\\ 120\\ 120\\ 120\\ 120\\$
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	er.	Approx. $\Delta \theta$	2.2 4.2 4.2 4.2 4.2 5.2 4.2 5.2 4.2 5.2 4.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5	00000000000000000000000000000000000000
ned.	Inclinometer.	P,- P.		
5-continued	н.	Scale corrected for Decl. and Bif.	329'5 314'0 291'6 290'1 290'1 200'8 274'5 274'5 274'5 274'5 274'5 286'9 286'9 286'1 199'2 198'2 199'2 1179'6 1179'6 1179'6 1179'6 1179'6 1179'6 1179'6 1179'6 1179'7 1179'6 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'7 1179'	174.1 196.7 196.7 196.7 196.6 180.6 179.4 179.4 179.6 167.6 167.6 167.6 167.6 167.6 167.6 199.6 199.6 199.6 199.6 199.6 199.6 199.6 199.6 199.6 199.6 199.7 199.6 199.7 199.6 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7 199.7
JANUARY	Bifilar.	Approx. $\frac{Approx}{\Delta X}$	- 0310 - 0310 - 0312 - 0312 - 0221 - 0221 - 0127 - 0127 - 0157 - 0157 - 0157 - 0157 - 0157 - 0157 - 0055 - 0005 -	• 0043 • 0037 • 0037 • 0037 • 0036 • 0054 • 0056 • 0052 • 0015 • 0053 • 0053 • 0053 • 0053 • 0053 • 0053 • 0053 • 0053 • 0055 •
	Bi	Scale corrected for Temp.	• • • • • • • • • • • • • • • • • • •	156.3         155.9         155.9         155.9         155.9         155.9         155.9         155.9         155.9         155.9         155.9         155.9         155.9         155.9         155.9         177.7         177.7         177.7         177.7         177.7         177.7         177.7         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5         175.5
	Deelination.	<u>ት</u> ላ	22333333333333333333333333333333333333	0 4 8 6 7 7 7 7 9 7 9 1 1 1 1 1 1 1 1 1 1 1 1 1
	Dceli	Scale.	436. 5 485. 5 485. 5 485. 5 483. 0 483. 0 483. 0 483. 0 485. 1 485. 1 48	$\begin{array}{c} 4432 \\ 42480 \\ 42480 \\ 4257 \\ 4257 \\ 4257 \\ 4257 \\ 4257 \\ 4257 \\ 4257 \\ 4257 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ 4187 \\ $
	Gött.	mean Time.	0 2 3 0 2 4 4 4 7 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4	۵۵۱۶۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵۵

Magnetical Disturbances, Lake Athabasca, 1844-continued.

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Magnetical Disturbances, Lake Athabasca, 1844 - continued.

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# FRREGULAR FLUCTUATIONS.

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•	Approx.	¢ ⊲		.0048	· CO29	<u> 000</u>	0000.	8100.	2000.	.0049	£100.	9100.	+0000	.0063	1000.
	er.	Αρρτοχ.	-	8.0	5.3	ы. 8.2	2.5	1.3	2.5	4.3	1.5	3.7	3.7	8.7	-1.4
	Inclinometer.	P,-P.	Div.	1	l	1	I	I	1	I	I	1	1	ļ	1
ontinued.	In	Scale corrected for Decl. and Bif.		1.60%	225.7	216'2	208.9	8.102	208.4	219'0	202.5	215.3	215.1	169.3	182.5
JANUARY G-continued.	Biĥlar.	Approx.		2900	1200	5400	- 0.057	- 0048	0042	0038	0500	0057	1200	1100.	• 0029
JANI	Bi	Scale corrected for Temp.		125.4	122.4	124.3	128.7	131.4	133.5	134.8	131.4	129.2	123.6	151.5	156.6
	ation.	^ ▼	•	4.1	8.1	5.9	8.1	2.9	8.2	8.11	9.3	6.01	12.2	4.5	0.9
	Declination.	Scale.		436.0	440.0	437.5	440.0	438.6	440.0	443.6	441.0	442.6	444.0	434.6	436°0
	Gött.	mean Time.	бр. Н. М.	2 33	36	39	42	45	48	51	54	57	3 0	4 0	50
	Approx.	Φ Φ		2000.	7200.	8100.	- 0024		0037	.0048	5200.	<b>4100</b> .	•0030.	.0026	.1100
	H	Approx. Δθ		2.1	4.3	5.1	2.1	1	6.1	3.5	1.0-	9.1	1.0	2. 7	2.6
bəi	Inclinometer.	P,-P.	Div.	1	1	1		1	1	Ι.	1		1	i	1
continu	In	Scale corrected for Decl. and Bif.		20.5.4	221.2	225.4	211.5	1	2C6.8	215.6	194.5	204.3	195°2	207.4	210.0
JANUARY 6-continued.	Biĥlar.	$\left  \begin{array}{c} \text{Scale} \\ \text{corrected} \\ \text{for} \\ \text{Temp.} \end{array} \right  \frac{\text{Approx.}}{\Delta X}$		6200	0059	0083	8200	0800	L100	- 0022	- 0073	1100	0031	8100	0042
ſ	Bif	Scale corrected for Temp.											135.3		
	Declination.	* V	-	3.2	6.1								3.1		
	)eclin	Scale.		135.5	434.0	1	439.2	440.0	442.5	439.4	434.0	440.0	435.0	440.0	436°8
	ч	Ň		v	×.			_			_			_	

Magnetical Disturbances, Lake Athabasca, 1844-continued.

JANUARY 24-continued.

JANUARY 24. Term Day.

Approx.	φ Φ		- 0052		- 0057	6500	- 0036	- 0050	- 0043	6700.	0200	0000	9700 -	- 0035	- 0032	- 0043	1700	0048	- 0046		.0026	- 0026	1000.	.0001	.0005	2100.	<b>6100</b> .	.0026	6000.	• 0003
	Approx. $\Delta \theta$			0.7	-1.4 -	- 1.4 -	-5.5	-1.3	-1.5	-0.2	-0.2		-0.0	-0.8 -0.1	     	1	-0.2	-1.s		-0	-0.4	-0.4 -	1.0	- 8.0	0.2	1.5	0.3	0.1	-0.4	1.0
Inclinometer.	P,-P.		8.9			-8.1	-13.0	8.1-					13.8				1.2.8	-7.3					5.4	4.8	4.0	2.8	0.1	6.5	-2.4	9.0
Inc	Scale corrected for Decl. and Bif.		1.106	203.4	198.7	0.661	193.9 -	0.661	2.661	203.5	203.6	202.5	202.5	201.5	8.661	199.2	203.2	9.861	199.4	204-9	203.4	203.1	210.9	210.3	209.5	214.1	206.4	211.3	203.0	506.0
	Approx.		0600.	0025	- 0026	0010	1100	- 0002	8100	8100	- 0016	- 0016	- 0014	8100	- 0018	6100	12100	- 0022	0023	- 0020	3100	1100	8100	8100	6000	6100	4100	5000.	1000.	1000.
Bifilar.	B,-B.		8.2	0 01	9.2-	6	-		51		4	1	14		01.	-		-6.2	~	œ	15.4	-4.9	-5.4	-5-4	-2.5	- 5.6	-5.1	5.I	0.3	0,3
	Scale corrected for Temp.		196.5	124.9	124.6	129.3	135.4	131.8	127.3	127.3	128.0	128.0	128.6	127.5	127.5	0.431	127.7	126.2	126.0	126.9	127.3	127.8	127.3	127.3	130.2	127.0	127.5	134.0	132.8	132.8
Declination.	φ 4		0.4	4 G	10.6	1.6	12.5		0.4			1.0		4.3	5.6				13.1	2,2		6.11	6.11	12.3	13.8	14.2	12.5		2.6	6.2
	mean Time. Scale.		494.0	424.8	427.5	426.0	429.5	424.0	424.0	125.0			1422.6	421.6	420.0	419.9	30 422.4	35 421.6	40 429.8	45 420.0	50 419.6	55 429.9	0 430.0	5 430.4	0 432.0	432.4	430.8	25 431.7	428.0	424.6
Gött.	mean Time.	24 n.	H. M.		30					<i>c</i> 2	13												14			15		53	30	35
Annrox	φ φ		0707.			0034	\$600	0027	- 0023	- 0021	9100	- 0021	0027	0022	0023	0024	0200.	8100	-0024	4000	8000	0036	- 0026	0032	- 0036	- 0024	0033	0044	0044	- 0043
Ľ,	Αρρτοχ. Δθ	-				-0.5	<b>+.</b> 0-	-0.4	-0.5	-0.2	0.2	1.0	1	0	0.0	0.0	9.0-	0.0	0.3	6.0	2.0	-0.4	0.0	-0.3	0.5	1	-0.6	1.1-	-0.8	-0.4
Inclinometer.	P, - P.		0.0	0 30 0 10 1 1	-6.4	-2.8	-2.4	-2.6	6.1-	I.I-		9.0	-1.4	-0.3	0.5	0.1		0.5	2.1	5.3	4.5	-2.4	0.3	-1.8	-2.8	0.1-	-3.3	-6.5	-4.7	-2.3
In	Scale corrected for Decl. and Bif.		000.0	202 3	204.5	207.9	208.2	207.8	209°I	209.0	211.0	210.4	208.2	209.2	209.8	209.3	206.4	209.1	210.9	214.0	212.8	506.1	208.7	206.4	205.3	207.0	204.7	201.6	203.0	205.3
	Approx.		£100.		8	0024	0024	- 0018	6100	2100	0020	-0022	- 0022	0021	1200	0024	2100	6100	100	-0.026	0323	2500	7200	9600	•	- 0021	- 0022	- 0022	4200	0035
Bifilar.	B, - B.				) )	1.1-	1.2-	-5.4	-5.5	-4.9	0.9-	-6.5	-6.4	-6.1	-6.5	-7.1	-5.1	-5.6	-4.9	1.1-	2.9-	6.2 -	- 7.9	i	-7.6	ic.				- 10.4
	Scale corrected for Temp.	İ	1.201	1.961		123.3	123.4	125.2	125.3	126.9	125.0	124.6	124.7	125.1	125.0	124.2	126'2	125.8	126.5	123.7	124.8	123.7	123.7	124.0	123.1	125.6	125.2	125.3	124.0	121.5
Declination.	\ ↑ \ \ \ \ \ \ \ \ \ \ \ \ \ \	.		1 - I 0.9	o ċ			5.6												14.9						01	6			8.0
Decli	Scale.	1	0.11	415.9	415.	416.0	422°C	25 420.6	421.0	423'2	425.0	426.0	426.0	55 424.8	428.4	428.0	427.0	15 426.0	20 431.6	25 431.0	30 437.6	35 426.0	40 430.0	45 429.6	50 426.0	428.0	430.0	427.8	497°C	425.0
Gött.	Time. Scale.	24 n.	ž	0 0	2	12	8	25	30	35	40	45	50	55	0 11	ŝ	Ì	15	20	25	30	35	40	45	0.5	22	19.0	5	2	15

IRREGULAR FLUCTUATIONS.

54			IRREGULAR FLUCTUATIONS.	IRREGULAR FLUCTUATIONS.	2
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	Inclinemeter	P, - P.	121         126         126         126         126         126         126         126         126         127         128         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         111         1	145.2           155.8           155.8           155.8           155.8           155.8           155.8           155.8           155.9           156.0           156.1           156.2           156.2           156.3           156.4           156.9           156.9           156.1           156.2           156.3           156.3           156.4           156.5           156.7           156.8           156.9	, , ,
14.	Ū.	Scale corrected for Decl. and Bif.	83377 9 8477 9 8777 9 8777 9 8777 9 8577  9 8577 9 8577 9 8577 9 8577 9 8577 9 8577 9 8577 9 8577 9	373'1 394'4 3994'4 3994'4 3994'6 3994'6 392'8 345'6 345'6 345'6 345'6 345'6 345'6 345'6 345'6 345'6 345'6 345'6 345'6 345'6 345'6 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 355'7 35	, , , ,
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	Declination.	^ ↑ \		12         12         12         15         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10<	
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	Annex	¢  ¢		- 0363 - 0357 - 0059 + 0059 - 0043 - 0044 - 0043 0153 0153 0153 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057 0057	
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-41	Bifilar.	P - P.	1       1       1       2       2       2       3       1         3       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	1       1       1       1       1       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2	, , ,
<b>Ја</b> ниању		Scale corrected for Temp.	135'6         140'6         140'6         140'6         140'6         140'6         140'6         150'1         150'1         151'7         151'7         151'7         151'7         151'7         151'7         151'7         151'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7         155'7      155'7         155'7      <	73.4 73.4 11167 4 11167 4 11167 4 11167 4 11167 4 11167 4 11167 4 1117 1 1117 1 1117 4 1117 4	
	ation.			200 200 200 200 200 200 200 200	
	Declination	Scale.	$\begin{array}{c} 124\\ 124\\ 125\\ 125\\ 125\\ 125\\ 125\\ 125\\ 125\\ 125$	413.8         5509.5         5509.5         5509.5         5509.5         5509.5         5509.5         5471.6         414.7         414.7         414.7         414.7         414.7         417.5         417.5         417.5         417.5         417.5         417.5         417.5         417.5         417.5         417.5         422.0         423.5         423.5         423.5         423.5         423.5         423.5         423.5         423.5         423.5         423.5         423.5         423.5         423.7         423.7         423.7         424.6         425.7         425.7         425.7         425.7         425.7         425.7         425.7         425.7         425.7         425.7         425.7 <td></td>	
	Gott.	mean Time.	24 h. 14 40. 15 55 15 55 15 55 15 55 15 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 10 55 1	17         0           15         10           15         15           15         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           25         25           26         25           26         25           26         25           26         25           26         25           26         25           26         25           26         25           26         25           26         25           26         25           27         25	

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Magnetical Disturbances, Lake Athabasca, 1844-continued.

IRREGULAR FLUCTUATIONS.

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Declination,  $a = 1^{\prime}.0$ ; bifilar, k = .0003412; inclinometer,  $k = 0^{\prime}.171$ ,

				IRREGULAR FLUCTUAT
ł	Annua	$\frac{\phi}{\phi}$	0020 0034 0028 0028 0028 0028 0028 0028 0027 0027	• 0065 • 0085 • 0037 • 0037 • 0035 • 0035 • 0035 • 0035 • 0035 • 0035 • 0035 • 0035 • 0035 • 0036 • 0036 • 0036 • 0038 • 0038 • 0038 • 0038 • 0038 • 0038 • 0038 • 0038 • 0035 • 0016
	ter.	Αρρτοχ. Δθ		1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1
	Inclinometer,	л- р, – Р.	1	40000000000000000000000000000000000000
ď.	и	. Scale cor- rected for Decl. and Bif.	5         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2         2       2	20391 21377 2010 2 2017 3 2007 9 2007 9 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2006 5 2005 5 2005 5 2005 5 2005 5 2005 5 2005 5 2005 5 2005 5 2005 5 200
-continued.		$\frac{A_{j}, prox.}{\Delta X}$	CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35           CO35	0035 00385 00385 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 00382 000475 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 000455 00000000
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Magnetical Disturbances, Lake Athabasca, 1844-continued.

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8			IRREGULAR FLUCTUATIONS.	IRREGULAR FLUCTUATIONS.	259
	Approx.	♦	- 0001 - 00054 - 00054 - 00054 - 00016 - 00016 - 00016 - 00016 - 00010 - 00010 - 00010 - 00010 - 00010 - 00028 - 00028	- 0129 - 0129 - 0109 - 0108 - 0108 - 0045 - 0005 -	
-	.	Approx. Δθ	<ul> <li>1.51.044911111988848010</li> <li>0.0986188660384551498848048030112</li> </ul>	1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1 <td>_</td>	_
	Inclinometer	Scale cor- rected for Decl. and Bif.	271:3 237:2 2237:2 2237:2 2237:2 2239:1 2211.8 2299:6 2095:6 2095:6 2295:7 2295:7 2295:7 2295:7 2295:6 2295:6 2295:6 2295:6 2295:6 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2295:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2205:7 2005:7 2005:7 2005:7 2005:7 2000	168.9         115.4         115.4         115.7         115.7         115.7         123.8         135.1         147.4         155.1         155.2         155.3         155.4         155.7         155.7         155.7         155.7         194.9         194.1         195.1         195.1         195.1         195.1         195.1         195.1         195.1         195.1         195.1         195.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1         185.1	201.3.
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Magnetical Disturbances, Lake Athabasca, 1844-continued.

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thabase	Gott.	mean Time.	2 л. д. Ж. 18 12 15 18 22 24	27 5 5 1 5 5 5 5	19 0 6 6 1 1 2 2 2 2 1 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			51 54 57	20	2 <u>1</u> 2 8					ର ରି ରି	4 H 82 O		   bifiler, 1 elinomete
Magnetical Disturbances, Lake Athabasca, wed.		$\frac{\text{Approx.}}{\Delta \phi}$		- 0046 - 0004 - 00047 - 0047 - 0015 - 0017	2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 200 200		+ 0003 + 0009 + 0003 + 0003 + 0000	+ 1000 + 1000 + 1000 + 1000 + 10020	+ 0000 + 10000 + 10000 + 10000 + 10000 + 10000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 100000 + 1000000 + 10000000 + 1000000 + 1000000 + 1000000 + 1000000 + 1000000 + 1000000 + 100000000	0020 6400.+	- 0001	0048 0043 0043	1100 10038 	- 0123	0053 0053	00:00 00:55 00:55 00:55 00:55 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00:05 00 00:05 00 00:05 00 00:05 00 00:05 00 00 00:05 00 00 00 00 00 00 00 00 00 00 00 00 0	.0015 .0021 .0024 .0028	values:     declinometer, 421     9;     bifilizr, 141.8;     inclinometer, 199.8.     1       Co-ordinate mean values:     declinometer, 423.0;     bifilar, 144.2;     inclinometer, 198.2.
urbance		pprox.		2.88 133.1 125.3 132.6 132.6 132.6 132.6	211110 	i	+ من من ط	4.0 7.7 0.0	, r ⁰ , 4, 4, r	~ ~ ~ ~	8.0.3. 	112.		- 13.			1 1 5 6 1 5 7 5 6 1 1 1 1	 declinome nate mean
ical Dist	Inclinometer.	Scale A corrected for Decl. and Bif.	193°7 190°7 190°7 189°1	214.6 276.7 276.7 276.3 275.1 276.3 276.3	268° 5 268° 5 268° 5 268° 5 268° 5 291° 4 212° 1 212° 1 212° 1 212° 1 220° 8 220° 8 220° 8		236.5 230.6 230.6 230.6										174.7 176.7 175.0 176.9	c
Magnet continued.		Approx.	• 0030 • 0045 • 0042 • 0030		- 0204 - 0188 - 0188 - 0186 - 0185 - 0185 - 0185 - 0185 - 0080 - 0087 - 00970 - 00970 - 00987 - 00977 - 009777 - 009777 - 009777 - 009777 - 009777 - 009777 - 0097777 - 0097777 - 00977777777777777777777777777777777777		- 0107 - 0056 - 0079 - 0079	- 00078 - 0104 - 0085 - 0085	6200	5100 9100	.0040 .0022 .0168	.0167 .0194 .0194	.0155 .0157 .0157		.0119 .0154	0109	.0066 .0064 .0073 .0073	throughout. Co-ordinate mean Clouded throughout.
Ţ	Bifilar.	Scale corrected for Temp.	148°8 148°5 148°5 147°0 139°4	112°6 67°0 66°2 73°8 73°8	857 7 846 7 846 7 847 9 897 7 997 7 118 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1397 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 1000 8 10000 8 10000000000		25.	119.8 117.8 117.8	119.	30. 70.	161 155	198. 206. 208.	195. 195. 196.	196.	195.	182 171 165	170°4 169°8 172°3 171°5	Ut. Co-o Dut. Co-o
FEBRUARY	tion.	 ≯ ∇	1 1 1 2 2 3 1 1 3 3 1 1 1 3 3 1 1 1 3 3 1 1 1 3 3 1 1 1 3 3 1 1 1 3 3 1 1 1 3 3 1 1 1 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10.1 1.0 1.3 .5 .5 .0 .5 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0			- 27 - 45 - 38		112.		'		· .			· · ·		
	Declination.	Scale.	414°7 415°9 417°0 420°2	435'8 425'0 	419'0 411'0 411'0 411'0 411'0 410'8 399'8 399'6 389'6 389'6 385'3 385'3 385'3			387.2 389.6 390.4 394.0						404	406 386 388 388	403 423 414 412	410.0 412.2 414.0 410.2	* Clouded
	t+ Eot	Time.	1 р. н. м. 20 54 21 0 22 0	ຊີສູນ, ເຊີຍ ເຊີຍ ເຊີຍ ເຊີຍ ເຊີຍ ເຊີຍ ເຊີຍ ເຊີຍ	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		7 57 66	12 0 0		0,00 800	16 0 17 0 17 0	12 2			2 6 4 6 2 6 7 9		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

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Magnetical Disturbances, Lake Athabasca, 1844-continued.

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IRREGULAR FLUCTUATIONS.

, , , , , , , , , , , , , , , , , , ,	Approx.	0 0	1 1	9100	28CO.	.0038	16000	.0026	:0036	.0045	6500.	:0052	.0043	1400.	1600	.0045	.0054	.0000	1400	c+00.	10060	0010	6400.	- 0047	ļ	0224	1410.	6910.	0203
	meter.	Approx. Δθ		-8.2	-6.1	6.9	α ο ία 	-5:0	-4.4	8.8-	-2.9	-3.6	-3.5	-3.6	4-1-	-2-1	-3.0	-2.1	7		0.0	12.2	- 1:0	-4.2	1	31.2	12.3	9.21	15.0
	Inclinometer.	Scale corrected for Decl. and Bif.		140.1	152.2	147-5	7.751	158:7	162.5	166.2	171.3	167.4	167.9	167.5	180.4	172.9	171.3	172.8	164.2	160.6	8,141	175.9	183.2	220.6	ļ	8,668	279.1	282.9	295.3
r 5-6.	Bifilar.	$\frac{Appro}{\Delta X}$		:0146	.0152	.0174	3910.	.0125	.0123	0210.	5110.	.0123	.0112	.0112	6900.	8600.	\$110.	.0113	10124	4710	2110.	.0113	6600.	.0036	1	- 0392	96000	9600	- 0093
FEBRUARY 5-6.	Bifi	Scale corrected for Temp.		8.661	195.6	202.0	0 061	187.3	186.8	185.8	184.1	186:2	6.781	182.8	170-2	178.7	182.7	182.7	185.9	4.021	4.681	182.5	178.6	152.9	1	21~4	1.701	1.901	107.2
:	ation.	γ 4	-	-6.2	-3.5	1.9	0.1	9.1	-2.8	-2.8	-0.5	-2.5	9.1-	6.4-	-6.4	-5.4	-5.9	6 12 1	12.9	-4-2		- 2.2	0.11	2.8	1	13.2	-6.5	10.1	- 20,2
	Declination.	Scale.		416.5	-419.6	424.6	1 624	423.3	420.0	420.0	422.3	420.6	421.2	418.0	416.5	417.5	417.0	417.0	420.0	418.7	414.0	417.2	424.0	424.8	1	435.0		402-2	
,	Gött.	mean Time,	5 D.		18 0	α, ι	00	12	15	18	21	24	27	30	33	36	39	42	45	\$ <del>.</del> 5	10	5 45	19 0	20	21 0	6	21	30	<u>S</u> 3.
	Approx.	φ φ		•0133	.0573	.0563	7220.	•0173	.0229	.0369	.0220	•0249	.0252	.0157	0310.	8400.	9010.	£609.	0800.	0000.	0200	- 0004	9100	8100.	.0005	.0040	1	C012	0000, 1
	meter.	Αρρτοχ. Δθ	-	34.3	54.6	60.2	4.04	27.4	25.7	8.16	6.66	39.8	36.0	28.9	26.9	22.4	20.4	15.3	12.8	10.9		- ²	9.1-	8.0-	1.1-	1.1-	1	1.2.9	6.8,-
ıtinued.	Inclinometer.	Scale corrected for Decl. and Bif.		413.7	532.1	564.0	4// 4 100. E	1.128	361.2	396.5	433.4	442.6	419.9	378.2	366.1	339.5	326.9	291.8	281.6	370.0	0.000	220.2	194.3	198.2	196.3		ſ	183.8	
FEBRUARY 5-continued.	Bifilar.	$\frac{\operatorname{Approx.}}{\underline{\Delta X}}$		0544	0505	0626	COCU -	- 0368	6120	0259	0518	- 0537	0459	0414	0411	0344	- 0297	- 0208	- 0173	- 10139	#CTO -	6500	9100.	.0034	.0027	.0062	0900.	6900.	4400.
FEBRU	Bifi	Scale corrected for Temp.		-31.5	-19.8	-55.3	121.12	21.0	47.1	53.2	-22.7	-28.0	- 4.0	10.3	0.6	2.62	43.1	69.4	80.2	0.16	0.201	116.1							
	ation.	∲ \		74.0	0.11	10.2	77.04	40.2	-43.8	- 82.0	-70.2	-30.4	- 39.2	-31.2	9.1-	23.6	1.01	4.7	0.6	2.01		19.4	24.0			0.8			<u> </u>
	Declination.	Scale,		503.2	466.2	439-6	401 CF	470.0	386.0	348.0	0.098	399.8	3.168	398.7	429.0	454.4	441.1	436.0	440.0	442.5	450.4	449.6	454.0	447.0	444.0	437.4	435.4	431.0	430.2
	Gött.	mean Time.	5 D. H. M.	18 9	12	15	87 0	242	27	80	33	36	39	42	45	20	55	1		91	06	25	30	35	40	45	50	55	6

																			-																		
0147	-0132	0143	1810.	0144	1110.	0810.	0129	.0129	.0142	2510.	0610.	8000.						•	0026	0400.	.0045	4000	0083	- 0023	0900	- 0028	- 0033	- 0054	4200			3					•
13.1	6.11 6.11	12.1	13.2	15.7	17.3	15.6	I6.3	15.3	14.3	15.0	9.41	-0.4	-						12.3	8.5	1.5	4.5	-5.2	12.8	-4.0	0.0	8.1.9	-30	4.1					•		-	
268.9	276.9	278.4	284.6	5.662	309.2	298.3	303.5	6.162	292.8	296.5	312.5	213.0							171.2	233.4	0.261	213.6	154.1	6.1/1	165°1	186.4	179.4	172.6	0 0/1	0.34L	9.031	, .	:				
- 0004	\$010	9600	0130	- 0156	0165	8210	0183	6410	0140	- 0144	- 0158	9100.							6100.	2600	.0015	9600	• 0029	* 0032	6100.		.0003	0005	5100	0700.	.000	0700				5 7 3 7	
111.7	103.6	105.2	94.3	87.4	84.5	80.5	9.82	81.5	84.8	9.06	85.3	133.2	******						162.7	128.6	158.6	125.7	161.5	6.191	157.5	146.6	151.4	151.5	153.3	107 F	150.5	2				•	
-19.1	1.8.1	4.5	14.5	1.21	12.5	1.01	0.61	23.2	23.6	22.2	35.9	9.1-							-0.3	-5.3	-23.6	14.0	13.9	16.5	20.4	21.2	16.2	2.2	6.01	0	0.11	H 4	1				
400.2	420.2	428.0	438.0	440.8	436.2	434.0	443.0	447.2	447.6	446.2	460.0	423.0							422.0	417.2	398.6	436.0	436.2	438.2	442.0	442.6	437.4	428.6	420.0	10 414	410.6	0.14					
8 8 6	45	48	51	54		22 0	5	9	6	12	15	23 0					6 р.	H. M.			10	15	20	25	30	35	40	45	20								
- 00800	10031	6600	6000	- 0165	- 0103	0087	6600	6400	6800	0110	1400	8900	9400	9800	1800	- 0087	1600	1100	<i>5</i> 100.	6100	- 0047	- 0049	- 0043	6000	2300.	0100.	<b>2000</b> .	0015	6000	- 0083	+200	0000	1200	.0016	0000.		
-5.2	-6.5	-7.2	- 8.0	- 18.2	-15.6	-15.0	16.0	-15.1	-14.5	-15.6	-14.1	-12.8	- 13.6	-13.2	- 14.1	-13.7	- 16.7	- 11.2	9.6-	- 10.3	- 10.2	-10.1	2.6-	-2.2	-4.9	-5.1	-5:2	-5.0	4	5	4 i	H	6.9-	4.2	1.5.0	-	
190.2	9.151	147.3	143.1	1.58	1.86	100.2	36.36	100.5	103.8	2.16	105.7	113.8	108.7	6.011	105.5	1.701	90.2	8.121	9.181	0.721	128.1	128.4	131.1	146'1	159.3	158.0	157.4	158.4	159.8	1.601	7.921	1.091	152.8	163.4	157.3		
0054 0114	4600.	.0103	.0149	4610.	.0205	6020.	1120.	6120.	4610.	8610.	7020.	.0185	8610.	5410.	1610.	<b>•</b> 0184	.0239	.0223	.0205	<b>4810</b> .	.0154	0510.	.0148	1610.	.0124	1110.	20102	0084	9800.	0000	5000	0000.	5600.	6600.	• 0105		b. See n.
124°7 109°1	178.7	180.3	193.7	2.907	210.0	211.1	213.4	213.8	207.3	207.7	210.4	204.0	206.1	200.9	205.6	203.2	219.3	214.7	209.5	203'3	194.7	193.7	193.3	188.3	186.3	182.5	180.8	174-8	175 4	0 601	6 <del>4</del> /.	0.941	182.5	6.641	181.6		Aurora visible from 14 ^h to 17 ^h
21.0	12.8	10.3	6.4	36.3	43.3	41.3	39.5	<b>6.0</b>	36°4	8.18	14.0	10.01	9.01	12.2	8.8	20.6	8.4	- 18.9	-6.1	13.9	29.2	29.8	24.7	23.7	18.7	14.7	12.0	15.8	200	22.2	0.01 1	6.01 I	9.1-	-4.6	1.8-		ieihle from
449°6 420°0	434.0	432.0	428.2	458 2	465.2	463.2	461.4	462.8	458.4	453.8	436.0	432.0	432.6	434.2	425.3	442.6	429.8	403.2	416.0	436.0	451.4	452.0	447.0	446.0	441.0	437.1	434.4	438.2	430-8	425.0	410.0	0 011 7 0 011	415.0	418.0	414.0		A thore a
3 4 0		15 0	16 0	18	21	24	27	30	33	36	39	42	45	48	51	54	57	17 0		9	6	12	15	18	21	24	27	30	33	92	65	45 1	48	21	54		*
						-			-									-					-			-			-				-	-			

# Magnetical Disturbances, Lake Athabasca, 1844- continued.

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# IRREGULAR FLUCTUATIONS.

IRREGULAR FLUCTUATIONS.

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* Aurora visible from 14* to 1/2, ever p. • Overcast. Co-ordinate mean values; declination, 422.6; bifilar, 148.9; inclinometer, 194.1, Correction to declination differences, + 1/.7.

Magnetical Disturbances, Lake Athabasea, 1844-continued.

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	Approx.	φ φ φ	,	.0033 12001	6000	.0022	+000.	9270-	0200-	-0092	8110.	8800.	2900.	·0024	-0013	•0026	0005	6100.	.0012	1100.	6000.	•0018	1000	2C00.	1000.	SC00.	-0002		,	
	meter.	Αρρτοχ. Δθ	-	0.9	2.1	2.5	12.1	14.8	14.4	15.1	15.8	13.8	11.3	8.1	2.9	6.9	4.9	5.1	4.0	3.4	3.3	3.3	2.7	2.3	2.4	2.0	1.0			
	Inclinometer.	Scale corrected for Decl. and Bif.		239.4	205.3	226.8	265°1	280.7	278.4	282'9	5.185	275.4	260.7	242.2	234.3	235.6	223 • 9	225.4	218.6	215.4	214.8	218.3	211.5	209.6	209.9	207.7	190.9			
<b>F</b> ЕВВИАRY 8,	Bifilar.	Approx. <u>A X</u> ·X	4 -		- 0042	0600	- 0235	- 0214	- 0214	- 0206	6610	6810	1910. ~	- •0136	6110	0110	- 0102	0082	4900	- • 0056	- 0056	0057	0900	- 0043	0046	- 0036	.0022			
	Bi	Scale corrected for Temp.		8.111	133.4	122.6	2.64	0.98	85.9	88.3	2.06	1.26	2.101	108.7	113.7	116-4	118.7	124.5	128.8	132.0	131-8	131.6	130.7	135-4	134.5	137.5	155•1	,		
	Declination.	<b>∲</b> ∇	`	12.7	6.5	1.81	19.3	1.71	19.7	10.5	15.1	6.01	5.3	0.1	-2.9	-2.5	-0.5	-6.3	-5.1	9.9-	-9.1	-8.1	6.6-	-12.1	2.6-	- 11.3	-12.6			
	Decli	Scale.		445.2	436.0	. 446'2	- 446.4 447.0	445.4	447.2	438.0	442.4	438.0	432.4	427.0	424.0	424.2	426.0	420.3	421.2	4:9.7	417.0	417.8	416.0	413.6	416.0	414.2	408.6			
	Gött.	mean Time.	8 D. H. M.	100	10		с. С.	0 0	6	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	6 0	7 0			
	Approx.	Ф Ф		8000	1				2900.	1400.	.0045	- 0020	- 0005	8500.	.0055	1000	2000.	.0055	0100.	8000.	<b>*</b> COO.	.0026	0800.	6000.	2100.	££00.	1600.			
	Inclinometer.	Αρμ rox. Δθ	-	-4.5	2			_	14.2	11.3	5.11	7.5	6.3	9.9	7.3	4.3	2.6	9.1	2.0	0,8	-0.4	6.0	8.8	2.2	8.c1	4.1	4.7			
7-8.	Incline	Scale corrected for Decl. and Bif.		178.8					294.6	277.4	277.8	253'9	246.1	247.9	251.6	233.6	223.5	217.3	211.4	212 1	204.3	212	225.6	220.4	222.0	2.622	2.32.3			
FEBRUARY 7-8.	Bifilar.	$\frac{Approx}{\Delta X}$		1800.					- 0213	- 0182	0182	8910	0127	5010	6800	- 0084	- 0044	2000	- 0004	8000	e100.	2000.	2800	- 0040	8600	0048	2900			
	Bil	Scale corrected for Temp.		162.7	6 72T				8.14	6.08	0.18	85.4	97.5	105.1	108.7	2.011	122.4	133.4	134.3	133.2	139.7	138.0	125.8	124.1	125.3	122.4	118.4			-
	Declination.	\$	-	13.5	4				20.6	1	8.6	15.6	23.9	28.3	21.2	0.15	26.5	16.8	8.2	12.8	12.4	14.2	15.2	0.81	16.0	13.8	13.8			-
	Decli	Scale.		421.6					450.6	1	439.0	446.0	454.5	459'0	452.0	452.0	457.5	448.0	439.6	444.2	444.0	445.8	447.0	450.0	448.0	446.0	446.0			
	Gött.	mean Timc.	7 D. H. M.					-	0		6	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57			-

Co-ordinate mean values, Declination, 424.7; Bifilar, 149.2; Inclinometer, 195.4. Correction to Declination differences, -0'4.

* Aurora at 8^d 1^h.

IRREGULAR FLUCTUATIONS.

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Approx.	Q &		0600.	•0043				8210.	- 0020	0100	2000.	.0232	.0156	·0297	.0236	•0264	·0309	1	1080.	•0345	.0268	.0355	:0203	.0401	~		the obser-		Where the	
meter.	Approx. $\Delta \theta$	``	6.8	5.3				10.01	-4.9	-4.3	0.2	27.1	24.3	31.6	30.4	33.6	39-5		38.5	40.8	38.0	42.2	35.1	40.7	_		and $\Delta \theta$ for	are found	t group.	,
Inclinometer.	Scale corrected for Decl. and Bif.		227.9	184.1				235.9	120-2	123-1	159.7	368.2	346.4	402.6	393.8	417.5	464.2	1	456.2	474.0	451.6	484.5	429.6	474.1		ΔX	×	e values	ers in that	
Bifilar.	Approx.		- • 0093	- 0025				.0025	·0800	.0073	1000	0320	0340	0346	0585	- 0418	9610	0477	0483	- • • • • • • • • • • • • • • • • • • •	- • 0505	- 0505	- • 0483	- • 0432	-		The quantities given in the columns $\Delta \Psi$		H	
Bit	Scale corrected for Temp.		196.1	217-7				233.5	250.7	248.5	225.0	124.6	118.6	116-6	104.4	94.1	69-69	75.6	73.2	7.07	66.7	66.7	73.7	2.68	_		in the co	een estima	can of all	
Declination.	<b>φ</b>	•	-2.2	3.0				1.6	0.6-	8.0-	0.2	0.76	74-0	0.69	70.5	81.9	80.0	9.16	0.9	0.611	109.3	105•4	77-4	95.0	_		ties riven	having be	ng the me	5
Decli	Scale.		350.8	356.0				354.6	344.0	352.2	360-0	450.0	427.0	422.0	423.5	434.9	433.0	444.6	459.0	472.0	462-3	458.4	430.4	448.0			The quanti	ange not	and takin	
Gött.	mean Time.	2 n. H. M.		30		30. 	н. м.		1	2	-	4 0	ς δ	9	с,	12	15	18	21	24	27	30	33	36				inrnal ch	number	
Approx.	φ φ		+400	- • 0019	1600	1200	·0263	.0129	~		•0	pld.	eu	u.	191	əp	<b>1</b> 0	N		_	•0213	8400.	0140	.0132			* Co-ordinate mean values : declination 353.0: hifilar 925.5: inclinameter 158.4.	various at Fort Simuson, are referred to the true means for the 24 n. the revular dimmal change not having been estimated	each day of observation the centre of a group of days, usually from five to each in number, and taking the mean	a group.
Inclinometer.	Αρρτοχ. Δθ	-	1.6-*	-4.5	19.4	15.3	1.1	9.4	69.4	75.5	75.6	61.4	41.7	61.6	43.8	60.1	59.4	61.4	61.4	40.0	29.7	15.0	15.1	13.8			25.5; incl	е 24 м., th	from five	re of such
Inclino	Scale corrected for Decl. and Bif.		C•88	113.5	62.5	117.5	166.7	231.1	695.0	742.3	743.2	633.9	481.0	634.9	596.8	623.6	617.7	633.6	623.8	467.7	387.7	274-8	275.4	265.5	-		· hifilar 99	eans for the	ivs, usually	as the cent
Bifilar.	Approx.		*•0112	• 0073	•0162	.0051	1400.	0382	~ ~						143						- • 0402	0228	- • 0167	- 0149			on 353.0	the true m	roup of da	hese two are taken as the centre of such a group.
Bif	Scale corrected for Temp.		260.7	248.6	276.3	200.0	238.5	9.661			4	s ə¦t	spə	əə: əų		X	∑ ⊽ o£a	в			98.9	153.7	172-9	178.7			· deelinat	referred to	entre of a g	, these two
Declinatio	* 4	-	*-14.8	- 18.8	8.1	# 8.6	1.4	-21.2	21.0	0.11	7.4	- 14.8	-43.0	-20.6	-40.6	155.4	1.0	-51.6	31.2	89.1	0.16	26.6	29-0	31-4			seules nee	unson, are j	tion the ce	disturbance includes two days, th
Declir	Scale.		338•2	334-2	361.4	0.040 8.698	354.4	331-8	374.0	364.0	360.4	338-2	0.018	332.4	312.4	508.4	354.0	301.4	384•2	442.1	444.0	409.6	382.0	384.4			rrdinate m	t Fort Sin	of observa	te include
Gött.	mean Time.	2 D.		17 0		0 0 02				18	21	24	27	30	35	40	45	50	55	23 0		10	15	20			*	vations a	each dav	disturban

APRIL 2-3.

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Magnetical Disturbances, Lake Athabasca, 1844-continued.

APRIL 2.

0.

Annee	000 000 000		- 0108	0110	1010	6200	1600	0104	0084	- 0085	6900	1400	- 0054	- • • • • • • • • • • • • • • • • • • •	0115	•0129	• • • • • • • • • • • • • • • • • • • •	•0034	GC10.	1600	1000.	•0014	0028	•0135	1000.	-0072	0180	0080	- • • • • • •
meter.	Αρρτοχ. Δθ		-15.8	-15.6	-15.6	- 14.0	-14.1	-14.2	- 13-1	6.11-	9.6-	-8.0	-7-1	9.9-	- 4-9	21.2	20.6	20.4	N 00	14.9	9.11	6-1-6	7.5	14.0	8-4	0.11	-3.9	-5.3	-5.8
Inclinometer.	Scale cor- rected for Decl. and Bif.		45.8	47.0	46.8	0.65	58.3	57.7	66.5	75.5	93.6	105-7	112.8	116.7	130-0	331.7	327-3	325.4	0,000	0.879	257.7	237.8	225.4	275-2	232.3	252.6	137.5	126.4	122.2
lar.	$\frac{\operatorname{Approx}}{\Delta X}$		.0213	•0207	/170.	-0201	•0198	.0186	•0183	•0158	·0126	•0092	0600.	.0075	- 0016	0289	0327	0381	0240	- 0819	- • 0237	0173	1810	- 0152		- 0151	1010:-	• 0029	·0034
Bifilar.	Scale corrected for Temp.		330•4	328.4	6.122	328.2	324-9	320.7	319-7	310.9	299-7	287-5	286.9	281.5	249.5	152-9	139.4	120.4	9-001	144.7	171-5	193.9	191.3	201.5	195.2	201-6	219.4	265•2	267•0
Declination.	<b>↓</b> ↓	-	-29.6	-28.6	4.12-	-34.0	- 32.8	-35.6	-33.8	- 33.4	- 30.8	- 33.4	- 33.4	-35.2	- 33.6	11.4	5.8	-75.4	0.10-	1 4 1 8 1 8	-45.2	- 49.4	- 52.4	- 73.4	-67.3	-63.2	- 83.0	-75.4	9.99-
Declin	Scale.		350.0	351.0	2.946	345.6	346.8	344.0	345.8	346-2	348•8	346.2	346.2	844•4	346.0	391.0	382.4	304•2	0.240	337.8	334.4	330•2	327-2	306-2	312.3	316-4	296.6	304.2	313-0
Gött.	mean Time.	16 D.		88	22	68	42	45	48	51	54		17 0	15	30	39	42	45	¢	1.42	22	18 0		9	6	12	15	18	21
Annrox	φ  Φ		.0250	1510.	2160.	•0148	.0340	.0219	•0110•	•0800	•0114	6600.	.0085	6100.				41000	1810		2110	2010	0133	- •0158	0158	0139	0120	- 0128	0150
neter.	Approx. $\Delta \theta$		36.7	26.4	4.07	28.7	35.7	33.7	23.1	20.2	20.9	15.2	11.2	2.9				0.0	1.06	9:61 -	- 19.3	-17-9	- 18-3	-20.8	-21.5	-20.9	-20.1	- 20.0	-21.0
Inclinometer.	Scale cor- rected for Decl. and Bif.		442.5	362.6	395.9	380.8	433-9	419.1	357.1	314.6	320.3	275-7	245.4	181-2				,	+ 66	16.2	19.7	29.5	26.4	9.9	1.3	5.8	12.2	12.5	5.0
lar.	Approx.		0496	0387	0000	0435	0387	0468	0352	0333	0314		0142	0045				00100	6860.	•0264	.0272	.0261	.0239	•0267	·0281	•0286	•0290	•0280	•0279
Bifilar.	Scale corrected for Temp.		69-7	111.6	8.96	87.8	103-8	78.3	114.8	121.0	126.8	159.4	180-7	211.5				000.5	854.7	348.5	351.3	847.3	339.7	349.3	354•3	356-2	357-4	354-2	353.6
ation.	ψ		125-2	0.09	0.99	57-4	47.2	63.4	23.6	39•2	37•4	40.0	29.0	25.0				- 10.5	9.65 -	-37-2	-35.6	-31.6	-23.5	-29.8	-35.0	-35.4	- 59.6	-48.4	- 49-2
Declination.	Scale.		478.2	419.0	419.0	410.4	400.2	416.4	376.6	392.2	390.4	393.0	382.0	378.0				1.038*	347.0	342.4	344.0	348.0	356.1	349.8	344.6	344•2	320.0	331.2	330-4
Gött.	mean Time.	3 D. н. м.	4 39	47	48	51	54	57	5	15	02 :		0 0 10 1					н. С			9	6	12	15	18	21	24	27	0 2 2

		IĻ	R	E(	3Q	Ļ	AI	2	F	C U	C	ŗļ	JA	Ţ	IO	Ņ	3.	7			
	•		<b></b>					_	-			_									
4	42	8	30	53	8	33	5		9	6	ŝ	1	4	ŝ	-	~	8	ō	0	0	6

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			1 4000		1200		- 0040	8000	0600	0400	0214	- 0042	0230	- • • • • •	•0029	- 0002	•0023	•0004	1100.	9100.	6900.	G110 -	Fond I	1000 -	2500.	.0027	- 0023	0140	0030	0000	9800	7600	1000 ·	.0293	0162	•0088		3.731	10.101
							-4.2	-6.9	-2.7	2.8		4.9	-13.6	9.0	2.4	4.2	0.2	2.2	¢.9	C.1	0.11	0.31	4.6	10.8	10.01	5.4	6.8	14.8	5.5	2.0	11.7	8.88	30.8	33.6	24.3	19.8	-	Co-ordinate mean values: declination, 379.6; bifilar, 255.1 : inclinometer. 167.6	(*********
		108.5				<u> </u>	134:8	118:6		1.681	144.2	201.3	62.5	172.6	186.5	200.1	222.1	1.122	6-01-2	9.030	4.688	9.167	213.0	251.1	245.1	209.5	220.6	278.9	210 4	4.000	6.227	467.8	405.7	427.0	355.2	320.6	-	255•1 : inc	
	1900-				8100:	•0080	:0046	1500.	.0034	-:0017	- :0153	1610	:0047	- :0020	1200	1800	1710	- 0189		- 0155	- 0550	- 0410	8600	0147	7410	- 0083	- 0163	- 0152	#000 -	- 0085	0145	0456	- 0403	1680	- 0332	0315	1	5; bifilar,	
	·	259-1				283 5			267.2	249.2	201.2	208-9	2.112	1:042	0:14.7	4:427	4.212	9.061	206.8	200.3	9.09	110.2	220.5	203.2	203.0	225.6	197.6	201.102	6.116	225.0	2.803	6.86	112.7	117.2	137.8	143.8		tion, 379.6	
	-63:6	1		1							-41-4	9.68-	1.01	P-96	9.0	0.60	8.0I,	2.4	-46.4	- 19-2	2.6	- 89.4	- 37.2	-31.2	- 31.4	15.0	201	- 15.0	- 19.4	-25.6	8.11-	-3.5	112.4	100.8	0.01	0, 1	-	es: declina	いたがいり
	816.0								20.000	0.000	2.000	0.015	499.0	406.0	380.2	412.4	390.4	332.0	333.2	360-4	382-2	290.2	342.4	<b>3</b> 48 4	2-842	0.100	6.668	363.7	360.2	354.0	367.8	376.1	492.0	480 4	0.040	0.00	-	mean value	
	24	27.	S; 6	8 S	0, 0	60	4 4	₽ <b>२</b>	₽ ī	5 2	5	5 61	2 4 2	10	<u>م</u>	20	25	30	35	40	45	20	ŝ	o ' Qi	۰ <u>د</u>	25	20	25	30	35	40	42	205	20 IS		<u>י</u>	•	ordinate	•
	1	1		1910	0810	NULO -	- 0166	0148	0188	6210	01.67	0147	6210: -	6710	2110	8510	- :01.52	- 0141	0135	- 0126	1210	4110	- 0133	0110.		0114	2600	- 0108	9600. –	0084	0076	500	0000	9010	8610				, ,
			1010	8.06-	- 22.0	-24.7	-25.0	-24.8	- 25.5	- 35.2	-24.3	-23.1	-24.3	-21.7	-20.8	-21-4	-21.2	-20.9	- 21.3	8.07-	6.12-	1.07-	0.16-	- 25.9	-21.1	-20.4	-18.5	-16.5	- ]0.0	-15.6	0.41	9.41	- 13.8	- 14-3	-16.4		Cop a 10	ore p. 182-5.	
		4.22	3		6. - 67 - 1	- 23 - 7	-26.1	- 16.6	- 29.5	-27.6	- 20.3	- 11.0	- 20.0	- 0.2 7	6.5	1.9	00 ( () )	0.0		0.0	2.4	2	- 1	-28.5	3.3	10.0	24.6	39-2	4.85	6.14	1.40	54.4	60.7	57.2	39.7		17 n O u		
-	.0267	02420	.0282	.0284	6160.	0330	.0345	•0338	.0346	.0348	•0338	:0323	.0316	-0313	8080.	0820.	0820	0220	000000	0.8180	0305	.030.5	.0330	•0342	•0322	.0302	6220.	.0253	4470.	6660.	.0214	.0213	·0207	•0186	•0209	• <b></b> •	6 p. 17 H. 38 M to 17 n 0 H	}   	
-	349-5	346-2	354.6	355.4	365.7	371.7	376.7	374.5	377.5	378.1	374.7	369-4	300.9	0.000	00.000	0.000	0 100	360.6	360.7	363.7	362-9	362-8	371.6	375.8	368.8	361.8	353.6	344.6	6 110 6 110	333.6	330.7	330.3	328-4	320.7	6.875	 ,	_		
•	-27.9		1	1	-33.6	- 30.8	-27.2	-41.4	-41.5	- 43.4	- 30.4	131.6	124-14	0.00	10.38	0.08	0.06	- 36.0	-45.4	- 33.2	-47.4	-55.4	-48.8	-26:4	- 34.0	- 38.6	4.91	+.12 -	- 22.4	-17.5	-25.0	-26.4	-24.6	-27.6	0.07-		* Brilliant aurora visible from		
•	351.7								338.1	2.925	349.2	348.0	1.000	350.9	343.7	8.025	403.4	343.6	334.2	346.4	332.2	324.2	330.8	353.2	345.6	341.0	2000	348-9	357-2	362.1				352.0	0.100		nt aurora y		
	88 90 90	39	42	45	48	12			0,0	ກຸດ	00	2 G	14	18	12	24	12	80	33	36	39	42	45	48	7.7	* C	16 0		9	6	12	15	18	77	1		* Brillia		
																														_		_	-		-				

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Magnetical Disturbances, Fort Simpson, 1844.

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		•	IRREGULAR FLUCTUATIONS.
	Δφ φ	- 0175 - 0119 - 01100 - 01100 - 0169 - 0184 - 0173 - 0169 - 0173 - 0073 - 0073	.0422 .0461 .0661 .0661 .0415 .0415 .0415 .0368 .0355 .0355 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0150 .0157 .0157 .0157 .0157 .0157 .0157 .0156 .0157 .0256 .0157 .0255 .0256 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .0255 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .02555 .025555 .02555 .02555 .02555 .02555 .025555 .025555 .025555 .02555555 .025555555555
meter.	Approx. $\Delta \theta$	, 1111222222222222222222222222222222222	4 4 5 5 5 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5
Inclinometer	Scale cor- rected for Decl. and Bif.	284.6 284.6 280.6 280.6 280.6 280.2 331.8 353.2 353.2 353.2 250.2 353.2 250.2 250.2 251.7 353.2 255.9 251.7 353.2 255.9 251.7 353.2 255.9 251.7 353.2 255.9 251.7 353.2 255.9 251.7 353.2 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 255.9 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 257.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 277.7 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Bif	Scale corrected for Temp.	207.8 191.9 191.9 191.9 191.9 191.9 191.9 191.9 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 203.7 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 176.3 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.0 200.00	58       34.4         34.4       34.4         34.4       34.5         34.5       34.5         34.5       34.5         35.5       1065.5         1065.5       1055.5         1055.5       1055.5         1111.0       1065.5         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1111.0         1111.0       1
Declination.	φ.Δ	<ul> <li>66</li> <li>75</li> &lt;</ul>	
Declir	Scale.	$\begin{array}{c} 444 \\ 444 \\ 417 \\ 5 \\ 407 \\ 0 \\ 399 \\ 0 \\ 377 \\ 0 \\ 377 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 401 \\ 0 \\ 0 \\ 401 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$	<b>5</b> 12.0 <b>5</b> 12.0 <b>5</b> 15.0 <b>5</b> 15.
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Inclinometer.	Scale cor- rected for Decl. and Bif.	424.5         424.5         424.5         424.5         424.5         424.5         424.5         424.5         424.5         424.5         424.5         424.5         443.7         464.5         464.5         469.8         447.5         469.8         447.5         456.8         456.8         456.8         456.8         456.8         456.8         456.8         456.8         456.8         456.8         456.8         456.8         356.7         356.7         356.7         356.7         356.7         356.7         356.7         356.7         356.7         356.7         356.7         356.7         356.7         356.7         356.7         357.7         357.7         357.7         357.7         357.7	431.3         414.4         397.5         397.5         396.7         396.7         399.3         329.3         329.3         329.3         329.3         329.3         329.3         329.3         329.4         329.5         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         329.7         339.8         319.5         339.8         319.5         339.8         339.8         339.8         339.8         339.8         339.8         339.8         339.8         339.8         339.8         339.8
Bifilar,	Approx.	- 0364 - 0426 - 0426 - 0426 - 04263 - 04263 - 0466 - 0466 - 0302 - 0466 - 0466 - 0300 - 0466 - 0310 - 0466 - 0302 - 0310 - 0258 - 0238 - 0238 - 0258 - 0258	- 0385 - 0351 - 0351 - 0351 - 0351 - 0351 - 0351 - 0351 - 0351 - 0205 - 0255 -
Bil	Scale corrected for Temp.	126         105         105         105         115         115         115         115         115         115         115         115         115         115         115         115         115         115         115         115         115         115         115         125         135         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         155         1	1119         1119         1119         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110         1110 <t< td=""></t<>
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Declu	Scale.	<ul> <li>392°0</li> <li>392°0</li> <li>4428°2</li> <li>411°4</li> <li>411°4</li> <li>411°4</li> <li>411°4</li> <li>438°0</li> <li>438°0</li> <li>438°0</li> <li>438°0</li> <li>438°0</li> <li>438°0</li> <li>475°0</li> <li>475°0</li> <li>475°0</li> <li>335°0</li> <li>475°0</li> <li>475°0</li> <li>335°0</li> <li>475°0</li> <li>470°0</li> <li>475°0</li> <li>470°0</li> /ul>	436.3         436.3         436.3         436.3         436.3         436.3         436.3         436.3         436.3         436.3         4400.2         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4404.0         4401.0         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6         4400.6
Gött.	mean Time.	21 H 6 D 22 0 0 23 0 0 24 2 0 25 1 1 28 2 2 2 1 28 2 2 2 1 28 2 2 2 2 1 28 2 2 2 2 1 28 2 2 2 2 1 28 2 2 2 2 1 28 2 2 2 2 1 28 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	23 23 23 23 23 23 23 23 23 23

Magnetical Disturbances, Fort Simpson, 1844-continued.

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IRREGULAR FLUCTUATIONS.

IRREGULAR FLUCTUATIONS.

# 270

# IRREGULAR FLUCTUATIONS.

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,	Approx.	4		-0140	.0053	•0046	6900.	0024	1000.	• 0042	1000.1	- 0103	6110	- 0100		9110	S000	.0088	- • 0053	- • • • • • • • • • • • • • • • • • • •	0026				14/142	•
با تورژ باد ز	Inclinometer.	Approx.	-	23.9	18.6	13-7	14.2	1.01	7.9	0.9		-13.0	-15.1	-15.8	-19-0	8.41-	-11.9	-10.6	-7.5	-7.6	6.2				;	
d, d,	Incliné	Scale corrected for Decl. and Bif.		352-8	811.7 810.8	273.4	277-4	200.8	224-2	214.1	0.00	6.00	50.8	45.7	20.9	33.5	0.92 81.0	85.6	109-3	1.601	144.8			-		
ared. Arris 17, continued.	Bifilar.	Approx.	а, к 1	0348	0312	-:0232	- 0222		- 0148	0080	0000-	•0162	<b>1810</b>	•0222	.0252	9570-	6910.	•0128	00100	•0113	• 0028					
inued.	Bil	Scale corrected for Temp.	. :	132.0	144.7	173.0	176-8	183.8	902-9	226-7	0.002	317.1	325.8	333.5	344.1	338.5	311.6	300.5	290.6	295.2	263.0		١			Ĩ
44	Declination.	Δ ψ		62-9	109-4	81.2	83.4	85 0 54.4	36.4	62.9	14.00	- 14.4	-49-4	-31.4	-29.0	-35.4	-21.6	-23.4	-21.4	-29-4	8.6 1					
pson, 18	Declin	Scale.		442.5	462.0	460-8	463.0	494.0	416.0	442.5	0.678	368•0	333.0	348-2	350.6	344.2	358.0	356.2	358-2	350-2	369.8			11(	3.1	
ort Sim	Gött.	riean Time.	17 D.		<i>თ</i> ч	0	12	15	45	2 0	2 2 2	0 0 0 0	11 0	12 0		<b>5</b> 5	18	36	4	0	15 0		•	,• .		w. w
Magnetical Disturbances, Fort Simpson, 1844-continued	Approx.	Φ Φ	:	0880	0890.	6180.	.0218	1770	0352	Í	1000 ·	0186	.0326	\$120.	.0282	:: 	.0152		• 0244	-0172	.0127	216	1634	:	207.4	
l Disturl	rneter.	<u>κ</u> υρτοχ. Δ θ		41.8	40°2 59°3	41.5	37-6	7.40 1	32/3.	18	0.77	28.4	35.8	34.6	34.2	1'8	38.0	36:0	2.62	26.9	23.8			, • , 	;	•
agnetica d.	Inclinorater.	Scale corrected for Decl. and Bif.	-	491.9	478.4	488-9	458.1	447.3	417-8	ľ,	0.67.9	348-2	444-3	435.1	432•2	1.5	349.9	445.8	397.5	375-4	351.0	1.10	×د.	1.2.1		
S S	ilar.	Approx.		- 0474	0510	- :0469	- :0547	-0450	- :0308		7770	- 0285	-0401	0443	:0415	) F	- 0529	ŕ	- 0362	- 0376	- 0360	1.11.	. ive	1.4. · · ·	121	
APRIL 17	Bifilar.	Scale corrected for Temp.		87-5	74.6	89-6	61.7	02	146.5	167.5	1.14 1.14	154:0	113.5	98.6	108.5	1.00	138.6	F	127.1	122.4	128-2				ť,	
4460 - 11 (1. 1000) 4800 - 11 (1. 1000) 4800 - 11 (1. 1000)	ation.	φ.	74	73.4	30:4	128/.8	92.3	218,4				16.4	~~~~		103:9	1	141.4	¦ ł	6.64	73.4	47-4	12			, <b>:</b> -	
	Declination.	Scale.		458.0	410.0 504.6	5081.4	471.9	514-0	540.0	459.0	0.064	396:0	489.6	494.0	483.5		486.0	d,	459.5	453.0	427.0	1.170		· · ·		
¥.35	Gött.	mean Time.	17 D. H Mů	3 30	39.9	36	42	6 <del>,</del> 84	51.	54	1.0 V		30	ч.	5	1. 1.	545 45		51	31	57	1	r	гн		

, , ,		Ammen	φ φ		1004	- 0033	0030	.0035	2300.	•0039	0033	-0032	0.00	•0032	•0033	·0024	.0036	0049	0031	.0021	8100- -		s100	0100	1100.	.0022	- • 0027	1200.	6100.	
		A.	4		1	i	i	i	1	1	1	; 		i	i	ï	i	1	i	<u> </u>		i	i	i	ĺ	1	i	ï	i	
	Inclinometer		Approx. $\Delta \theta$ .			- 8.5	-3.6	-3.7	-3.3	-4.1	-4.2	-4.0	0 0 0 0	- 3°5	-3.5	-3.1	-3.6	-4.3	-3.6	-3.1		- 8-0	-2.8	-2.2	-2.6	-3.3	-3.5	-3.5	3.8-	
	Incline		Scale corrected for Decl. and Bif.		154.9	4-851	155.0	154-7	157-4	151.7	150.9	152.4	152.0	155.6	155.7	158.7	154.3	150.1	155.4	158.9	150.0	159.3	161.2	166.1	162.9	157.3	155-4	155.0	158.0	
houritan	lar		Approx.	,	.0048	•0053	•0049	·0045	•0046	.0050	.0057	.0055	0000	.0045	·0044	.0044	.0045	.0045	•0048	.0049	0140	•00.50	•0049	0059	.0046	.0050	.0050	.0050	.0052	
nued. April 94 - continued	Bifilar		Scale corrected for Temp.		1.146	272.1	271.5	270.1	270.5	8.112	274.5	273.7	0.646	270.3	269.8	270.0	270-2	270.0	271.1	5.11.2	2.117	271.8	271.5	275.0	270.4	1.172	272-2	271.9	272-5	-
-contin	Declination.		<b>∲</b> ∇		-11.9	- 12.6	-12.6	- 10.6	-10.6	-11.6	-12.6	-12.0	9.01-	-12.0	-10.6	-12.6	-12.6	-10.6	-10.6	10.6	9.61			-10.6	-8.4	80 80 1	ა.8-	<u>-</u> 8.8	-8.4	-
on, 1844	Decli		Scale.		875-4	374.0	374-0	376-0	376.0	375.0	374.0	874.9			376.0	374.0	374.0	376.0	376.0	2.9/6	874.0				378-2	8.77.8	378~0	. 377.8	378-2	-
t Simps	į	Gott.	mean Time.	24 D.	19 15	202	25	30	. 35	<b>4</b>	45	02 y	13 0		01	15	20	25	8.5	00 Q	45	50	55	14 0	5	10	15	20	25	-
Magnetical Disturbances, Fort Simpson, 1844— <i>continued</i> .		Annrox.	Ф Ф		2100	0027	- 0026	- • 0028	0030	0200	0028	- 00192	-002	0033	0027	6100	2100	- 0023	0800	1600	1800	- 0027	- • 0029	- 0029	- 0027	0037	- • 0037	co37 -	- • 0032	_
Disturba	meter.		Αρρτοχ. Δθ		-2.8	-3.3	-3.5	-3.6	-3.9	200	1 2 2 2	- 2 - 1 - 2 - 1	- 3.7	-3.7	-3.6	-3.5	13.2	- 8 4	- 2 - 2	- 2.	1 000	-3.4	-3.6	-3.7	-3.7	-4.0	-4.1	4-1	-3.3	
rnetical ]	Inclinometer.		Scale corrected for Decl. and Bif.		161.7	157-4	156.0	155.5	153.1	153.5	154.5	1.721	154.9	154-7	155.2	158.5	158.4	156.5	154.2	1.401	155.8	156.4	155-2	154.8	154-2	152.4	151-1	-151-I	157.3	
Ma _é Tern Day.	Bifilar.		Approx.		•0043	•0046	.0051	.0050	.0052	1900.	SC00.	+CUU	• • • • • • •	• 0046	•0052	.0050	.0052	•0052	700	0200-	. 0046	.0048	· 0050	.0052	.0056	•0049	•0053		1900	
	Bif		Scale corrected for Temp.		269.5	270.5	272.2	271.8	2.212	5.717	6.717	619.8	272.8	270.7	272.6	272.0	212.7	272.5	0.717	1.646	270.5	27.E 3	6-T/2	279.4	273.7	271.7	273 ¥	273.2	272.2	
APRIL 24.	ation,		× 4	~	9.8-	1.9-	- 8.0	-7.6	0.0	0.01		9 °0 9 °0 1 ; 1	-9.9-	-6-2	9.9-	9.9 9.9 1	0.0	7.2-				8.8	4.6-		6.8 			-12.6		
	Declination.		Scale.		378.0	380.5	378.6	379.0	0.088	0.025		380.4	380.0	380.4	380.0	0.088	380.6	4.6/2	2.110	377.6	376•7	8.11.	37.7.2	0.878	377-7	375.2	374.0	374-0	374•0	
	++25		mean Time.		10	ŝ	10	15	2 2	C 7	, v , v	9 [.] 6	45	. 20	55	0 ' [	u	3:	2.6	2 ²	8	35	40	45	<b>G</b>		12	(بم	0	

271

Overcast throughout! Coordinate mean values: declination, 386.6; bifilar, 254.8; inclinometer, 183.2.

272			Ţ	RR	EG	σL	AF	: I	rL1	UC	TU	JA'	L1(	ON	s.																
	Approx.	¢ •	11001	0024	- • 0007	- 0049	-+0047	1001-	0050	0042	- • • • • • • • • • • • • • • • • • • •	0400	0035	- •0043	- • 0044	0041	- 0044	+c00	- 0054	- 0026	- 0030	- • 0023	0023	0021	0023	0028	•			-3.40090	
	eter.	Approx. Δθ	1	1.3.8	-3.6	-6.2	9.9-	-7-2	2.9-	-6.3	-5.9	-5.4	6 4 T	-2-1	-4-9	-4.4	14.3	4.4	1.0-	1.6	-2.9	-3.2	-3.0	-2.9	-3.4	-4.3				<u></u>	
	Inclinometer.	Scale cor- rected for Decl. and Bif.	1	153-9	155.3	135.1	132.4	127.7	6.121	134.7	137-7	141-0	0.441	143.7	145.1	148-7	149.3	148-9	0.601	6.201	2.091	158-2	159-9	160.6	156.5	149.5	-		,		151.4
					.0073				1010				00.0	00/3 0023	.0068	•0063	.0056	-0052	-0042	6200	1003	0047	.0043	•0042	.0052	.0057	-			•00.54	0900.
24-25.	Bifilar.	I Approx.																·•••••									-		•	273.3	274·5 276·4
еd. Агки. 24–25.	В	Scale corrected for Temp.		283•1 278•1	279.9	28U-3	288.3	292-3	292.2	286.5	284-2	282.2	281.3	280.1	278.4	276.5	274-0	272.6	269-3	263.4	1.990 7.02	0.026	269.4	269.2		274.4	<b></b> 1			-3.4	
ontinu		<b>∲</b> \	-	-2.6	-1.6	1.1	9.4 4.6	1.4	-5.6	9.0-	9.9-	-2.6	-5.0	-2.1	9.6T	-2.0	-5.4	-7-4	6.8-		- X-	0.0	.4-	- 1.6	-12.9	-2.6					
844-0	Declination.	Scale.		384•0	385-0	385.5	0.068	388.0	381-0	380-0	0.088	384.0	381.6	384.5	2.095	384.6	381-2	379-2	377.7	378.5	582.7	282.8	9.000	0.628	373-7	384•0				383•2	384•3 384•0
30n, 1			D. M.	10 38			20 25 25			50 33					20					50 3			0 C C			25 3				30	35 40
Simp	Gott.	mean Time.	24 I H.	201							6	:										52	_				==			033	6900.
Magnetical Disturbances, Fort Simpson, 1844 continued. inued.		Approx. $\frac{\Delta \phi}{\phi}$		2100	- 0012	0012	1100	0015	0012	6000		- 0018	6100		0025	0026	009.5	0017	.0020	0020	- • 0019	0024	8200	10000	0000	- · · 0047				0033	
urbance		$\begin{array}{c c} A \\ A \\ \Delta \theta \\ \Delta \theta \end{array}$		- 6.6-			4.6					1 2 1		-3-9	-4-1	4.3		- 3.5	1.4-1	-4.1	-4.1	-4.2	1.8-1			-5.1	-			-5.2	
Distu	Inclinometer.		   							۱ ص						·										יי סיא				143-0	139.7
netical	Incli	Scale cor- rected for Decl. and Bif.		160.3	162.0	163.3	164.4	160.09	162-3	164.3	163•2	162.6	159-2	153.1	151-2	149.8	6.0cT	155.0	151-4		151.5	150.3	159.4	157.4	P-0-11	143.5				.0080	
Mag APRIL 24—continued.	ar.	Approx.		•0048	•0048 •0046	·0043	•0043	7400.	·C047	·0044	1400.	0040.	·0048	· 0057	•0066	1900.	0900.	6900.	6900·	·0700	•0070	•0068	1900.	.0010	1/00-	0200.		a the second second second second second second second second second second second second second second second			
PRIL 24-	Bifilar.	Scale corrected for Temp.	·	1.122	271 · 3 270 · 6	269-5	269.2	269.8	270.9	269.7	268.5	267.9	271.3	274.5	277.5	278.2	277-6	C.912	0.017	278-9	278.9	278.3		2,9.0		279.4				.4 282.7	
A	0u.	>> → ↓		-7.3	-7.9	-5.2	-4-3	1 0 7 5 1 4	-5.6	-3.9	-4.0	-4.5	4.4	-4.6	-6.4	9.9-	-2.0	4.71	 	8.9 1 1	9.9-	-6.8	9.9-	9.9-	9.9-	9.9-	•			°° 1	6 16 1 
	Declination,	le.	1	379•3	378•7 879•3			381.4				382.1			380•2	0.0	379.6	879-2	4.6/0	8.000	380.0	379-8	380.0	380.0	380.0	380•0	 >			378-5	377.0
		u n le. Scale.		30 W.								20 38								10 37						40 38 45 37				20	17 0
	į	Time.	24	н. 14				1. 											91							<b></b>					

																										,													
0020	- • 0032	0043	- • 0032	- •0020	0024	2000.	• 0033	·0119	.0185	.0124	.0130	1210.	.0156	.0231	•0173	·0204	.0105					.0157	.0116	.0105	•0138	0110.	.0142	0810.	1110.	.0102	•0094	1800.	·0120	1210.	0600.	.0059	0200.	.0075	5210.
-3.4	14.0	-4.8	-4-3	-3.9	-0.4	-1.2	1.0-	5.9	14.6	6.11	13.3	13.0	13.6	19-3	1.71	15.9	15.5					16.4	12.7	12.9	14.7	11.8	12.8	11.8	10.1	0.11	9.5	1.6	11.3	12.0	1.2	5.2	5.5	5.9	12.0
1-121	151.4	145.8	149.5	152-9	179-9	173-6	182.2	228-7	296.4	275-8	286-3	284.0	288.8	332.4	315-5	329.9	304.2					311•3	281.8	282.6	1.702	274-2	282.0	274-9	5.195	268.3	256-9	253.6	270.7	276.0	238.6	223.3	223.2	228.9	276-2
.0054	1900.	0900.	.0062	· 0065	0015	.0030	• 0036	- • • • • •	- 0133	- 0136	0160	0162	0141	- 0188	6610	0208	- 0535					0203	1910	- 0175	0182	0146	- 0136	- •0128	6010	0126	0113	1110	0124	0133	0065	0051	0042	0053	- • 086
273.3	274.5	276-4	276.4	277.3	249.2	264.8	267.1	251.3	207.3	206.2	6.791	0.791	204.6	187.8	184.0	180.7	171.3					182.6	197.3	192.6	189-9	202.7	206.4	209-0	215.8	209-9	214.4	215.0	210.4	207.2	231.2	235.3	239.5	235.4	224.0
-3.4	2.7-	-2.6	0.5	9.0-	7.4	15.7	13.7	10.1	7.4	30.0	15.8	16.4	23.0	23.1	31-4	26.3	21.4							25.6														16.8	
383.2	384.3	384.0	387-1	386-0	394.0	402.3	400.3	396.7	394-0	416.6	402.4	403.0	409.6	409-7	418.0	412.9	408.0					414-2	405.6	412-2	416.0	419-6	402.0	420.6	404.4	404-3	418.4	419.6	410.3	403.7	413.0	411.7	408-9	403.4	420.3
30	35	40	45	5.5	55	23 0	ŝ	9	15	05 02	25	30	35	40	45	50	55			25 D.	H. M.	0	5	10	15	20	25	30	35	40	45	50	55	1 0	ŝ	10	15	20	25
0033	0039	6900	- • 0068	0055	0054	0052	- • 0059	- 0058	- 0049	- 0044	- • 00.58	8200	0045	0044	0050	0041		0080	0056	- • 0078	- 0075	- • 0093	2200. –	4600	1200	0153	0049	0900	- • • • • • • • • • • • • • • • • • • •	0056	0087	0064	0055	0056	0053	0050	0051	0041	<b>-</b> ·0043
-5.2	1.2.6	-6.4	-6.4	1::-	-7.3	-7.3	-7.4	-7.2	6.9-	-6.5	2.2-	-8.8	-8-2	-7-2	-6-2	-6.3	-6.4	-8.4	-8-3	-11.0	-10.9	-12.3	-11.4	-12.4	-10.6	-9.5	- 8.3	- 8.3	-7.8	- 8.3	-8.5	8•2	6-2-	-8.1	-7.8	-7.4.	0.1-	-6.3	-5.9
143-0	1.621	133.6	133•3	127-9	126.6	126-6	126.1	127.4	129.7	132.5	123.3	114.9	6-611	127-2	135.5	134.6	153-9	117.9	118-7	97.8	2.86	88.8	94.9	87.3	101.3	103.5	0.611	118-7	122.6	119-1	117.3	120.1	121-7	120.9	122.6	125-7	129.1	134.7	137.5
.0080	.0083	0600.	•0093	0010.	·0103	•0105	1010.	•0100	.0102	66CO.	0110.	·0114	·0132	•0113	•0104	9600.	•C039	·0104	.0125	·0162	•0162	•0175	0110.	·0173	0910-	.0145	·0132	1210.	5110.	·0124	• 0098	•0113	·0118	<b>6</b> 110 <b>·</b>	-0116	1110.	1010.	•0096	•0085
282.7	0.682	286.2	287.0	289-7	290.8	291.6	290.2	290.7	290.3	289.4	293-2	294.7	301.1	294-2	2.162	288.1	285-6	290.9	298.5	311.5	311.5	316-2	314.4	315.4	310.8	305-4	300.8	296.9	293.8	298.1	299.1	5.1.3	296.0	296.3	295.3	293.6	290.1	288.1	284.5
4.8-	9.6	-5.6	-5.6	-4-4	-2.6	-4.4	-5.0	-3.4	-3.0	-3.0	-3.6	-2.6	-0.5	8-2	4.8	14.0	7.4	7.2	0.0	7.4	0.4	- 12.4	-13.6	-10.1	-15.1	-10.1	9.8-	-7.6	0.8-	- 10.2	- 8.2	-12.6	- 8.2	-3.6	-4.6	-5.6	-2.6	9.0-	-2.1
378.2	211.0	381.0	381.0	382.2	384.0	382.2	381.6	333.2	383.6	383.6	383.0	384.0	386.4	394-8	391.4	400.6	394.0	393.8	386.6	394.0	387.0	374.2	373.0	376.5	371.5	S76.5	378.0	379.0	378.6	376.4	378.4	374.0	378-4	383.0	382.0	381.0	384.0	336.0	384.5
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	meter.	Approx. Δθ			0.0		1.5	1.3	. 4.0	••	-0.2	2.6	3.5 7	100		, , , , , ,	4.0	5.5	5.0	4.6	8·8	4.8	4-5	6.0	-2.3	-2-9	-4.5	9.9-		-8-3
	Inclinometer.	Scale cor- rected for Decl. add Bif.			175.9	195.8	194.8	193.7	188-4	184.0	181-3	203 . 8	208-0	4.222	0.002	5 107	6 117 6 14.4	223.3	228.4	225.4	213•2	220.6	218.1	190.5	165.0	160.9	148.4	131.6	165.2	118.5
APRIL 25-continued.	lar.	Approx.	,		- 0016	0031	- • 0031	- 0031	8100	0018	- 0022	0033	0045	0/00-1	#con	4900.	6200	8900	0800	- • • • • • • • • • • • • • • • • • • •	0057	9900	0900	0033	·0015	6100.	-0057	6400.	0600.	:0103
Арви 25-	Bifilar.	Scale corrected for Temp.		1	248.5	243.5	243.3	242.2	248.1	248.1	246.5	242.6	238.5	0-127	1.900	1.080	226.5	230.4	226.0	228.1	234-3	230.9	233.0	242.6	259.5	261.2	274.5	282.3	285-9	290.7
·	stion.	¢ ↓ ↓		-	12.4	20.4	21.7	23•2	28-7	24.8	29.4	30.2	0.92	1.00	19.4	19.6	23.2	24.0	25.4	26.2	23.2	23.4	19.61	5.5	-7.8	-14.8	-18.6	-12.4	-18.4	-14-2
	Declination.	Scale.		. 0- 007	0.665	407.0	408.3	409.8	415-3	411.4	416.0	416.8	410.0	0.011	400.0	400.9	409.8	410.6	412.0	412.8	409.8	410.0	406.2	392.1	379.3	371-8	368.0	374.2	368.2	372.4
	Gott.	mean Time.	25 D.	н. м.	55	6 0	Ω.	01	15	20	25	00.5	04	45	205	22	7 0	5	10	15	20	25	202	35	40	45	50	55	8	S
1	Approx.	Ф Ф		8800.	•0034	6600.	·0042	.0247	.0355	4020-	1620-	0140	1010 10250	0360.	.0496	.0577	.0545	.0427	.0581	•0293	.0492	.0504	2020-	.0357	.0235	•0146	.020	.0235	.0128	•0264
	meter.	Αρρτοχ. Δθ		7.9	5.3	9•2	3.5	19-3	32.0	5.02	0.00	41.8	49.0	49.5	48.9	51.3	47.1	46.6	51.0	40.1	44.4	49.0	0.17	32.3	27-3	20.6	23 • 1	25.2	19•3	23•8
ued.	Inclinometer.	Scale cor- rected for Decl. and Bif.		040.0	224.3	254.6	210.5	332-9	430.5	4.00-5	2.114	101-0	508.8	511.4	561.0	580.0	547.4	543.4	579-4	493.4	9.929	9.400	1.760	433 I	395.5	342.7	361.7	378-2	332.5	367-2
APRIL 25-continued	Bifilar.	Approx.		1200	- 0072	- 0100	0036	- 0163	- 0340	+0f0	2040	- 0479	0556	0562	0567	- • 0538	0478	0504	0530	0585	04/3	6560	6600	0346	0362	-10202	- 0302	0313	- • 0290	- 0253
APRIL	Bif	Scale corrected for Temp.		6.066	229.0	219.1	241.7	9.96.	132.3	c.06	#-001	8.88	0.09	59.1	53.3	64.2	85.1	76.3	68.9	47.4	6.00	0.40	1.101	6.121	126.3	147.8	147.3	143-7	151.6	164.8
	ation.	ት ላ	-	59.4	55.2	21.4	34.2	4.50	0.10	191.60	8.701	2.62	83.8	124.0	168.4	151-4	118.4	128•4	148.7	1102.0	0.601	0.001		7.171	141.4	4.62	73.8	108.4	99•4	85.4
	Declination.	Scale.		440.0	441.8	408.0	420.8	440.0	2.1/5	0.011	404.4	466.3	470-4	510.6	555.0	538-0	505.0	515.0	535.3	0.486	7-070	10.012	210.0	2.010	0.020	400.0	400.4	495.0	486.0	472.0
	Gott.	mean Time.		н. 30 к	35	40	45	00	, e		2	15	8	25	30	35	40		25	رر م		ۍ <u>د</u>		C7			0.5	çö :	Q. ;	45

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124.9         130.5         141.6         141.6         152.1         152.2         162.2         155.4         155.1         155.1         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2         155.2
-0096 -0097 -00132 -00132 -00132 -0048 -0043 -0044 -0064 -0064 -0064 -0064 -0064 -0005 -0005 -0001 -0000 -0001 -0000 -0001 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -0000 -00
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IRREGULAR FLUCTUATIONS.

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Magnetical Disturbances, Fort Simpson, 1844-continued.

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Ī	Approx.	₽ ₽		66 I O .		•0042	9110.	1600	1210	9600.	.0916	.0130	6100	.0032	•0024	- • 0082	0057	1200.	•0134	2000-	1200.	0110.	0610-	6010	6010.	•0124	9500.		1400	1
	ncter.	Αρρτοκ. Δθ		19.5	2	10.9	13.1			*.0%		13.4			15.7	0.5	18.5	12-9	20.3	7.01	15.6	6.07	9.12	7.17	14.2	16.5	6•1			l 
	Inclinometer.	Scale cor- rected for Decl. and Bif.		0.100		270.7	288.1	248.4	240.3	390.6	180-5	130.4	D 067	6.CHI	308.0	190.6	121.1	286.3	343-4	311.6	307-2	348.5	353-3	350.7	297.4	314-6	233.6	133-4	122.8	9.611
27.	lar.	Approx. $\frac{Approx}{\Delta X}$		01 10	- 0178	6210	0152	- 0112	0104			1200.	4410	6800.	9660.	6600	.0116	0185	- 0279	coso	0220	0278	- 0287	0293	0184	0213	0365	·0014	•0128	•0112
APRIL 26-27.	Bifilar.	Scale corrected for Temp.			201-4	188.7	198.4	212.2	215.2	122.3	219.2	277.1	0.107	283.4	4.187	2.010	6.666	186.5	153-4	145.8	156.6	153-6	150-7	148.3	186-7	176.7	228.9	257.1	297.2	
·	tion.	* ♦		_	53.2	64.2	39.8	30.6	30.8	77.2	39.2	-2.8		-48.2	- 23.8	0.00-	7.38	8.99	-42.8	-34.5	-54.8	-36.0	-11.8	5.2	- 18.6	-8.5	8.91	6.8	-22.8	
26.	Declination.	Scale.			446.0	457.0	432.6	423.4	423.6	470.0	432.0	390.0	308-4	344.6	369•0	332.0	0.000	1 100	350.0	3.58 • 3	3:48.0	356-8	0.188	0.868	974-2	984.9	0.988	988.0	0.026	369.9
	Gott.	mean Time.	26 p.	E. M.	1 45	4 <u>8</u>	545	22		0	6 0	17 01	18 O	15	30	45	3	00 01		2	12	20	25	8	2 4		24	6 g	55	20 0
		$\phi \frac{\phi}{\phi}$			6900	-0386	8180.	5610.	0800	1000	1000.	.000	•010•	•00.59	•0006	•0034	0007	2002-	2200	.000	1500.	1000	1:00.	-0043	2100		100.1	1200-1		
	neter.	Approx. Δθ		•	-5.9	20.7	107	0.24	1.00	19.91	1.1.1	10.2	16.8	13.7	0.6	17.2	16.5	19.2	1.21	11.0	10.2	1.01	10.61	0.01	0.0 0			4.	1	) 1
	Inclinometer.	Scale cor- rected for Decl.			140.8	346.3	545.6	515.3	1 000	1.000	0.102	0.112	6.916	2.606	256.3	319-9	314•4	335-2	318.6	0.108	30.7.8	202.0	0.887	8.167	216.9	179-1	227.5	197.5	176.9	- 121
PRIL 25-26.	Bifilar.	$\frac{\text{Approx.}}{\Delta X}$			.0052	- • 0035	0526	0341	2620	- 1000 -	10020- I	1020	2260.	0660	0171	- 0316	0343	- • • 0579	0323	- • 0266	0270	0120	0231	- 0246	0122	0038	6110	- • 0049	6000.	6100
APE	Bift	Scale corrected for	.duna.		270.4	239.5	6.5.9	60.8	1.611	125.5	169.6	100.5	n-001	1.691	189.4	140.4	131.1	118-2	137.7	158-0	156.7	177-8	170.4	165.0	209.1	238-6	210.0		255.3	
	ation.	+			9.06-	18.8	-16.8	10.4	21.2	49.4	29.2	17.4	0.4	23.2	+ 6 T	98.5	- 17.6	- 30.5	-34.0	-57.1	-45.0	-34.0	- 22.6	-4-4	-4.8	-34.8	-14.8	- 18.6	-12.8	9-9-
	Declination	Scale.			9.079	374-0	576.0	392.4	414.0	442.2	422.0	410-2	0.888	416.0	403.2	0.000	375-2	362.3	353.8	335.7	347.8	358.8	370-2	388.4	388.0			374.2	<u> </u>	
		Gott. mean Time.			H. M.			9	6	12	15	18	21	24	72	200	98	68	42	45	48	51	54	57	21 0		30	45	22 0*	

- 0043	0034	.0120	.0175	•0165	1100.	•0164	1210.	•0166	•0108					•0008	1110.	1	•0132	.0175	• 0266	·0122	·0084	·0114	•0086	·0342	·0158	1800-	6400.	1400.	.0015	• 0065	·0075	• 0065 .	•0031	.0025	•0020	
0.7	9.1	23.5	23.3	26-2	20.0	22.1	21.7	22.7	20.8					20.4	24.7	22.8	22 · 1	23.7	29.6	22.1	20.0	20.1	17.9	14.1	15.0	10.01	9-2	2.6	2.3	3.9	4.8	5.5	3.1	1.9	1.2	
192.5	198•6	368-6	366-8	388.9	352.7	357-2	354.5	369.4	347.6					344.6	377-4	365-2	357-2	369.6	415-2	357.6	341.1	343.0	324.8	295-3	302+9	264.0	257.5.	245.4	204.7	216.5	223-3	226.8	215.6	201.5	195•6	_
1100.	0067	0330	0300	0369	0361	- • 0285	0321	- • 0299	- 0315					- • 0323	0326	1	- • 0318	0308	- 0336	- • 0328	0324	- • 0298	0277		0148	0162	- • 0108	- • • • • • • • • • • • • • • • • • • •	- •0033	0014	- • 0023	- 0041	- • • • • • • • • • • • • • • • • • • •	0014	·0005	
232•1 255•8	228.3	135.3	145.8	121.7	124.5	150.3	138.7	145.8	140.6		,,			133.0	136-6	1	139.8	143.2	133.2	136-1	137.8	146.6	154-0	165.8	199.7	194.5	213.8	224.4	240.3	247.0	244.0	237.4	235-9	247.0	253.6	•
-45.6 -8.3	7.2	29-3	15.0	-8.5	-9.8	-1:3	5.6	10.2	- 10.8					-20.4	-13.4	١	1.3	17.8	20.2	34.1	6.1-	-15.6	4.6	22.9	31.2	11.5	21.2	20.2	16.2	3.5	-2.5	0.6	0.7	3.6	3.2	Ξ
347•2 384•5	400.0	422.1	407.8	384.6	583.0	391.5	\$98.4	403.0	382.0					372.4	379-4	1	394.1	410.6	413-0	426-9	390.9	377.2	397.4	415.7	424.0	404.3	414.0	413-0	409-0	396.3	390.6	401.8	399.8	396.4	396.0	
21 0 22 0		36	39	42	45	48	51	54	57			27 в.	•	0	ς,	9	6	12	15	18	21	24	13	30	33	36	39	42	45	48	51	54	57	1 0	ŝ	
	·0572	.0347	1890.	•0636	.0521	•0446	.0413	.0430	.0344	.0235	•0547	·0380	•0412	•0376	·0307	.0296	.0225	.0286	-0232	.0251	1720.		.0230	·0131	•0116	·0092	8600·	·0082	.0078	·0062	•0028	.0078	·0032	•0044	•0137	
	59-4	1.91	74-9	68°3	6.69	57.1	54.2	53.6	46.5	43·8	61.2	51.2	52.2	49.1	40.6	36-8	31.7	33.8	31.9	34-2	35.3	1	32.4	23.0	18.4	15.7	15.0	13.2	13.5	0.11	0-2	6.8	1.6	9.2	14.2	•
	645.9	781.5	766-0	1.612	658-7	628.9	605.5	602-3	546-3	525-1	659-1	582.6	590.6	566.0	500-2	471.4	432.1	447.7	432.8	451.0	460.1	1	437.2	364.3	328.8	308 • 3	302.3	288.5	2.102	271.4	240.9	256.4	256.9	257.5	296.2	
	- • 0638	0715	- 0845	0765	6120	6120	1630	9990	0605	- • 0657	8690	0664	0652	0626	0521	0455	0423	0402	0418	- • 0446	- 0449	- • 0472	0430	0338	0258	- 0229	0207	0187	-•0198	0161	- 0114	- 0103	0153	- •0133	0152	
	26.9	1.0-	-46.7	-18.3	-1.9	-2.0	6.2	16-8	38.4	19.9	5.4	17-3	21.5	30.7	68.1	91.3	102.6	0.011	104.5	94.4	93.2	85.3	6.66	132.7	160.8	171.0	178.8	185.9	182.1	194-9	211.4	215.7	197.8	205.1	198-0	
	29.2	- 12.8	15-0	69-2	19.2	22.6	- 52.0	-51.0	-71.2	-67.3	-31.8	- 19-8	-0.8	- 13.6	9.4	9.2	9.6	13.6	27-2	10.2	36.2	50.8	23-4	-14.8	-23.0	-26.0	-4.2	22.8	31-0	17.0	19.61	18.2	41.2	58.0	49.6	
	422.0	380.0	407.8	462.0	412.0	415.4	340.8	341.8	321.6	325.5	0.198	373.0	392.0	379-2	402-2	400.4	402.4	406.4	420.0	403.0	429.0	443.6	416.2	378-0	363.8	366.8	388.6	415.6	423.8	400.8	412.4	411.0	434.0	450.8	442.4	
26 D. H. M.		S	9	6	12	15	18	12	24	27	30	33	36	39	42	45	с: •7	215	54	57	1	00	9	6	12	15	18	21	24	27	30	33	36	39	42	

# Magnetical Disturbances, Fort Simpson, 1844-continued.

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IRREGULAR FLUCTUATIONS.

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	Approx.	\$ •		- • • • • • • • • • • • • • • • • • • •	0900	2000.	•0046	·0044	21CO.	- 0030	7700	9000.	2000-	2500·	5100 <b>.</b>	5100	.0016	.0015	•0022	•0040	1	1	·0037	•0036	•0022	.0027	2200.	.0021	90.0.1
	meter.	Approx. Δθ	~	0.2	-1-4	4.1	0.9	6.4	2.5	6.0	0.1	- 1 5 - 1	6.1	6.0		1.7	1.8	- 8- - 61	2.6	4.0	1	2.9	3.1	2.6	2.1	5.1	2.4	1.8	0.5
	Inclinometer	Scale cor- rected for Decl. and Bif.		242.7	232.2	289.1	6.682	282.6	256.0	246.6	241-4	249-4	1.887	285.6	212	2.950.9	5.64·8	259.2	258.1	267•2	!	260.0	261.1	258.0	254.4	254.6	256.4	252.9	238.0
5	lar.	Approx.		- 0018	- 0032	.0088	- 0100	- 0086	0035	- 0049	- 0023	- 0022	1800	- 0094	6/00	0200	10020	- 0042	0031	- 0041	1	l	0026	- 10017	0021	0016	0017	0016	: <b>ب 100</b> 16
MAY-2-3,	Bifilar.	Scale eorrected for Temp.	•	251.3	246.3	226.6	222.4	227.4	245.2	240.5	249-4	249-9	226.9	224.4	8.677	0.742	0.986	949.9	246.9	243.4	!	1	248-6	251.6	250.4	252.2	251.6	252.0	252.1
	ation.	φ 4	`	6.8	8.7	23.7	25.9	9.8	1.9	6.6	1-2	-6-1	-10.3	-2.1	4.7	1.8-1	1.31	1 0T	1.91				1.0-	0.3	0.3	6.7		3.9	
	Declination.	Scale.		400.0	399.8	419.8	422.0	404.7	398.0	406.0	403-2	390-0	385.8	394.0	393.7	392-4	2.0017	710.6	419.9	407.2	404.0	1	0.968	396.4	396.4				396-2
	Gott.	mean Time.	27 D. H W	21 24		36	39	45	48	51	54		22 0	S	9	o ;		CI a	6	24	27.	80	88	36	39	42	45	48	51
-	Approx.	φ Φ		1000	• 0002	.0020	•0035	9200.	.0015	.0016	1000.	•0018	•0032	·000	0100.	·0014	0100.	1100.	2000	9800.	6100.	2200						1	- 0145
	meter.	Approx. Δ θ		6.0-	-1.1	8.0-	0.8	0.1	50	1 80	-1.8	-1.5	0.4	-1.6	6.0-	-1.1	0.1-	2.0-	0.1	1.0	0.1	1			,				-12.8
8	Inclinometer.	Scale cor- rected for Decl. and Bif.		185.0	173.2	180.4	193.0	194.0	6.001	180.7	172.6	174.6	189-9	173-9	9.641	173.0	I78.8	181.3	7.007 4.007	1.111	0.901	Det						 *	158.3
27. MAY 2.	Bifilar.	Approx.		1100.	1100	.0036	6100·	•0008	9200-	0100-	•0038	•0048	•0024	.0033	•0029	• 0049	.0030	•0032	<u> 2000</u> . –	1100.	2000	enno-						10145	2110.
APRIL 27.	Bif	Scale corrected for Temp.		0,770	2222-0	264.8	258.7	255.0	261-3	4.890	965.6	0.696	260.5	263.7	262.5	269.3	262.7	263.5	250.3	256.0	0020	¥-027				•		800.0	0.806
	ation.	¢ ↓	.		7 6	1 07 1 07	5.8	8.2	2.0	2 0 0						11.2	11.2												
	Declination.	Scale.			395.0	0.908	398.6	401.0	400.6	0.668	0.104	404.9	406.0	408.0	406.4	404.0	404.0	404.0	409.0	406.0	0.668	417.8							0.165
,	Gott.	mean Time.		H. M.		6	15	18	21	24			8	68	42	45	48	51			0 0 7 1 7 1					MAY.	- - 	H, M.	0 21 18 0

0095 0120 0129	0089						01001	SI00-	soon.	6200-	1800.	2/cn.	2400.	6660.	4000.	seen.	540.	9100.	14201.	1400.	.0346	0220	.0323	•0279	•0274	·0248	<b>9610</b> .	.0115	.0126	•0145	•0052	0026
	- 5.5 - 2.9 - 3	) )					0.0	0.0	2.0		0 C	5.19	55.25	59.8	5.69	20.00	54.8	27.2	59.8	4.02	10.88	0.00	84•8	31.0	29-4	28.0	24.7	18.3	16.6	17.71	11-7	4.0
204-5 202-1 198-1	205•4 222•0 998•8	201					0.00	2.162	242.0	539.9	C. 167	1.410	C. 160	627-1	2.4.29	6.809	595.0	0.686	6.979	9.009	9.985	8.88P	465.9	441.1	430.7	422.1	400.3	369-4	348.3	355.2	316-7	266.6
- 0012	•0025 •0020	1100						2100.	2000	CZ00.	7200	1090	0582	6190	1000	P090	0573	6990	0590	0587	-0498	8000	- 0386	0352	0325	0322	0305	- 0257	- 0212	- 0216	- 0186	- 0106
253•3 258•5 259•4	266•4 264•9	0 107						262.1	256.9	G.997	232.2	43.2	6.19	39.0	44.2	44.8	55.4	1.09	49-2	50.3	0.10	2.011	0.017	133•3	142.9	143-8	149-9	166-9	182.9	181.2	191.9	220-4
-1.7	6.1	4						1.1	1.6	6.4	5.67	6.1.9	51.9	6.88	11.5	57.9	72.5	105.5	117-3	96.7	n - 10	1.0.	8.00	2.15	60.09	73-9	65-7	43.1	65.7	33.5	47.9	19•3
396•6 394•4 396•7	396.0 398.0	0.000						397-2	405.2	404.0	426.0	458.0	448.0	485.0	467.6	454.0	468.6	501.6	513-4	492.8	404-0	0.1/#	467.4	447.8	457.0	470.0	461.8	439.2	461.8	429.6	444.0	408•4
54 57 23 0	15 30 45	CF.				а. 9		0	0	0	8 9 0	4	ŝ	9	6	12	15	18	21	24	22	200	65 S	8 68	42	45	48	51	54	57		0 9
-0026 -0052 -0044	- 0015	- 0016	0042	.0010	0005	- 0046	0900	0052	0097	6200	6800	6800	6110	8010	0053	- • 0169	0037	0082	0015	0080	100	#100-	1800-	1000	0200	.0025	0030	0052	£600·-	0036	0054	0086
5.5 5.8 8	-1- 8.1- 8.0	0.5	-1.5	4.1	3.8 8	2.0-	-4.5	-3.6	9.8-	7.2-	-7.6	1-8-1	-10.3	1.6-	1.5	-7.5	-4.3	-4.6	2.9	5° 8'	5.0	0 0	2 3	о с • ч	2.1	4.9	6.0	0.0	-5.0	9.1-	-3.4	-6.2
265-0 275-7 278-6	260·7 232·7	242.4	231.3	267-4	26.5 - 5	236.3	211.8	217.4	196.5	194.7	2.161	188.8	174-8	181.9	208.1	192.8	213.4	211.4	259.9	278.5	244.3	1.902	4-1-12	9.846	254.8	272.7	247.0	241.3	208.7	230.7	219.1	201.1
- • • • • • • • • • • • • • • • • • • •	0048 0020	- 0020	- 0021	0073	- 0082	- 0029	•0026	•0022	.0075	<b>1900</b>	9900.	.0076	0600.	• 0078	.0052	- 10017	.0049	1100.	- 0045	6800	8700	6800	Ga00	- 0.084	6900	0075	0048	0053	•0008	0003	.0015	•0032
240•0 237•2 231•0	240.9 250.5						267.0	265.3	284.2	281.4	281.0	284.6	289.6	285•3	276.0	251.7	274-9	261.6	241.9	244.0	247.8	244.0	7.422	1.866	235.4	231.2	240.6	239.0	260.4	256.5	263.1	268.9
	1.7	13.9	3.2	8.5	-3.5	- 16.1	-23.1	- 36.1	-34.3	-20.2	-25.9	-18.3	-19.4	-15.9	1.9-	6.6-	-0.1	-18.1	-12.1	6.91-	- 12.8	- 4	-0. ²	0.91	-15.1	-34.1	-29.9	-23.5	1.01-	-3.7	-8.1	-2.3
597•8 392•3 392•4	390.8 397-8	419-7	399.3	404.6	392.6	380.0	373.0	360.0	361.8	375-9	370-2	377.8	376.7	380.2	390.0	386•2	0.968	378.0	384.0	380-2	385.5	0.765	2.062	0.088	281.0	362.0	366-2	372.6	386.0	392.4	388.0	393.8
19 0 6 6	12 0	18	21	24	27	30	33	36	39	42	45	48	51	54		20 0	6	18	27	30	ŝ	202	62	454	48	51	54	57	21 0	9	12	18

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# IRREGULAR FLUCTUATIONS.

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#### IRREGULAR FLUCTUATIONS.

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		IRREGULAR FLUCTUATIONS.	IRREGULAR FLUCTUATIONS.
Approx.	φ φ	- 0028 - 0165 - 0219 - 0219 - 0226 - 02250 - 0257 - 0015 - 0017 - 0015 - 0025 - 0015 - 0025 - 0005 -	- 0115 - 0116 - 0217 - 0230 - 0118 - 0108 - 0008 - 0008 - 0008 - 0008 - 0008 -
meter.	Approx. Δθ		
Inclinometer.	Scale cor- rccted for Decl. and Bif.	138.7         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         125.5         135.5         145.7         135.5         145.7         155.1         151.0         151.0         151.0	148.0 148.1 148.1 148.1 148.1 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5 152.5
lar.	$\frac{Approx.}{\Delta X}$	• 0230 • 0280 • 0286 • 0286 • 0285 • 0285 • 0242 • 0212 • 0212 • 0190 • 0190 • 0190 • 0190 • 0190 • 0190 • 0190 • 0190 • 0173 • 0173 • 0173 • 0173 • 0173 • 0173	0227 0228 0238 0238 0238 0238 0238 0238 0238
. Bifilar.	Scale corrected for Temp.	324.9 324.9 3372.5 342.5 344.9 3344.0 3344.0 3344.0 3344.0 3344.0 3344.0 3344.0 3344.0 3344.0 3344.0 324.5 310.4 255.2 225.2 225.2 225.2 225.2 225.2 2278.4 2278.4 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2278.5 2079.5 2079.5 2079.5 2079.5 2079.5 2079.5	223       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       232       2
ation.	<b>↓</b> Δ	<pre>4</pre>	
Declination.	Scale.	379.9         379.9         379.9         379.9         379.9         379.9         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0         370.0	0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0.1       0
Gött.	mean Time.	22 b. 12 18 22 21 22 22 22 18 22	4 5 5 5 5 5 5 5 5 5 5 5 5 5
Annros	φ Φ	<ul> <li>0312</li> <li>0332</li> <li>0337</li> <li>0337</li> <li>0337</li> <li>0337</li> <li>0337</li> <li>0337</li> <li>0337</li> <li>0337</li> <li>0428</li> <li>0405</li> <li>0405<td>•0205           •0170           •0174           •0176           •0176           •0176           •0176           •0176           •0176           •0176           •0176           •0176           •0176           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0176           •0176           •018           •0191           •0191           •0034           •0034           •0034           •0034           •0034           •0110           •0034           •0034           •0034           •0034           •0034           •0034           •0134           •0134</td></li></ul>	•0205           •0170           •0174           •0176           •0176           •0176           •0176           •0176           •0176           •0176           •0176           •0176           •0176           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0178           •0176           •0176           •018           •0191           •0191           •0034           •0034           •0034           •0034           •0034           •0110           •0034           •0034           •0034           •0034           •0034           •0034           •0134           •0134
neter.	Approx. Δθ	A 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212 2212
Inclinometer	Scale cor- rected for Decl. and Bif.	<b>4 4 5 5 5 5 5 5 5 5 5 5</b>	<ul> <li>421.3</li> <li>421.3</li> <li>392.0</li> <li>392.0</li> <li>392.0</li> <li>392.0</li> <li>392.0</li> <li>392.0</li> <li>365.4</li> <li>351.6</li> <li>391.6</li> <li>391.6</li> <li>391.6</li> <li>391.6</li> <li>391.7</li> <li>351.7</li> &lt;</ul>
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Bifi	Scale corrected for Temp.	130         130         130         133         133         133         133         133         133         133         133         135         135         135         135         135         135         135         135         135         132         132         132         132         133         133         134         156         156	163.6 163.6 173.9 173.9 173.9 173.9 173.9 173.9 173.9 190.0 190.0 190.0 190.0 190.0 192.5 171.9 192.5 177.9 192.5 177.9 177.9 192.5 177.9 177.9 177.9 192.5 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9 177.9
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, MAY 22-continued. -continued. Magnetical Disturbances, Fort Simpson, 1844-

MAY 22.

280

horizontal force, 243.5; inclinometer, 284.0. 422.7; declination, Co-ordinate mean values: Strong twilight.

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54		,	IRREGULAR FLUCTUATIONS.	IRREGULAR FLUCTUATIONS.
	Approx.	\$ \$ \$	0255 0255 0264 0264 0264 0186 0187 0187 0187 0238 0238 0228 0228 0228 0182 0228 0265 0182 0265 0182 0265 0182 0265 0268 0228 0269 0268 0228 0269 0269 0269 0285 0285 0285 0285 0285 0285 0285 0285	-0255 -0227 -0227 -0201 -0105 -0123 -0045 -0045 -0045 -0045 -0045 -0045 -0045 -0005 -0005 -0112 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0115 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055 -0055
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ontinued.	Bifilar.	$\frac{\operatorname{Approx.}}{\operatorname{\Delta} X}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0241 0229 0179 0179 0179 0015 0014 0014 0014 0014 0014 0014 00124 00124 00124 00124 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077 0077
MAY 23-continued.	Bif	Scale corrected for Temp.	177:5 177:5 188:0 188:0 194:9 194:9 194:9 194:9 194:9 177:5 177:5 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:5 177:6 177:6 177:5 177:6 177:6 177:5 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6 177:6	158.4 169.7 169.7 197.8 209.7 233.5 233.5 233.5 247.5 247.5 2253.0 2245.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 2212.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 222.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 22.6 2.6
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Magnetical Disturbances, Fort Simpson, 1844-continued.

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IRREGULAR FLUCTUATIONS.

IRREGULAR FLUCTUATIONS.

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t Simps	Gött.	mean Time,	24         D.           15         330           15         350           16         555           17         550           17         550           16         550           17         550           17         550           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255           255         255	81 61 63 63 64 65 70 6 11 6 75 70 6 7 6 7 6 7 6 7 0 7 1 7 8 8 8 9 7 9 7 9 7 9 8 8 9 7 9 7 9 7 9	ation, 42
lees, For	-	Approx. $\frac{\Delta \phi}{\Phi}$	<ul> <li>- 0.033</li> <li>- 0.033</li> <li>- 0.053</li> <li>- 0.053</li> <li>- 0.065</li> <li>- 0.065</li> <li>- 0.065</li> <li>- 0.065</li> <li>- 0.065</li> <li>- 0.053</li> <li>- 0.073</li> <li>- 0.075</li> </ul>	0115 01114 01114 01119 0120 0120 0120 0120 0120 0120 0121 0121 0120 0121 0120 0121 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120 0120	day: declin
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Magnetical Disturbances, Fort Simpson, 1844-continued.

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		ψ Scale for Temp.	<pre>/ 1   1   1   1   1   1   1   1   1   1</pre>	7.7.5         111           1.7.7.1         12.7.5           1.7.7.1         12.7.5           1.7.7.1         12.7.5           1.7.7.1         12.7.5           1.7.7.1         12.7.5           1.7.7.1         12.7.5           1.7.7.1         12.7.7           1.7.7.7         12.7.7           1.7.7.7         12.7.7           1.7.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.7.7           1.7.7         12.	10.9
	Declination.	<	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         433200         44400         433200         433200         433200         433200         433200         443300         44400         443300         443300         443300         443300         443300         443300         443300         443300         443300         443300         443300         443300         443300         443300         443300         443300 </td <td>435•2</td>	435•2
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IRREGULAR FLUCTUATIONS.

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sturbances, Fort Simpson, 1844—continued.	MAY 25continued.
agnetical Dist	iued.

Magnet May 25—continued.

Approx.	ф Ф			6800	0035	0002	6100	6100		0068	- 00:00	0050	0065	0900	1900	- • 0053
neter.	ΑΓρτυχ. Δθ		•	8-0	9.0-	-0.3	6.0-	-1.6	-3.8	-4.3	-4.2	-3.7	-4.5	-4.5	-4.5	6.5-
Inclinometer.	Scale cor- rected for Docl. and Bif.			296.0	287.9	289.4	285.5	281.2	266.7	263.6	264.6	267.7	262-2	262.0	262.3	266.5
Bifilar.	Approx. $\frac{\Delta X}{\Delta X}$			0022	0022	9000	0002	.0015	1800.	.0025	·0033	·0030	·0033	·0040	· 0037	•0031
Bif	Scale corrected for Temp.			232.8	252-8	238.6	239.9	246.0	251.6	249.6	252.3	251.3	252.4	254.6	253.6	251.6
lation.	<b>φ</b> Δ		<u> </u>	-4.3	-4.3	-8.1	-7.3	-2.3	-2.7	-3.3	-4.5	-5.3	-4.7	-6.3	-6-3	- 6.8
Declination.	Scale.			420.0	420.0	416-2	417.0	422.0	421.6	421.0	419.8	419-0	419.6	418.0	418.0	417-5
Gött.	mean Time.	25 D.	н. М.	0 6	ιΩ	10	15	20	25	30	35	40	45	50	55	10 0
Approx.	φ			+:00	6900	0027	9900	0047	0044	- • 00 58	0900	2+00	0053	0044	0025	- • 0222
meter.	Αρρτοχ. Δθ		-	-3.6	-3.8	-2.2	-4.0	-3.1	12.9	-3.5	6.8-	-3.1	-3.4	-2.9	-1.5	: 
Inclinometer.	Scale cor- rected for Decl. and Bif.			268.0	266.0	277.0	265.5	0.172	273.0	269.0	266.0	271.5	269.5	273.0	281.5	284.5
Bifilar.	Approx.			·0015	- 2100-	• 0.022	•0022	• 0022	• 0018	81CO.	•0056	.0020	.0021	·0018	•0008	·0002
Bif	Scale corrected for Temp.			246.0	246.5	248.2	248.2	248.4	246.9	246.8	249.7	247.7	247.9	247-0	243.5	241-2
ation.	* 4		•	11.9	2.2	2.11	5.2	7.7	5.7	5.7	7.7	5.7	8.7	2.2	5.7	2.9
Declination.	Scale.			436.0	432.0	436-0	430.0	432.0	430.0	430.0	432.0	430.0	433.0	432.0	430.0	431.0
Gött.	mean Time.			7 55		5	10	15	20	25	30	35	40	45	50	55

## IRREGULAR FLUCTUATIONS.

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## SIR JOHN RICHARDSON'S MAGNETICAL OBSERVATIONS

#### REDUCED AND DISCUSSED

## BY CAPTAIN YOUNGHUSBAND, R.A.

THE Magnetic Instruments supplied to Sir John Richardson for observation in North America were—

1. An Azimuth Compass.

2. A Declinometer for observing Changes of Declination.

3. An Inclinometer, fitted with Deflection Apparatus. This instrument is constructed for observing the Magnetic Inclination or Dip in the usual manner, and then, by deflecting the dipping needle by another magnet, results are obtained from which (combined with an observation made with the Unifilar) the total force can be obtained in absolute measure.

4. A Unifilar Magnetometer for determining the absolute Horizontal Force, and to be used as a Declinometer in observing Changes of Declination.

Instructions for the use of these instruments in the observations recommended to be made with them were contained in the following letter and memorandum addressed by Colonel Sabine to Sir John Richardson previous to his starting on the expedition:—

## From Colonel SABINE to Sir JOHN RICHARDSON.

My dear Sir, I hope that you will find the subjoined directions sufficient for the use of the magnetic instruments with which you are supplied; and it remains only that I should indicate to you the points which it appears to me are most deserving of your attention.

1. Azimuths everywhere; we cannot have too many determinations in the quarter to which you are going, on account of the convergence of the lines, and the importance of ascertaining the point or points towards which they converge.

2. I hope that you will find the Declinometer of service in enabling you to record some of the principal disturbances of the Declination during your winter residence. It will in particular enable you to observe the movements of the magnet accompanying momentary auroral phenomena.

3. The diurnal variation of the Declination, both in amount and in turning hours, would be an important determination, especially if you should find it convenient to determine them for each of the months of winter and of spring.

4. The determination of the Horizontal and Total Forces in absolute measure at your winter residence, is of an importance which I will venture to say will recompense all the time you bestow upon it. It would probably be referred to for centuries to come in connexion with the secular changes of the magnetic elements.

5. If you should be able, without too great a sacrifice of time or convenience, to obtain a second good determination of the absolute total force in a longitude more to the east than your winter residence, say between  $90^{\circ}$  and  $100^{\circ}$  west longitude, it will be extremely valuable. You will see by the directions that this may be done without carrying about the Unifilar Magnetometer.

Most cordially wishing you and Doctor Rae health for your noble enterprise, and a safe return to England, either with Sir John Franklin, or to be welcomed by him on your route.

I remain.

Sincerely yours, EDWARD SABINE.

#### MAGNETIC DIRECTIONS for Sir JOHN RICHARDSON.

Woolwich, 22d March 1848.

The magnetic instruments furnished to Sir John Richardson are four in number; viz.

An Azimuth Compass.

A Declinometer.

A Dipping Needle, with Deflection Apparatus.

A Unifilar Magnetometer.

1. Azimuth Compass.—No directions respecting this instrument are considered necessary, except the caution that the magnet should always be lowered very gently on its support, for fear of injuring either the cup or the point, which are very carefully worked. The point is of steel, and a spare one is also sent which is of iridium. When azimuths are observed, the wooden stand on which the instrument is placed should be correctly levelled.

2. Declinometer.—This instrument is intended to serve the double purpose of observing the diurnal variation of the Declination and the fluctuations of the Declination in times of magnetic disturbance. The magnet may be used either on a point or suspended by a silk thread. The point support is preferable, except it should be found that in very high magnetic latitudes the friction on the point impairs the free movement of the magnet, and thus prevents its taking up its true direction. In such case the silk suspension must be resorted to.

The instrument being placed on its support, the bottom plate levelled, and the suspension tube in its place, screw in the steel point, place the magnet upon it, and fit on the top cover; then raise the point support (and with it of course the magnet) until the opposite portions of the graduated ring are seen in good focus in the two microscopes. The instrument is then ready for use.

If it is found that the magnet when resting on the point does not return after vibration in small arcs to (nearly) the same division in successive trials, it may be necessary to employ the silk suspen-In such case, the magnet resting on the point support, lower sion. the support as far as it will go, lift the magnet off it, lower the screw attached to the thread, so that there may be no danger of breaking the thread whilst the screw is fastening; having then attached the magnet by the screw to the suspension thread, replace the magnet on the point support and raise the support as high as it will go, then shorten the thread until the magnet is relieved from the support and lower the support; now examine if the magnet must be either raised or lowered (by the thread), in order that the graduation on the ring may be in focus. When in focus, examine whether the suspension be truly central as regards the microscopes; it is so when the ring is seen in each microscope in about the same part of the field, and when precisely opposite divisions of the ring are cut by the two microscope wires. If this adjustment be not. correct, make it so by moving the suspension either way by means of the adjusting screws which act on the suspension tube; fasten on the top cover, and the instrument is ready for use.

The magnet and ring are correctly balanced at present for the Dip at Woolwich; in any other Dip the balance may require to be adjusted afresh, by means of the cross of wires attached to the magnet. This adjustment is proved by the graduation being in distinct focus in both microscopes at the same time:  $1^{\circ}$ , when the magnet is in its natural position; and  $2^{\circ}$ , when it is deflected by another magnet 90° from its natural position. The instrument must be correctly levelled when this adjustment is made.

When the magnet is suspended by a silk thread the influence of torsion should be ascertained in the usual manner, *i.e.* by turning the torsion circle through an angle of  $90^{\circ}$ , first in one direction and then the other, and noting the difference of the readings in the microscopes in the three positions of the torsion circle, viz., before the torsion circle is turned, and when it is turned  $90^{\circ}$  on either side.

The agreement or otherwise of the diurnal variation observed by this instrument and by the Unifilar Magnetometer will assist in judging whether the friction on the point support operates unfavourably or not.

3. A Dip Circle, with Apparatus for Deflection.—This instrument is to serve the double purpose of observing the Dip, and of determining the ratio of the magnetic moments of each of the two 3 67 inch magnets of the Unifilar Magnetometer to the total force of the earth's magnetism. As the latter determination is novel, and as circumstances have prevented Sir John Richardson's practice with the instrument, full directions may be required.

Two dipping needles are supplied, A 1 and A 2; both are to be used and the same observations made with each. I shall therefore describe the process with A 1, only premising that a precisely similar process is to be pursued with A 2.*

4. If Sir John Richardson should have leisure to make a determination of the Total Force at any other than the winter station, deflections of the dipping needle will suffice, and the Unifilar Magnetometer

need not be employed on that occasion; but the values of m X and  $\frac{m}{X}$ 

must be ascertained by experiments with the Unifilar Magnetometer, either at the same or some other station, as soon after as leisure and circumstances will permit.

Be very careful at all times to pack the magnets S and C with their *opposite* poles adjacent to each other, and attend to the same precaution with the dipping needles A 1 and A 2. The deflecting tube and its counterpoise are only to be screwed on the vernier plate during the experiments of deflection, as if left on during travelling they might strain the instrument. The temperature should be noted at each determination of u or u'. The thermometer should be near the deflecting magnet.

Unifilar Magnetometer.—This instrument is supplied for the purpose of determining the absolute value of the horizontal component of the magnetic force, and (in conjunction with the deflection apparatus accompanying the dipping needle) the absolute value of the *total* magnetic force. Sir John Richardson is already furnished with printed instructions, in a paper entitled "On Magnetic Observations, by Lieutenant-Colonel Sabine," containing directions for the use of the Unifilar; and for his further guidance he is referred to the observations of the absolute Horizontal Force, which have been made at Woolwich by Captain Younghusband with the instrument supplied to Sir John Richardson, and have been entered in the

^{*} The process is the same which has been subsequently printed in the "Admiralty Manual," pp. 34 to 39, and 44 to 48; and is therefore omitted here.

register books furnished for the record of the observations in America.

There are two deflecting magnets, C and S, each 3.67 inches in length, which will require to have their respective moments of inertia carefully determined. For this purpose three inertia rings are supplied, and each of the three will have to be used with each of the magnets C and S. The observations for this purpose may be made at any time in the winter when most convenient.

Instead of the distances between the magnets named in Lieutenant-Colonel Sabine's paper (above noticed), Sir John Richardson had better employ those adopted for this occasion by Captain Younghusband, viz., 1'1 foot and 1'4 foot. Should it be convenient to make one determination of the values of m and X early in the winter, and a second towards its close, the two determinations may suffice. Six repetitions of the experiments at the two distances (*i.e.*, six at each distance) may be considered to constitute a determination of the values of m and X with the Unifilar.

When not employed in experiments on the magnetic force, the Unifilar Magnetometer may be used for determining the diurnal variation of the Declination, and should give results in accordance with those of the Declinometer. The hourly observations for this purpose need not be carried on through the twenty-four hours. From 6 or 7 A.M. to 8 or 9 P.M., on days on which it may be otherwise inconvenient to observe *hourly*, will probably suffice.

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The instruments were adjusted at Fort Confidence on Great Bear Lake, situated in 66° 54' north latitude, and 118° 49' longitude west of Greenwich; this being the first opportunity afforded to Sir John Richardson for employing the instruments since arriving in America, owing to the rapid rate he found it necessary to travel, so as to be able to explore the coast lying between the Mackenzie and Coppermine rivers, and reach Fort Confidence before the close of the season.

#### DECLINATION.

Absolute Value.—The absolute value of the Declination at Fort Confidence was determined in March and April 1849, with the Azimuth Compass. The observations are as follow, and show the reading of the Declinometer corresponding to each absolute observation.

Date.	Absolute Declination.	Correspond- ing Reading of the Declination Magnet- ometer.	Date.	Absolute Declination.	Correspond- ing Reading of the Declination Magnet- ometer.
1849: March 31st - , 31st - , 31st - , 31st - , 31st - , 31st - , 31st - , 31st - , 31st - , 31st - , 31st - , 1st -	$ \begin{array}{c} & & 0 \\ & 50 \\ & 36 \\ & 49 \\ & 52 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ & 50 \\ $	o / 4 21 4 22 4 19 4 22 4 18 4 22 4 18 4 22 4 15 4 22 1 28 1 58 2 06 3 18 4 18 3 13 4 41	1849 : April 21st - , 21st - , 21st - , 21st - , 21st - , 21st - , 21st - , 21st - , 21st - , 21st - , 1st - , 14th - , 19th - , 19th - , 21st - , 21st - , 21st -	o       /       E.         49       05       n         50       33       n         49       92       n         50       12       n         49       90       n         47       27       n         49       90       n         47       27       n         49       92       n         49       53       n         49       53       n         49       29       n         48       51       n         52       40       n         50       42       n	$\begin{array}{c} 0 & 1 \\ 4 & 12 \\ 4 & 50 \\ 4 & 08 \\ 4 & 50 \\ 4 & 50 \\ 5 & 20 \\ 5 & 20 \\ 5 & 20 \\ 5 & 24 \\ 4 & 45 \\ 5 & 03 \\ 5 & 27 \\ 5 & 50 \\ 5 & 21 \\ \hline \\ 4 & 17 \\ \end{array}$

Erom the mean of these observations it appears that the Declination was 50° 42′ E. at the period referred to, and that this Declination corresponded to the reading 4° 17′ of the Declinometer scale; whence, having the mean reading of the Declinometer for each month of observation, we may obtain the mean absolute values of the Declination for the same periods. Table II. contains these values.

TABLE	TI.

·	Date.	,		n Reading of the inometer.	Differences from the Zero 4° 17'.	,	Decl	solute ination 2' + Diff.
Öctober November December January February March April	1848. " 1849. " "	-	 0 4 3 3 4 4 4	49.5 27.5 58.7 57.0 01.3 12.7 22.6	-32' 5 - 10' 5 + 18' 3 + 20' 0 + 15' 7 + 04' 3 - 05' 6 Mean	-	50 50 51 51 50 50 50 50	09'5 31'5 00'3 02'0 57'7 46'3 36'4 43'4

Diurnal Variation.—The Declinometer with which the principal series of observations was made has been fully described in Colonel Sabine's memorandum above; the instrument was used as directed by the instructions, and nothing further seems necessary to be stated with reference to it, except that of the two modes of adjusting the needle of which the instrument is capable, that was chosen in which the magnet is made to traverse upon the steel point instead of being suspended by a silk thread; this is now to be regretted, as the observations show that the friction was so great as to impede the free movement of the needle. The observations made with another magnet, suspended by a silk thread in the Unifilar, prove that the range of movement of the Declinometer Magnet was limited by the friction on the point, but that the *direction* of the movement was recorded faithfully. The additional observations with the Unifilar extend over a portion of three months, and are valuable as confirmatory of the general accuracy in direction of the movements of the Declinometer Magnet, and as affording a truer value of the extent of the diurnal change in those months than can be obtained from the impeded action of the Declinometer Magnet.

Observations were made with the Declinometer during the months: of October, November, and December, 1848, January, February, March, and April, 1849, commencing at 6 A.M. and continued hourly until 9 p.M. Occasionally, observations were taken at 4 and 5 A.M.; and on two days generally in every month an observation was made at the night hours omitted on ordinary occasions. These observations are given in full, pp. 28 to 35, Table VIII.

The mean monthly diurnal variation appears in Table III.

# TABLE III.

'Mean Time at Fort Confidence. Astronomical Reckoning.	Noon.	• 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1848 : October	23.2	20.3	, 29.5	38.8	48.7	, 53·4	, 53·3	, 53.6	, 56.8	61.2	<u>′</u>	·
November December 1849 :	1.0 8.0	1'6 9'1	7.4 10.4	10.7 11.6	$15.6 \\ 13.8$	19·9 14·9	19·5 15·8	$\frac{23.6}{16.3}$	$26.3 \\ 16.8$	$27.1 \\ 18.6$	=	-
January February March	2·3 0·0 6·6	5·4 0·9 7·7	$4.5 \\ 3.7 \\ 13.1$	7·7 4·4 18·9	$9.5 \\ 8.3 \\ 20.9$	$11.9 \\ 11.6 \\ 23.6$	$13 \cdot 2$ $13 \cdot 3$ $25 \cdot 9$	$14.8 \\ 16.2 \\ 27.1$	$15.8 \\ 17.8 \\ 29.2$	17.7 18.1 29.7	20·8 30·6	
April -	10.8	18.5	26.0	33.0	20 9 37 · 2	23 6 44'3	45.8	49.4	28 2 52·2	52.5	55.3	
Means	7.4	9.1	13.2	17.9	22.0	25.7	26.7	28.7	30.7	32.1		-
Means reduced -	4.6	6.3	10.2	15.1	19.2	22.9	23.9	25.9	27 • 9	29.3	-	
	1 1			(								
Mean Time at Fort Confidence. Astronomical Reckoning.	Mid- night.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.
at Fort Confidence. Astronomical Reckoning.		13.	14.	15.	16.	17.						
at Fort Confidence. Astronomical Beckoning. 1848: October November December	night.											
at Fort Confidence, Astronomical Reckoning. 1848: October - November - December - 1849: January February - March -	night.	·		·	·	26·9 12·8	, 44.0 15.9 13.6 4.3 20.4 27.8	/ 38·2 12·2 11·9 5·3 20·9 26·6	/ 13·9 14·4 0·0 3·8 19·4 22·0	, 0.0 7.7 0.6 2.5 9.9 8.7	/ 4·1 7·3 2·1 0·0 6·0 0·0	/ 17·7 0·0 5·5 0·3 2·5 3·9
at Fort Confidence, Astronomical Reckoning. 1848: October November 1849: January February March April	night.		-	· - -	·	26·9 12·8	/ 44.0 15.9 13.6 4.3 20.4 27.8 49.0	/ 38·2 12·2 11·9 5·3 20·9 26·6 45·3	, 13·9 14·4 0·0 3·8 19·4 22·0 30·8	, 0.0 7.7 0.6 2.5 9.9 8.7 3.4	/ 4·1 7·3 2·1 0·0 6·0 0·0 0·0	/ 17·7 0·0 5·5 0·3 2·5 3·9 2·5
at Fort Confidence, Astronomical Reckoning. 1848: October - November - December - 1849: January February - March -	night.	·		· - -	·	26·9 12·8	, 44.0 15.9 13.6 4.3 20.4 27.8	/ 38·2 12·2 11·9 5·3 20·9 26·6	/ 13·9 14·4 0·0 3·8 19·4 22·0	, 0.0 7.7 0.6 2.5 9.9 8.7	/ 4·1 7·3 2·1 0·0 6·0 0·0	/ 17·7 0·0 5·5 0·3 2·5 3·9

Mean Diurnal Variation in the several Months of Observation.

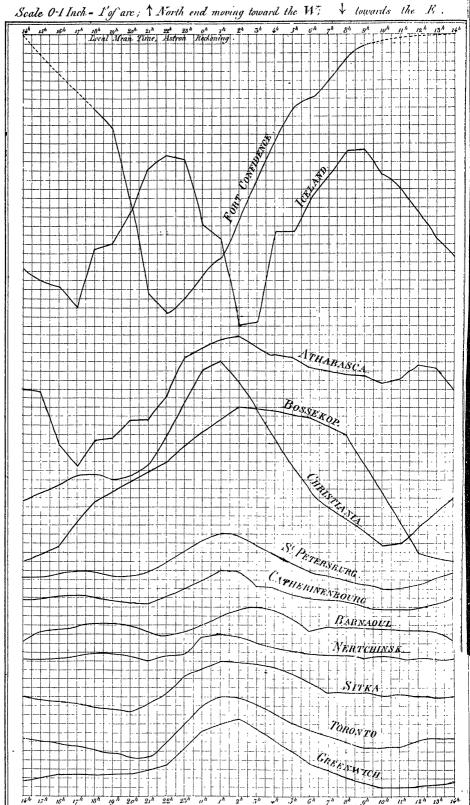
From these observations, it appears that on taking the first observation in the morning, the north end of the needle was found to be proceeding eastward, that the easterly extreme was attained by a rather rapid movement about  $22^{\text{h}}$  (the time varied in the different months between  $20^{\text{h}}$  and  $0^{\text{h}}$ ), that the north end then moved westward and continued a tolerably uniform movement until  $9^{\text{h}}$ , after which no observation was made. The westerly extreme was attained some time in the course of the night, but from no observation having been made later than 9 P.M. the exact time is unknown, the north end of the magnet being found moving eastward, as has been already stated, on taking the first observation in the morning.

If we compare these movements with the diurnal variation in middle latitudes in the Northern Hemisphere, we find a very striking dissimilarity, and the difference is worthy of attention, because it appears probable that the diurnal variation of the Declination needle in high latitudes follows a law differing materially from that of the diurnal variation in middle latitudes, now well known and established. The principal feature of the diurnal variation in middle latitudes of the Northern Hemisphere is the attainment by the north end of the magnet of its extreme westerly position about 1 o'clock P.M. daily, whereas, as stated above, at Fort Confidence the extreme easterly position occurs at 11 A.M., from whence a movement westward takes place, continuing until the latest hour at night at which any observation is made, the extreme being attained between 9th and 18th.

So few observations of the diurnal variation of the Declination in high latitudes are up to this time at command, that not even an approach can be made towards indicating a general law of the phenomena in such localities; we can only present those facts that have been already obtained, and direct attention to points of similarity and of discordance from movements in middle latitudes. In the accompanying plate is drawn the curve of the diurnal variation of the Declination at a number of places, for the purpose of showing the diurnal movement at Fort Confidence and at other stations in high latitudes in comparison with each other and with the movement It is thus shown that at Reikiavik in Iceland. in middle latitudes. the extreme easterly position is attained at 2 P.M., which is about the hour that the westerly extreme is attained at every other station from which we have observations, with the exception of Fort Confidence; thus presenting, perhaps, as strong an instance as could be ound of the widely differing phenomena of the diurnal variation in high from middle latitudes. The curve at Reikiavik differs also from that at Fort Confidence in the westerly extreme, which occurs in I celand at 22^h, the same hour that an easterly extreme is attained at Fort Confidence. It is true that the observations at Reikiavik

Plate 11Showing the Diurnal Variation of the Declination at

Fort Confidence, from Oct." 1848 to March 1849. Iceland, from 21st to 28th August 1836. Lake Athabasea, from Oct." 1843 to Feb.⁴ 1844 Christiania, from June to Nove¹ 1842 Bossekop from Oct." 1838 to April 1839. St. Petersburg, from Oct." to April; 1841 to 1845. Catherinenbourg, from Oct." to April: 1841 to 184 Barnaoul, from Oct." to April: 1841 to 184 Nertchinsk, from Oct." to April: 1841 to 184 Sitka, from October to April: 1842 to 184 Toronto, from Oct." to April: 1843 to 1848 Greenwich, from Oct." to April: 1841 to 1846



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include only one week's series, in the month of August 1836, taken hourly; they are, however, very accordant, and the curve drawn from the observations proceeds from a maximum to a minimum and back again in a regular continuous progression.

Plate II. contains the curves of the diurnal variation at several stations in the Northern Hemisphere; it illustrates better than any verbal description the great change that takes place in the law of the diurnal variation when advancing into high latitudes. The stations are :---

		Latitude.		Longitude.
Fort Confidence	-	66° 54′ N.	-	118° 49' W.
Reikiavik, Iceland	-	64° 08' N.	-	21° 55' W.
Athabasca -	-	58° 41′ N.	-	111° 18' W.
Bossekop -	-	69° 58' N.	-	21° 10′ E.
Christiania -	-	59° 55′ N.	-	10° 34' E.
St. Petersburg	-	59° 57' N.	-	30° 19′ E.
Catherinenburg		56° 50' N.	-	60° 34' E.
Barnaoul	-	53° 20' N.	-	83° 27' E.
Nertchinsk -	-	51° 18′ N.	-	119° 21' E.
Sitka – –	-	57° 03′ N.	-	135° 18′ W.
Toronto -		43° 39' N.	-	77° 05′ W.
Greenwich -	-	51° 29' N.	-	00° 00′

By this plate we perceive that at Christiania, St. Petersburg, Catherinenburg, Sitka, and Toronto the extreme westerly position of the north end of the magnet was attained at 1^h for the period included in the observations; at Athabasca, Bossekop, and Greenwich at 2^h, and at Barnaoul at 3^h, while at Reikiavik a westerly maximum was reached at 22^h, and again at 8^h, and at Fort Confidence some time in the course of the night between 9^h and 18^h; thus at once pointing out the irregularity in the law of diurnal movement in high latitudes, and the marked contrast from the persistent general law of movement which everywhere obtains in middle latitudes. The curves are all drawn to the same scale, and show the relative amounts of the daily excursions at each place.

We may now examine in more detail the diurnal movement at the several stations. At Reikiavik we find the north end of the needle at its extreme observed westerly position at  $9^{h}$ , from whence it proceeds uniformly to a secondary east at  $17^{h}$ , thence to west at  $22^{h}$ , again to east (the maximum) at  $2^{h}$ , then back again to west at  $9^{h}$ ; the double curve is very fully exemplified by the two excursions (west to east and back again), being very nearly the same in extent.

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The observations at Athabasca are those of Captain Lefroy, printed and discussed in the second part of this volume. They comprise hourly observations made in the months of October, November, and December, 1843, January and February 1844; the several months' observations accord with each other, and having been made regularly at each hour in the twenty-four, very valuable evidence is afforded of the diurnal movement at that station; the results may perhaps with advantage be again stated in this place for the sake of making the account of the comparison more complete. At Athabasca we find the easterly extreme occurring at  $17^{\rm h}$ , viz., the same hour at which one of the easterly extremes was attained at Reikiavik; a fact specially worthy of notice, because at no other station is this period of the day marked by a similar position of the magnet.

From  $17^{h}$  the (north end proceeds pretty uniformly to extreme west at  $2^{h}$ , showing an accordance in this respect with the general law of the diurnal variation; thence again to east at  $17^{h}$ . An interruption occurs from  $10^{h}$  to  $13^{h}$ , when the north end turns and moves west, but the retrograde movement is insignificant compared with the whole diurnal excursion.

At Bossekop a single curve is formed. Extreme west at  $2^h$ ; extreme east at  $14^h$ .

At Christiania a double curve. Extreme west at  $1^{b}$ ; extreme east at  $10^{h}$ ; a secondary west at  $17^{h}$ ; a secondary east at  $19^{h}$ . This curve is similar in form to that at St. Petersburg and several other places, but the amount of the excursion is much greater, as, for example, at Christiania, 20'; at St. Petersburg, 6'. It must, however, be remarked, that the months of observation are not the same at the two stations; they are June to November at Christiania, and October to April at St. Petersburg.

At Catherinenburg the curve is nearly the same as at St. Petersburg, showing at these two places the evening easterly extreme greater than the morning easterly extreme. At Barnaoul, Nertchinsk, Sitka, and Toronto, the morning easterly extreme exceeds that of the evening, while at Greenwich we have the morning easterly movement nearly obliterated, and the extreme easterly position at 10^h.

It will now be seen that there are no general characteristics of the diurnal variation of the Declination in very high latitudes; also, that in middle latitudes there is a consistent law, the most prominent feature of which is the occurrence in the Northern Hemisphere of the maximum westerly Declination during the day at  $1^{h}-2^{h}$ . This is invariable. There is, also, a distinction between the character of the movement on the Siberian from that on the American continent, particularly if we study the law of the variation during the several

seasons of the year; but such considerations are not relevant to the present discussion, and need not be here further noticed. All the base is . It is necessary to mention that every observation made has been included in forming the mean results upon which the discussion of the phenomena of the diurnal variation at Fort Confidence is founded, consequently the diurnal variation spoken of includes the modification to which it is subject, caused by the disturbed observations remaining, these disturbances having themselves a distinct, and different law. Now it may be reasonably assumed that the effect due to disturbance varies considerably at different stations, and it seemed not improbable that, from the position of Fort Confidence, the effect there might be greatly magnified, even so much so as to cause the diurnal variation, without the disturbances, to present a very different aspect from the curve drawn from all the observations without omission. It may therefore be satisfactory to state that the process of eliminating the disturbances was undertaken, and that the diurnal curve of the residual observations was found only modified in the extent of range, but not altered in general character.

## ABSOLUTE HORIZONTAL FORCE.

The instrument employed by Sir John Richardson in observing the Absolute Horizontal Force was a portable Unifilar Magnetometer of the usual construction, viz., one in which the deflecting magnet is kept at right angles to the suspended magnet, and the angle of deflection read on the horizontal circle. Two magnets, 3.00 inches in length were supplied for suspension in the deflection apparatus. The deflecting magnets were C 1 and S 1, each 3 67 These magnets were also employed as deflecting inches in length. magnets in Dr. Lloyd's Inclinometer for determining the Total Force in absolute measure. The distances from the suspended magnet at which the deflectors were placed were, in the Unifilar 1'1 and 1'4 feet, and these two distances were employed whenever experiments of deflection were made. The nearer distance, 1.1 feet, was chosen as being just beyond the limits of the quantity expressed by three times and a half the length of the longer magnet, and the second distance is in proportion to the first as 1.3 to 1 nearly.

For the experiments of vibration the magnets were suspended in the wooden box allotted to this purpose; the same stirrup was used during the whole series, and the moments of inertia of the magnets and stirrup determined by means of Dr. Lamont's Inertia Rings. The temperature coefficients of the deflecting magnets were determined after the instruments had been returned to Woolwich; and as the range of temperature to which they had been exposed during the winter had been very great, involving consequently very large corMAGNETICAL OBSERVATIONS.

rections, the experiments for determining the coefficients were conducted with particular care, and it is believed that the value of the coefficients at different parts of the thermometric scale is known with sufficient accuracy. The observations made at Fort Confidence included temperatures varying from  $-36^{\circ}$  to  $+70^{\circ}$  Fahrenheit.

The value of the coefficient P, depending upon the distribution of magnetism in the suspended and deflecting magnets, was found to be inappreciably small when the suspended magnet was one of the 3 0 inch Unifilar magnets, but to have a sensible value when the dipping needle was suspended; the corrections on this account have been applied in calculating the value of the Total Force.

Table I. contains the data from which the values of K, the moment of inertia of the deflecting magnets, C 1 and S 1, were calculated. Three rings were employed in their determination, of which the weights and dimensions are as follows:

	Outer Diameter. Inches.	Inner Diameter. Inches.	Weight. Grains.
Ring 5	- 3.286	2.921	1493 14
" [°] 6	- 3.026	$2^{\cdot}472$	960.14
,, 8	- 3.005	2.477	638.64

The value of K' for each ring was calculated by the formula  $\mathbf{K}' = \frac{1}{2} (r^2 + r^2) w$ , when r and r, denote respectively the outer and inner radii of the rings in decimals of a foot, and w the weight in grains; whence we have

For Ring 5; K'=27.949 - - Log. = 1.44636,, 6; K'=12.724 - - Log. = 1.10461,, 8; K'= 8.397 - - Log. = 0.92412

TABLE IV.

Observations for the Moment of Inertia of the Magnet and Stirrup.

<u></u>	MAGNET C 1.				MAGNET S 1.				
Date.	No. of Ring.	Vibrations with Ring. Logs. of T ^{v2} .	Vibrations without Ring. Logs. of T ² .	vithout Ring. Date. of with Ring.		ng.	Vibrations without Ring. Logs. of T ² .		
1848: Nov. 16	-		1.83537 (10 [°] 0)	1848 : Oct. 16				1.92842	(30 ^{°.} 0)
20			1.83822 (10.0)	17	-	-		1.92943	(30.0)
20	-		1.83541 (10.0)	17	-	-		1.92371	(30.0)
21	5	2·71178 (10°0)		Nov. 9	-	-		1.95449	(0.0)
21	5	2.71552 (10.0)		9	5	2.82535	(0°0)		
22	5	2.70839 (10.0)		13	5	2.83219	(0.0)	_	
23	6	2.42341 (10.0)	_	13	6	2.55273	(0.0)	-	
23	6	2.42876 (10.0)	-	13	6	2.55232	(0.0)	_	

The degrees following the logs of the squares of the vibrations, with and without rings, signify the temperatures corresponding to the vibrations.

MAGNET C 1.							MAGNET S 1.						
Dat	Date. No. Vibrations of with Ring. Logs. of T ¹ 2. Logs. of T ² 2.		Ring.	Date. No. Vibrations of with Ring. Ring. Logs. of T ¹² .		ling.	Vibrations without Ring. Logs. of T ² .						
1848 Nov.	27	8	2.29678	(10 [°] 0)		0	1848 Nov.	: 14	8	2.43614	(0 [°] 0)	-	٥
	27	8	2.29515	(10.0)			1	14	8	2.42177	(0.0)		
Dec.	22	-	_		1.83550 (-	-20.0)	-	15				1 95991	(0.0)
	22		-		1.83608 (-	-20.0)	Dec.	18	-	-		1 • 95809 (	-30.0)
1849 Mar.	): 23		-		1•84473 (-	-5.0)	1849	18	-	-		1•96117 (-	-30.0)
	23	_	_		1.84645 (	-5.0)	Mar.		-	-		2.00021 (	-5.0)
	24		-		1.85101 (			20		-		2.00053 (	-5.0)
	24		_		1.85019 (			20		-		1.98974 (	-5.0)
April	3				1.84173	(5.0)		21	-	-		1.99532 (	-5.0)
-	3		-		1.84993	(5.0)	p	21	-	-		1.99431 (	-5.0)
	3	-	_		1.84565	(5.0)	Apri	l 10	-	-		1.98720	(5.0)
	4	8	2.33157	(5.0)	_	()	1	10	-	-		1.99406	(5.0)
	4	8	2.32559	(5.0)	_		1	10	-	-		1.99359	(5.0)
	5	8	2.32532	(5.0)	_			11	8	2.45641	(5.0)	-	
	5	6	2.45582	(5.0)	_			11	8	2.45904	(5.0)	-	
	5	6	2.45681	(5.0)	_			11	8	2.45763	(5.0)	-	
	6	6	2.46098	(5.0)	_			13	1 -	-		1.99113	(5'0
	6	3	2.73246	• •	-			14	6	2.28786	(5.0)	-	
	7	5	2.73330	• •	-		1	14	6	2.58680	(5.0)	-	
	. 7	5	2.73375		-			16	6	2.59764	(5.0)	] -	
	. 9			(0 0)	1.85028	(5.0)		17	5	2.91789	(5.0)	-	
	9	1	_		1.85498	(5.0)		17	5	2.91068	(5.0)	-	
	9		1 _		1.84705	(5.0)		18	5	2.92048	(5.0)	-	
	26	5	2.72626	(20.0)		(0 0)		18	-	-		1.99055	(5.0)
				(=0 0)			1	25	-	-		1.99079	(20.0)
	26	6	2.46194	(20.0)	-			25	8	2.46344	(20.0)	-	
	20			(20.0)				25	6	2.29175	(20.0)	-	
وشاويبه	20				1.84970	(20.0)		25	5	2.03349	(20.0)		يصغيدهم

#### TABLE IV.-continued.

The deduced values of K for each magnet, and from the observations with each ring, are as follows :---

	MAGNET C 1.	
With Ring 5.	With Ring 6.	With Ring 8.
4'2941	4'4053	4'4626
4'1890	4'1444	4.1682

The mean of all these is  $4^{2772}$ ; = Log. 0⁶³¹¹⁶, which is the value employed in the calculations.

		1	MAGNET S 1.		
********	With Ring 5.	· . •	With Ring 6.	With Ring 8.	
	4.2774	,	4.3399	4 3300	
	$4^{\cdot}3582$	; ·	[3 7693]	$4^{\circ}2751$	, ,

Some undiscovered source of error existed in the second series of experiments with Ring 6 and Magnet S 1; the result has therefore been omitted in taking the mean. The mean of all the others is 4.3161;  $\pm$  Log. 0.63509, which is the value of K employed in the calculations with this magnet.

Temperature Corrections.—The experiments for ascertaining the temperature coefficients of magnets C 1 and S 1 were conducted according to the method of deflection. The suspended magnet employed was 3 00 inches in length, and the deflecting magnet was placed at right angles to it at a distance of 9 inches; the mean deflection produced was  $25^{\circ}$ . The angle of deflection, by magnet C 1, was ascertained at the following temperatures, viz. :—

At 36° 57, 55° 42, 73° 62, and 90° 79; and by a second series of experiments, at  $32^{\circ}$  71,  $53^{\circ}$  39,  $72^{\circ}$  47, and  $88^{\circ}$  99; and the coefficient q determined as follows :—

q = 00	00 <b>412</b> at a	mean temperature	44°'5
= .00	00488	"	63° 7 .
= .00	0496	**	81°'5

For magnet S 1, the angle of deflection produced by it was ascertained at the temperatures  $32^{\circ} \cdot 61, 52^{\circ} \cdot 89, 71^{\circ} \cdot 34$ , and  $88^{\circ} \cdot 91$ ; and by a second series of experiments, at  $32^{\circ} \cdot 04, 50^{\circ} \cdot 82, 70^{\circ} \cdot 45$ , and  $88^{\circ} \cdot 69$ ; from whence the coefficient q for this magnet was determined, viz. :—

	q =	.000309	at temperature	42°'0
		<b>`0003</b> 75	-	61°'3
1	=	000382		79°`8

The rapid decrease in the value of the coefficient between  $64^{\circ}$ and  $44^{\circ}$  in the case of one magnet, and between  $61^{\circ}$  and  $42^{\circ}$  in the case of the other, rendered it desirable that the coefficient should be ascertained at lower temperatures than those just stated. Accordingly an attempt was made, by subjecting the deflecting magnet to temperatures varying between  $0^{\circ}$  and  $32^{\circ}$ , to ascertain the angles of deflection at low temperatures, which should be known with tolerable exactness. A mixture of pounded ice and salt was employed to surround the magnet, and the temperature reduced to  $-6^{\circ}$  (as indicated by the thermometer employed, whose index error at that temperature was not, however, precisely known). Deflections were observed at  $-6^{\circ}$ ,  $14^{\circ}$ , and  $32^{\circ}$ .

3.)

Zr.

The observations are subject to some degree of error, dependent upon the rapid changing of the temperature of the freezing mixture at a degree so much below the natural temperature; but great pains were taken to sustain a constant circulation.

The final results obtained were for Magnet C 1-	)
q = 000361 at temperature 4° 6	:
and $q = 000366$ , 23°.8	*
For magnet S 1, the results were	1
$q = 000298$ at temperature $14^{\circ} 3$	}
and $q = 000328$ , $21^{\circ} 8$	1
	1

After allowing for the probable amount of error occasioned in these values from the cause already mentioned, it appeared evident that the coefficient did not diminish in value in the same rapid ratio below 42° as it was proved to do between 42° and 62°, and it was considered that the temperature coefficients were sufficiently well obtained for every purpose of correction in the observations under calculation. The experiments were continued in the hope of ascertaining more precisely the law of change with the change of temperature; but it is sufficient here to mention that the conclusions previously arrived at were substantially confirmed.

The magnetic moment (m) of the deflecting magnets was found by combining together the values of  $\frac{m}{X} = \frac{1}{2}r^3 \sin u$  obtained from the experiments of deflection, and of  $m X = -\frac{\pi^2 K}{T^2}$  from the experiments of vibration; here some difficulty occurred on account of the experiments of deflection and of vibration having been conducted in separate series on different days. A mode of grouping the results of each experiment was eventually adopted, which gave, it is believed, the most satisfactory value of the magnetic moments of the bars that could be obtained from the observations, as well as the rate of the loss of magnetism, which it was found had occurred largely in the case of each magnet. A value of m has accordingly been calculated for every day on which observations were made. The Horizontal Force (X) was then found by the usual formula.

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# MAGNETICAL OBSERVATIONS.

# TABLE V.

# FORT CONFIDENCE.

Horizontal Force.-5th October 1848 to 26th April 1849.

1

	Magnets e	mployed.	Experiments of Deflection.					
Date.	Suspended in Unifilar.	Deflecting and Vibrating Magnet.	Observed Temp. of Magnet.	Distance.	Angle.	Log. Values of $\frac{m}{X}$ .		
		C. 1 C. 1	$ \begin{array}{c}             37 \cdot 5 \\             35 \cdot 4 \\             \\             \\         $	1'1	12 49 45 36 55 06 17 01 <b>3</b> 2 36 49 27	9'64844 9'52375 		

## MAGNETICAL OBSERVATIONS.

# TABLE V.

# FORT CONFIDENCE.

# Horizontal Force.--5th October 1848 to 26th April 1849.

	Expe	riments of Vibr	ation.					
Observed Temp. of Magnet.	Observed Time of One Vibration.	Log. Values of T ² corrected for Torsion of Thread and Rate of Chronometer.	Temp. to which the Values of T ² are reduced.	Log. Values of m X.	Log. Values of <i>m</i> employed at Temp. 20°.	Result- ing Values of X.	Monthly Means.	Remarks.
$ \begin{array}{c} \circ \\ 28^{\circ}5 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{\circ}0 \\ 28^{$	s 9'194 9'205 9'143 	Chronometer.	reduced.	9' 70097 9' 69996 9' 70568 	9,71533 9,62753 9,62413 9,62379 9,62379 9,62379 9,62277 9,62277 9,62277 9,62141 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,71203 9,70205 9,70718 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738 9,70738	1'158 1'264 1'197 1'195 1'211 1'169 1'266 1'266 1'239 1'224 1'213 1'207 1'203 1'207 1'203 1'301 1'299 1'254 1'313 1'309 1'153 1'309 1'154 1'313 1'109 1'138 1'113 1'137 1'138 1'114 1'195 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205 1'205	1'235	Vibrations with Ring 5 Ring 5 Ring 6 Ring 8 Ring 8 Ring 5 Ring 5 Ring 5 Ring 5 Ring 5 Ring 6 Ring 6 Ring 8 Ring 8
	8°265 8°265	1`83550 1`83608 	- 20°0 - 20°0 	9'78996 9'78938 	9°70363 9°70363 9°57789 9°57755 9°69298 9°69298 9°69268 9°69268 9°69268	1 · 201 1 · 199 1 · 295 1 · 249 1 · 242 1 · 236 1 · 240 1 · 240	} 1·177 ] ] 1·210	Changed the face of the mirror.

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# FORT CONFIDENCE-continued.

Horizontal Force.-5th October 1848 to 26th April 1849.

	Magnets	employed.		Experi	ments of Deflection.	
Date.	Suspended in Unifilar.	Deflecting and Vibrating Magnet.	Observed Temp. of Magnet.	Distance.	Angle,	Log. Values of m X.
1849 :			0		 0 / //	
farch 6 6	C. 2 C. 2	S. 1 S. 1	6'4 7'0	1'1 1'4	27 10 50 12 46 51	9·48286 9'48216
7 7 7.	C. 2 C. 2 C. 2	S. 1 S. 1 C. 1	$ \begin{array}{c c} -2.9 \\ -2.3 \\ -0.7 \end{array} $	1'1 1'4 1'1	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	9'4847 <b>3</b> 9'48598 9'60302
7 8	C. 2 C. 2 C. 1	C. 1 S. 1	-0.5 -7.7	1·4 1·1	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	9'60291 9'48937
8 8	C. 1 C. 1	C. 1 S. 1	-5.0 -7.1	1.4 1.4	18 13 22 13 02 38	9`63251 9`49086
8 9	C. 1 C. 1	C. 1 S. 1	-5.1 -10.3	1·1 1·1	<b>3</b> 8 07 27 27 56 41	9'61369 9'49397
9 9	C. 1 C. 1	S. 1 C. 1	$-9^{2}$ -5^{7}	1.4	13 02 43 39 04 18	9'49091 9'62269
9 12 12	C. 1 C. 1 C. 1	C. 1 C. 1 C. 1	$ \begin{array}{c c} -6.2 \\ -11.9 \\ -11.5 \end{array} $	1'4 1'1 1'4	18 21 59 40 10 23 18 02 11	9'63579 9'63278 9'62818
13	C. 1 C. 1 C. 1	S. 1 S. 1	-8.7 -8.5	1.1	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	9'48854 9'48231
20 20		S. 1 S. 1	-	-		_
20	_	S. 1			· · · · ·	-
21 21		S. 1 S. 1				
23	-	C. 1	-			-
23 24		C. 1 C. 1				
24		C. 1 C. 1	- 1			-
pril 3 3	_	C. 1 C. 1			-	
3	-	C. 1		-		·
4		C. 1 C. 1	-	-		-
4 5		C. 1 C. 1				_
5		C. 1	-	1 - 1		-
5		C. 1				-
6 6		C. 1 C. 1				
7		C. 1			-	- 1
7	- 1	C. 1		-		
9		C. 1	-	-		-
9 9		C. 1 C. 1	-			
10		S. 1				
10		S. 1	-	-		-
10	- 1	S. 1	- 1	1 1		-
11	-	S. 1		-		
1 t 1 1	-	S. 1 S. 1	-			
13		S. 1				
14	- 1	S. 1	- 1	_		
14		S. 1 S. 1	-	~		1
16				1		1

# MAGNETICAL OBSERVATIONS.

# FORT CONFIDENCE-continued.

# Horizontal Force.--5th October 1848 to 26th April 1349.

-	1			-											
		E	xperiments of	Vibrat	ion.							· .			ļ
	Observ Temp of Magne	. Time o	of for Tors	ected t ion and V	Temp. o which the alues of T ² are educed.	$\begin{bmatrix} \text{Log. val} \\ \text{of } m X \end{bmatrix}$		Log. Valu of m employe at Temp. 9	a i	Resulting Value of X	es	Mont) Mean	-	Remark	cs. i
ł	0	s			0	·			- -						
I		1 -	-					9.5761	9	1.243	~	1			
l		-			~			9.5761		1 247				1	. 1
ł		1						9*5758.		1 242		{			- 1
l		-			~			9.5758		1.238			-		-11
l		1 -	-			_		9*69238 9*69238		1°289 1°239			1		
		-	-		~			9.57551		1.529					1
			_		-			9`69229	3   3	159	11				
	-				-			9.57551		228					
		-	-	1.	$\equiv$			9°69223 9°57517		210	11				
		-			- 1			9.57517	1	217 225					
					-			9.69208		185					
			_		-			69208	1	150		1.210			11
	<u> </u>	~						9.69163		160					
	<del>~~</del>	1 -	-		-	·		) 69163 ) 57381		•172 •227					1
	-6.6	9.967			-		19	57381		245					1
,	-4.8	9.980	2'00021		5.0	9'62918		57143		134					
,	-1.2	9.864	1.98974	1	5.0	9'62916 9'63965	-	57143		134	11				4
	10.9	9.916	1 99532		5.0	9.63407		57143		161					· {
•	-7.8	9.911	1.99431		_ 1	9.63508		. 57109		147 150			1		
	-5.4 -8.7	8'348 8'369	1'84473			9.78466	9	68998		231			1		1
	ni	8.402	1.84645			9'77901		68998		215	11				11
•	-7'8	8.397	1.85019		i	9'77445 9'77527	•	68983		203	11				1
	4.7	8'320	1'84173			9'78373		`68983 `68833		205 239	K				1.
	6.3 6.3	8.407	1.84993		5.0	9'77553		68833		216	11		ιv	ibrations	1.
	4.2	8°364 14°616	1°84565 2°33157			9.77981		68833	1.	228			1	with	· ].
	8'3	14.525	2'32559			9°76565 9°77163		68818	11	189	•	•		Ring 8	ł
	4'8	14.215	2.32532			9.77190		68818 68803		206	•	• •		Ring 8	1
	13°5 14°6	16.896	2'45582	L L		76896		68803		207 198		· •		Ring 8	
	5'1	16'916 16'963	2'45681			76797		68803		196	1.		[	Ring 6 Ring 6	
	12.7	23'050	2°46098 2°73246			76380		68788		185	-	-	.	Ring 6	
	10.2	23'122	2.73330			77005 76921		68788 68773		202	-	•		Ring 5	1
	8.2	23°124	2.73375			76876		68773		200	1	•	{ :	Ring 5	
	5·2 1·4	8.987	1.85028		°0   9	77518		68743		217	1	-		Ring 5	ţ.
	3.5	8'420 8'347	1°85498 1°84705			77048		68743	1.3	205	71	·198			ŀ
	4.2	9.795	1.98720			77841		68749		227	1				и 
	2.9	9.879	1'99406		) .	64219 63533		56429 56429	1.1	191	1				
	4.1	9'875	1.99359	5	0 9	63580		56429	î.		1				
	3.6	16.808 16.844	2.45641		0 9	64214	9°.	56395	i	- 1		-	I	ling 8	
	5.5	16.828	2°45904 2°45763	4		63951		56395	1.1	85		~		ling 8	
	0.7	9.840	1.99113			64092 63826		56395	1.1		-	-		ling 8	
	1.0	19.512	2 58786			63791		56327	1.1				Y	line of	
	9°1 8°1	19.521	2.58680	5	0 9	63897	9'	56293	1.1		~			ling 6	
		19·755 28·294	2°59764 2°91789	5		62813	9'8	56225	1.1	59	-	-	Ē	ling 6	
	•	(	~ 01(09	5		58514	9.8	6191	1.0	50 []	-	- [		ling 5	
						x 2									

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# MAGNETICAL OBSERVATIONS.

# FORT CONFIDENCE-continued.

Horizontal Force.--5th October 1848 to 26th April 1849.

	Magnets	employed.		Expe	riments of Deflection.	
Date.	Suspended in Unitilar.	Deflecting and Vibrating Magnet.	Observed Temp. of Magnet.	Distances.	Angles.	$\frac{\log. \text{Values}}{\frac{\text{of }m}{X.}}$
1849 :         April 17         18         19         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         20         21         21         23         23         23         23         23         23         23         24         24         24         24         25         25         26         26         26         26         26         26		S. 1 S. 1 S. 1 S. 1 S. 1 S. 1 S. 1 S. 1		$\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	29       37       12         14       20       42         28       11       38         13       01       43         27       40       37         12       39       49         36       50       10         17       18       52         38       58       38         15       10       46         35       10       14         17       43       46         26       02       59         12       12       02         26       02       50         12       18       43         25       46       08         12       05       11         36       32       34         17       03       43         37       18       16         16       58       17	

# MAGNETICAL OBSERVATIONS.

# FORT CONFIDENCE-continued.

Horizontal Force.-5th October 1848 to 26th April 1849.

	Exp	eriments of Vibr	ation.		.	1	1	1
Observed Temp. of Magnet.	Observed 'Time of One Vibration.	Log. Values of T ² corrected for Torsion of Thread and Rate of Chronometer.	Values of	Log. Value of m X.	Log. Values of m employed at Temp. 20°.	ing	Monthly Means.	Remarks.
20°2     1       22°5     2       16°7     2       17°8     1       18°6     1	28`988 22`882 6`984 4`515	2°93349 2°72626 2°46194 2°32597	20.0       9         20.0       9         20.0       9         20.0       9         20.0       9         20.0       9         20.0       9         20.0       9         20.0       9         20.0       9         20.0       9         20.0       9		9'63563 9'68563 9'55987 9'55987 9'55987 9'55987 9'55987 9'55987 9'55987 9'55987 9'55987 9'55987 9'68518 9'68518 9'68518 19'68518 19'68518 19'68518 19'55919 1 9'55919 1 9'55919 1 9'55919 1 9'55919 1 9'55919 1 9'55919 1 9'68488 1 9'68488 1 9'68488	· 254 / 197 · 220 · 233	Vibrat:	Ring 8 Ring 5 Ring 5 Ring 5 Ring 6 Ring 5 Ring 6 Ring 5 Ring 6 Ring 8
, Militari ang kang kang kang kang kang kang kang		j						200

1

Total Force.—The values of  $\frac{m}{\phi}$  were calculated by the formula

$$\frac{m}{\phi} = \frac{1}{2} r^3 \sin u \left( \frac{1}{1 + \frac{P}{r^2}} \right)$$

 $r_{,i}$  and  $r_{,i}$ ,  $u_{,i}$  and  $u_{,i}$ , &c. being substituted in the formula for the value of  $\frac{m}{\phi}$  at the second and third distances.

Three distances were employed in the experiments of deflection, viz., 8°0, 9°2, and 10°5 inches. It was found, in making the calculation for the value of P, that the formula for two distances was preferable to that which it is intended should be employed when deflections at three distances are observed; and accordingly P was calculated for each combination of two distances that can be formed, viz., at 8°0 and 9°2, 8°0 and 10°5, and 9°2 and 10°5 inches; the results are as follows:—

## Magnet C.1.

								- '0193	
8'0 and	10'5	,,	-	-	-	$\mathbf{P}$	=	- '0153	
9'2 and	10'5	,,	-	-	-	$\mathbf{P}$		-'0094	,

#### Magnet S.1.

8'0 and	9 <b>`2</b>	inches	-	-	-	$\mathbf{P} =$	- '0156
8'0 and	10'5	,,	-	•••	-	$\mathbf{P} =$	- '0173
9'2 and	10'5	,,	-	-	-	P =	-'0091

The mean values were employed, viz.,---

For magnet C.1, P = -0147. For magnet S.1, P = -0140; and from them the following factors were obtained:—

Magnet C. 1.  

$$1 + \frac{1}{1 + \frac{P}{r^2}}$$
 Log. =0.01459.  
 $\frac{1}{1 + \frac{P}{r_{r_{1}}^{2}}}$  Log. =0.01099.  
 $\frac{1}{1 + \frac{P}{r_{\mu}^{2}}}$  Log. =0.00842.

Magnet S. 1.  

$$1 + \frac{1}{r^2}$$
 Log. =0'01389.  
 $1 + \frac{1}{r_r^2}$  Log. =0'01046.  
 $\frac{1}{r_r^2}$   
 $1 + \frac{1}{r_r^2}$  Log. =0'00801.

The quantity m was derived from the observations of absolute Horizontal Force, the value being calculated for the particular day on which the deflections of the dipping needle were observed.

The Total Force  $\phi$  was found by the formula

Log. 
$$\phi \equiv \log m - \log \frac{m}{4}$$

Log. *m* receiving the necessary correction to reduce it to the same temperature as that of *m* in the quantity  $\frac{m}{\phi}$ .

		Mag emple	nets oyed.	De- net.		An of Defi	cles ection.	Log. Values	Log.	Valu	les of	Incli- nation
D	ate.	Suspended in Circle.	Deflecting Magnet.	Distance of De- flecting Magnet.	Mean Temp.	Circle face East.	Circle face West.	of 3 7 ³ sin u 37, ³ sin u' &c.	Values of $\frac{m}{\phi}$	m at 20°.	ф	deduced from De- flection Observa- tions.
OCTOBER.	448 :         D. H.         2 00         01         02         03         04         05         21         223         23         3 00         03         04         05         03         04         05         05         05         05         05         05         05         05         05         05         05	A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1		Inches, 10.5 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 10.5 9.2 8.0 8.0 10.5 9.2 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	°           58.0           67.0           59.5           56.0           55.0           55.0           55.0           55.0           55.0           55.0           57.0           64.0           65.5           66.0           67.0           62.0           58.0	$\begin{array}{c} \circ & \prime \\ 5 & 13 \cdot 7 \\ 6 & 49 \cdot 6 \\ 10 & 03 \cdot 8 \\ 15 & 22 \cdot 7 \\ 7 & 24 \cdot 4 \\ 11 & 04 \cdot 8 \\ 5 & 17 \cdot 6 \\ 7 & 28 \cdot 6 \\ 11 & 16 \cdot 5 \\ 6 & 48 \cdot 7 \\ 9 & 55 \cdot 2 \\ 15 & 04 \cdot 3 \\ 4 & 54 \cdot 4 \\ 7 & 13 \cdot 2 \\ 11 & 03 \cdot 4 \\ 6 & 44 \cdot 4 \\ 7 & 13 \cdot 2 \\ 11 & 03 \cdot 4 \\ 6 & 9 & 59 \cdot 9 \\ 15 & 12 \cdot 2 \end{array}$	$\begin{array}{c} \circ & , \\ 5 & 13 \cdot 3 \\ 6 & 45 \cdot 8 \\ 9 & 58 \cdot 6 \\ 15 & 19 \cdot 1 \\ 7 & 21 \cdot 2 \\ 11 & 02 \cdot 9 \\ 4 & 39 \cdot 0 \\ 7 & 12 \cdot 4 \\ 11 & 10 \cdot 4 \\ 8 \cdot 3 & 39 \\ 9 & 16 \cdot 7 \\ 14 & 58 \cdot 0 \\ 4 & 67 \cdot 6 \\ 7 & 17 \cdot 3 \\ 11 & 02 \cdot 6 \\ 6 & 44 \cdot 4 \\ 10 & 02 \cdot 3 \\ 15 & 10 \cdot 3 \\ 15 & 10 \cdot 3 \end{array}$	$\begin{array}{c} 8 & 43436\\ 8 & 59805\\ 8 & 598396\\ 8 & 59409\\ 8 & 46216\\ 8 & 445216\\ 8 & 445283\\ 8 & 456991\\ 8 & 445283\\ 8 & 456991\\ 8 & 45058\\ 8 & 45058\\ 8 & 45045\\ 8 & 45045\\ 8 & 45458\\ 8 & 455958\\ 8 & 45645\\ 8 & 455958\\ 8 & 55958\\ 8 & 559569\\ 8 & 559569\\ 8 & 559569\\ \end{array}$	$\begin{array}{c} 8 & 49238\\ 8 & 60647\\ 8 & 60447\\ 8 & 60868\\ 8 & 47262\\ 8 & 47087\\ 8 & 47087\\ 8 & 474087\\ 8 & 474087\\ 8 & 59660\\ 8 & 447408750\\ 8 & 59946\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 8 & 546750\\ 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\\ 12 \cdot 766 \\ 12 \cdot 692 \\ 12 \cdot 766 \\ 13 \cdot 402 \end{array}$	0         /           44         64         34           34         39         28           44         38         39         28           44         38         39         28           44         38         39         28           54         38         3         36           54         38         3         36           54         38         36         36           54         36         47         1           54         48         5         38         10           54         48         7         1         38         38         10           54         48         37         1         38         38         10           54         48         35         1         38         10         38         10           54         38         10         38         36         37         38         36         37         38         36         35         7         38         36         37         38         36         36         37   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\cdot 57193$ $8 \cdot 57195$ $8 \cdot 57165$	$\begin{array}{c} 9.61733\\ 9.61733\\ 9.61733\\ 9.71053\\ 9.71053\\ 9.71053\\ 9.71053\\ 9.71053\\ 9.71053\\ 9.71053\\ 9.61699\\ 9.61699\\ 9.71038\\ 9.71038\\ 9.71038\\ 9.71038\\ 9.61665\\ 9.61665\\ 9.61665\\ 9.61665\\ 9.61663\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 9.71023\\ 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4 \\ \end{array}$

TABLE	VI	-Total	Force.
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# MAGNETICAL OBSERVATIONS.

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# TOTAL FORCE—continued.

TOTAL FORCE—continued.												
ş 1	emple	nets oyed.	e of De- Magnet.		And of Def	gles lection.	Log. Values	Log.	Valu	les of	Incli- nation	
Date.	Suspended in Circle.	Deflecting Magnet.	Distance of flecting Ma	Mean Temp.	Circle face East.	Circle face West.	of $\frac{1}{2}r^3 \sin u$ $\frac{1}{2}r^3 \sin u'$ &c.	Values of <u>m</u> φ	m at 20°.	φ	deduced from De- flection Observa- tions.	
$\begin{array}{c} 1848:\\ D, II.\\ 13 22\\ 14 00\\ 001\\ 02\\ 15 01\\ 03\\ 223\\ 15 01\\ 003\\ 223\\ 233\\ 16 00\\ 00\\ 01\\ 02\\ 03\\ 33\\ 00\\ 01\\ 02\\ 03\\ 03\\ 03\\ 03\\ 03\\ 03\\ 03\\ 03\\ 03\\ 03$	A. 1 A. 1 A. 2 A. 2 A. 2 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 2 A. 2 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1	5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.	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52'8 \\ 8 & 34'4 \\ 6 & 65'2 \\ 9 & 01'5 \\ 13 & 35'6 \\ 5 & 45'5 \\ 13 & 30'2 \\ \end{array} $	$\begin{array}{c} 8 \cdot 43803\\ 8 \cdot 42584\\ 8 \cdot 43056\\ 8 \cdot 43726\\ 8 \cdot 43726\\ 8 \cdot 43158\\ 8 \cdot 43158\\ 8 \cdot 42140\\ 8 \cdot 42280\\ 8 \cdot 42140\\ 8 \cdot 42280\\ 8 \cdot 42140\\ 8 \cdot 42126\\ 8 \cdot 54207\\ 8 \cdot 54801\\ 8 \cdot 53087\\ 8 \cdot 54800\\ 8 \cdot 543087\\ 8 \cdot 543087\\ 8 \cdot 54337\\ 8 \cdot 543387\\ 8 \cdot 5438385\\ 8 \cdot 543387\\ 8 \cdot 543875\\ 8 \cdot 543875\\ 8 \cdot 543875\\ 8 \cdot 54387$	$\begin{array}{c} 8 \cdot 44605\\ 8 \cdot 43630\\ 8 \cdot 44545\\ 8 \cdot 44502\\ 8 \cdot 44545\\ 8 \cdot 44547\\ 8 \cdot 452942\\ 8 \cdot 43217\\ 8 \cdot 55109\\ 8 \cdot 55086\\ 8 \cdot 555086\\ 8 \cdot 55596\\ 8 \cdot 555229\\ 8 \cdot 555229\\ 8 \cdot 555192\\ \end{array}$	$\begin{array}{c} 9.60441\\ 9.60407\\ 9.60407\\ 9.60407\\ 9.60407\\ 9.60407\\ 9.60373\\ 9.70468\\ 9.70468\\ 9.70468\\ 9.70463\\ 9.70453\\ 9.70453\\ 9.70453\\ 9.70453\\ 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28 \cdot 9 \\ 6 & 40 \cdot 2 \\ 10 & 09 \cdot 9 \\ 4 & 35 \cdot 1 \\ 6 & 50 \cdot 3 \\ 10 & 21 \cdot 2 \\ 4 & 31 \cdot 2 \\ 6 & 40 \cdot 1 \\ 9 & 49 \cdot 4 \\ 5 & 48 \cdot 6 \\ 8 & 37 \cdot 6 \\ 8 & 37 \cdot 6 \\ 8 & 37 \cdot 6 \\ 13 & 15 \cdot 2 \\ 3 & 05 \cdot 1 \\ 13 & 30 \cdot 6 \\ 5 & 59 \cdot 1 \\ 13 & 30 \cdot 6 \\ 8 & 50 \cdot 2 \\ 13 & 22 \cdot 2 \end{array}$	$\begin{array}{c} 8 & 43416\\ 8 & 42061\\ 8 & 42220\\ 8 & 43011\\ 8 & 42248\\ 8 & 42248\\ 8 & 42236\\ 8 & 54257\\ 8 & 545482\\ 8 & 55482\\ 8 & 55481\\ 8 & 55481\\ 8 & 55450\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 554219\\ 8 & 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\hspace{0.1cm} 24^{\circ}0 \\ 9 \hspace{0.1cm} 36^{\circ}2 \\ 4 \hspace{0.1cm} 26^{\circ}1 \\ 6 \hspace{0.1cm} 37^{\circ}0 \\ 4 \hspace{0.1cm} 10^{\circ}1 \\ 6 \hspace{0.1cm} 25^{\circ}5 \\ 10 \hspace{0.1cm} 01^{\circ}0 \\ 5 \hspace{0.1cm} 43^{\circ}3 \\ 8 \hspace{0.1cm} 56^{\circ}2 \\ 13 \hspace{0.1cm} 31^{\circ}4 \\ 8 \hspace{0.1cm} 57^{\circ}7 \\ 13 \hspace{0.1cm} 33^{\circ}3 \\ 9 \hspace{0.1cm} 5 \hspace{0.1cm} 46^{\circ}3 \\ 8 \hspace{0.1cm} 37^{\circ}3 \\ 13 \hspace{0.1cm} 07^{\circ}8 \\ 13 \hspace{0.1cm} 07^{\circ}8 \end{array}$	$\begin{array}{c} 8^{+}40462\\ 8^{+}41236\\ 8^{+}41286\\ 8^{+}41529\\ 8^{+}41572\\ 8^{+}41253\\ 8^{+}41545\\ 8^{+}41545\\ 8^{+}41545\\ 8^{+}41545\\ 8^{+}41545\\ 8^{+}5173\\ 8^{+}55103\\ 8^{+}55103\\ 8^{+}55103\\ 8^{+}55105\\ 8^{+}54106\\ 8^{+}54106\\ 8^{+}54106\\ 8^{+}54106\\ 8^{+}53305\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 8^{+}5335\\ 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Inclination.—The Inclination was observed by direct reading of the needle, forming results independent of those deduced from the deflection experiments.

Table VII. contains the particulars of these observations. All were made with the same needle, A.1, except in a few instances, when A.2 was employed.

From the whole number of observations, it was found that the mean readings of "poles direct" and "poles reversed" differed by a very small amount, and less than the probable error of a single mean; so that the half determination, whether "poles direct" or "poles reversed," has been taken as an observation of the Inclination, and the monthly means found from all the observations in the month without any correction.

				Poles	direct.	Poles reversed.		
		Needle. 	Azimuth.	Face of	Ncedle.	Face of Needle.	Incli-	Monthly
	Date.	or Mark,	Azim	Direct.	Reversed.	Direct. Reversed.	nation.	Means.
				a a'	a'' a'''	<u>b</u> <u>b</u> ' <u>b''</u> <u>b'''</u>		
OCTOBER.	$\begin{array}{c} 848:\\ \textbf{D}, \textbf{II}, \textbf{M},\\ \textbf{I} \ 23 \ 00\\ \textbf{2} \ 20 \ 30\\ \textbf{3} \ 01 \ 30\\ \textbf{6} \ 21 \ 15\\ \textbf{7} \ 03 \ 00\\ \textbf{10} \ 21 \ 00\\ \textbf{11} \ 03 \ 00\\ \textbf{14} \ 03 \ 30\\ \textbf{20} \ 21 \ 00\\ \textbf{14} \ 03 \ 30\\ \textbf{20} \ 21 \ 00\\ \textbf{24} \ 15 \ 00\\ \textbf{24} \ 15 \ 00\\ \textbf{25} \ 03 \ 30\\ \textbf{25} \ 03 \ 00\\ \textbf{25} \ 09 \ 00\\ \textbf{31} \ 21 \ 00 \end{array}$	A. 1 A. 2 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1		$\begin{array}{c} 84 \\ 21 \\ 25 \\ 25 \\ 25 \\ 26 \\ 20 \\ 75 \\ 20 \\ 75 \\ 20 \\ 75 \\ 25 \\ 20 \\ 75 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 27 \\ 25 \\ 25$	$\begin{array}{c} 5 & 5 & 03 & 75 \\ 5 & 5 & 03 & 75 \\ 5 & 5 & 03 & 75 \\ 5 & 5 & 06 & 75 \\ 5 & 5 & 06 & 75 \\ 84 & 34 & 25 \\ 85 & 44 & 25 \\ 85 & 44 & 25 \\ 85 & 24 & 05 \\ 85 & 24 & 05 \\ 85 & 24 & 05 \\ 85 & 24 & 05 \\ 85 & 24 & 05 \\ 85 & 24 & 05 \\ 85 & 24 & 05 \\ 85 & 21 & 67 \\ 84 & 29 & 50 \\ 85 & 11 & 50 \\ 84 & 08 & 67 \\ 75 & 32 & 17 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 34 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 34 & 24 & 30 \\ 85 & 11 & 50 \\ 84 & 38 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 34 & 20 & 33 \\ 85 & 24 & 50 \\ 84 & 30 & 34 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 34 & 21 & 67 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 33 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 31 \\ 84 & 30 & 31 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 31 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 31 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 31 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 31 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 31 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 31 \\ 85 & 24 & 50 \\ 84 & 31 & 42 \\ 84 & 30 & 31 \\ 85 & 31 & 44 \\ 84 & 30 & 31 \\ 85 & 31 & 44 \\ 84 & 30 & 31 \\ 85 & 31 & 44 \\ 84 & 30 & 31 \\ 85 & 31 & 44 \\ 84 & 30 & 31 \\ 85 & 31 & 44 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 31 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 & 40 \\ 84 & 40 &$	o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         ,         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o         o	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	84° 49′ 37
NOVEMBER.	$ \left( \begin{array}{c} 1 & 03 & 00 \\ 1 & 02 & 30 \\ 3 & 21 & 00 \\ 4 & 03 & 00 \\ 5 & 19 & 50 \\ 6 & 22 & 00 \\ 7 & 21 & 00 \\ 10 & 21 & 00 \\ 11 & 03 & 00 \\ 14 & 21 & 00 \\ 15 & 02 & 40 \\ 17 & 21 & 00 \\ 18 & 03 & 06 \\ 21 & 21 & 00 \\ 22 & 03 & 05 \\ 28 & 21 & 00 \\ 22 & 03 & 05 \\ 29 & 03 & 05 \\ \end{array} \right) $	A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	19:33         84         14:50           755         22:00         84         07:07           355         26:50         84         07:03	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	44 49.71 84 51.88 84 46.55 84 46.55 84 47.20 84 48.56 84 48.56 84 45.25 84 57.66 84 45.25 84 55.21 84 49.04 85 50.296 84 48.79 84 48.79 84 56.17 84 49.70	}€4°51′′08
DECEMBER.		A. 1 A. 2 A. 1 A. 2 A. 1 A. 2 A. 1 A. 1 A. 1	-	84 46.83 85 02.34 		23 33 85 06 05 48 00 84 57 75 54 00 85 02 25 83 25 85 13 00 	84 54.58 84 44.69 84 52.87 84 58.12 84 48.12 84 46.37 84 49.33 84 45.75	\ 84° 49′*93

# TABLE VII.

#### MAGNETICAL OBSERVATIONS.

#### TABLE VII.—continued.

	Needle.			Poles o	lirect.			Poles re	eversed.		
Date.	No.	Azimuth.		Face of,	Needle.			Face of	Needle.	Incli-	Monthly
Date.	or Mark.	Azin	Dir	ect.	Reve	rsed.	Dir	ect.	Reversed.	nation.	Means.
	· ·		a	a'	a"	a'''	6	Ъ/	b" b"	<u> </u>	
1849 : D. H. M. 2 21 30 3 03 00 15 22 00 16 22 15 17 00 22 05 18 01 40 27 02 50 31 03 30	A. 1 A. 1 A. 2 A. 1 A. 2 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1	111111111	84 43.05 84 47.83	84 52.50	° '         85 21:00 85 15:50	°	84 38.00 84 26.50 84 31.50 84 40.00 84 24.00 	85 05·50 85 12·75 85 06·50 84 58·00 85 08·50 		84 41 25 84 45 58 84 49 62 84 49 62 84 49 00 84 48 00 84 46 25 84 45 25 84 45 26 84 45 26 84 50 29 84 60 29 84 60 29	<b>84°48''84</b>
2         21         05           3         03         00         6         21         00           6         21         00         9         21         00         10         03         00         12         21         20         13         01         12         21         20         13         01         20         13         01         21         20         13         01         20         13         21         20         13         21         20         13         21         40         13         21         40         14         14         14         02         10         14         02         10	A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 1 A. 2 A. 2 A. 2 A. 1 A. 1	1111111111	84 28.67 		=		84 48.67 85 03.67 84 48.00 84 52.00 84 23.25 84 22.00	85 10.00 85 15.00 85 05.50 85 13.8 85 12.7		7 84 53 58 84 45 08 84 47 96 0 85 01 33	84°53′'90
$H_{\rm A}= \left( \begin{array}{c} 6 & 21 & 05 \\ 7 & 03 & 00 \\ 11 & 21 & 00 \\ 12 & 00 & 10 \\ 12 & 00 & 10 \\ 12 & 00 & 45 \\ 12 & 22 & 20 \\ 13 & 00 & 12 \\ 13 & 00 & 12 \\ 13 & 01 & 22 \\ 13 & 01 & 22 \\ 13 & 01 & 22 \\ 13 & 01 & 22 \\ 20 & 21 & 00 \\ 21 & 03 & 00 \\ 27 & 21 & 00 \\ 28 & 03 & 00 \\ \end{array} \right)$	A. 1 A. 1 A. 2 A. 1 A. 2 A. 1 A. 1 A. 1 A. 1 A. 2 A. 1 A. 2 A. 2 A. 2 A. 1 A. 1		84 58.67	84 55 83 85 01 50 85 03 33 85 03 33 	85 08.67 85 18.33	84 13·35 84 15·56 84 —	84 58 83 84 50 00 84 24 00 84 21 00 84 51 83 84 50 50	85         09·3           85         08·3           85         18·0           85         18·0           85         10·0           85         05·0           85         11·1           85         09·8           85         09·8           85         09·8           85         09·8           85         09·8		0 84 55 2 84 59 1 84 59 1 84 48 5 84 49 9 84 46 2 84 59 0 84 46 2 84 58 4 84 46 2 84 46 7 84 49 6 0 84 49 0 0 84 40 1 0 84 48 9	8 5 5 7 7 7 8 4 8 5 7 7 7 8 9 7 7 8 9 8 9 7 7 8 9 8 9 8 9 7 7 8 9 8 9

The monthly mean results of the Inclination are-

	o ·	1
October	$\theta = 84$	49'4
November	$\theta = 84$	51.1
December	$\theta = 84$	50'0
January	$\theta = 84$	48'8
February	$\theta = 84^{\circ}$	53.9
March	$\theta = 84$	50'4

Mean by direct observation 84° 50' 6

The monthly means, by the method of deflections, are not so regular, and somewhat less in amount, viz. 84° 45''9.

The Horizontal Force experiments were made in series at certain periods, and not at regular intervals; there are therefore some months in which no observations are made, and others that contain very few. Taking, however, monthly means of all that were observed, the results are as follows:---

October	1848	-	-	-	- '	-	X = 1.235
November	,,	•	-	-	- '	-	X = 1.198
December	,,	-	-	-	-	-	X = 1.177
March	1849	-	-		-	_	X = 1.210
April	,,,	-	-	-	-	-	X = 1.198

The Total Force for these months, derived from the horizontal component multiplied by the secant of the Inclination, is as follows :---

October	1848		-	-	-	$\phi = 13.640$
November						$\dot{\phi} = 13^{\circ}231$
December	"					$\dot{\phi} = 12.999$
March	,,	•	-	~	-	$\phi = 13.364$
April	,,	-	-	-	-	$\phi = 13.231$

The values of  $\phi$ , found by the direct method for the several months, are—

October	1848	-	-	-	-	$\phi = 13.402$
November	,,	<del>,</del>				$\phi = 13.998$
December	وو	-	-	-	-	$\phi = 14^{\circ}243$
January	1849	-	-	-	-	$\phi = 14.025$
February	,,	-	-	-	-	$\phi = 13.849$
March	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-	-	-	-	$\phi = 13.801$

The mean Horizontal Force during the whole period is 1'205, which, multiplied by sec.  $84^{\circ}$  50''6, is equal to 13'407. The mean of the whole of the values of  $\phi$  by the direct method, is 13'886. The mean of both determinations is 13'646.

# TABLE VIII.

Contains the hourly observations made with the Declinometer in the months 1849. These observations show correctly the direction of the diurnal movesuspension of the Declinometer needle, as stated in page 7. In the months same object were made with the Unifilar Magnetometer, the magnet of correct amount as well as direction of the diurnal variation. These obserin *direction*, but indicate that the range of the diurnal variation is nearly are those of mean time at the station.

#### FORT CONFIDENCE.

Abstract of Hourly Observations during the month of October 1848.

						Decli	nometer	•.	,				
Date.	1 ^h	2 ^h	3 ^h	4 ^h	$5^{\mathrm{h}}$	ճո	7հ	8 ^h	9h	10 ^h	11 ^h	Noon.	1 ^h
1	• /	° / 	° '	° /	° /	° / 	° /	° ′	o 1 	° 1	° /	。 <i>i</i>	• /
1 2 3 4 5 6 7	=	=	=	=	=	=	_	=	=			_	=
4	_	-	=	=	_	=	=	=	=		_		1 =
é		- 1	-		-							-	- 1
7 8 9	=	=	=	-	=	=	=	=	=	_		=	
10 1	_	=	=	=	_	=	=	_	=	_	=	5 24	5 20
11 12 13	=	_	=	=	_	5 30	$5\ 15\ 0\ 30$	5 14 5 21	5 07 4 55	$5 \ 05 \\ 4 \ 51$	5 05	5 06	5 09
13				-	-		5 19	0 15	502	4 50	4 49		-
14 15	_	_	=	_		=	5 10	5 02	5 11	5 10	500 506	458 509	5 10
16 17			_	=	=	=	4 33	4 37	5 10	$5 00 \\ 4 30$	0 00	0 10	5 00
18	-	-	=	=	=	=	4 50	_	4 22		8 10	4 00	5 27
20		-				5 18	5 10	4 25	3 55	3 52	4 50	4 50	4 01
21 22		_	=	5 30		$502 \\ 509$	5 03	454 500	4 50 5 00	455 501	4 48 4 42	4 46 4 26	4 40 4 22
19 20 21 22 23 24	_	_	=	_	4 50	$525 \\ 454$	5 05 4 49	$   \begin{array}{r}     3 36 \\     4 17   \end{array} $	3 17 4 15	4 15 4 25	4 16 4 30	4 16 4 29	4 42 4 31
25	_	_	4 45	5 15		$3 50 \\ 5 24$	$\frac{1}{4}$ $\frac{30}{5}$ $\frac{15}{15}$	4 40 4 50	4 35 4 47	4 32 4 32	4 45 5 08	5 09 5 04	5 09 •5 15
25 26 27 28 29	-		5 35	5 27		5 26		4 30	4 29	4 22	4 36	4 38	4 42
28 29		_		-	_	$5 05 \\ 4 02$	$5 \ 01 \\ 4 \ 02$	$\begin{array}{c} 4 & 10 \\ 3 & 55 \end{array}$	4 14 4 01	4 20	4 34 4 32	4 32 4 56	4 24 4 57
30 31	_		=	_	5 12	5 04	503 445	4 42 4 37	4 06 3 20	4 05 3 01	4 10 3 31	4 15 4 07	3 50 4 20
Sums -			10 20	16 12	10 02	54 39	48 43	53 36	50 49	47 20	54 22	55 28	54 53
Means -		-	5 10.0	5 24.0	5 01.0	4 58.1	1 52.3	4.28	4 14.1	418.2	4 31.8	4 37.3	4 34'4
Diurnal Variation	} -	-	0 55.9	1 09.9	0 46.9	0 44.0	0 38.2	0 13.9	0 00.0	0 04.1	0 17.7	0 23.2	0 20.3

Increasing numbers denote a movement of the north

Observations from 20th to 31st

# TABLE VIII.

of October, November, and December 1848, and January and February ment, but not its amount, in consequence of the friction on the point of of December 1848, January and February 1849, observations having the which instrument is suspended by a silk thread, and shows, therefore, the vations confirm the general accuracy of the Declinometer observations twice the amount shown by the Declinometer. The hours in Table VIII.

#### FORT CONFIDENCE.

#### Abstract of Hourly Observations during the month of October 1848.

Declinometer. ցհ 10h 11^h Midn Means. ßh 7h ջհ Sums. 3h *d*.h 5h 9h 0 / 0 / 0 0 1 0 ο. 0 0 0 0 0 o 0 5 30 5 15 5 12 5 12 4 12 5 10 0 11 5 41 5 30  $\begin{array}{c} 5 & 30 \\ 5 & 35 \\ 5 & 35 \\ 5 & 5 \\ 5 & 12 \\ 4 & 41 \\ 5 & 35 \\ 5 & 15 \\ 5 & 19 \\ 5 & 04 \end{array}$ 535 555 09 515 $\begin{array}{c} 5 & 29 \\ 5 & 25 \\ 5 & 04 \\ 5 & 05 \\ 4 & 40 \\ 5 & 32 \\ 5 & 16 \\ 5 & 20 \\ 5 & 01 \end{array}$  $\begin{array}{r} 4 & 36 \\ 4 & 55 \\ 4 & 56 \\ 4 & 40 \\ 5 & 29 \\ 5 & 06 \\ 5 & 15 \\ 5 & 58 \\ 5 & 00 \\ 4 & 59 \\ 5 & 07 \\ \end{array}$ 5 36 5 54 5 20 4 56.4 4 49.8 4 40.8 4 31.1 4 30.0  $511 \\ 531 \\ 505$ 5 00 4 36 5 01  $\begin{array}{c} 62 & 47 \\ 70 & 12 \\ 72 & 18 \\ 67 & 30 \end{array}$ 4 53 4 55 4 35 5 05 4 31 4 30 4 40 5 00 4 35 4 59 5 06 56 21 56 25 62 11 63 03 --------921 30 57 50.0 60 33 51 15 56' 43 58 35 92 16.3 5 07.5 5 07.4 5 07.7 5 10.9 5 15.3 ----------4 49.5 4 43.6 5 02.8 -----4 52.9 0 56.8 1 01.2 0 53.3 0 53.6 ----_ ----0 53.4 0 29.5 0 38.8 0 48.7

end of the needle towards the West. only included in the means.

MAGNETICAL OBSERVATIONS.

#### FORT CONFIDENCE.

Abstract of Hourly Observations during the months of November and December 1848.

| 1                                                                                                                                                                                                | Declinometer.  |                                         |       |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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* Declinometer moved to clean the glasses, and replaced with the foot screws in the same holes of the stand. Increasing numbers denote a movement of the North end of the needle towards the West. MAGNETICAL OBSERVATIONS.

# FORT CONFIDENCE.

Abstract of Hourly Observations during the months of November and December 1848.

t At 17th day noon moved soon afterwards to 0° 29'. Unifilar Magnetometer in motion from 520 to 540. Red tints of aurora in the evening. (See Notes on Auroræ.)

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319

320

#### FORT CONFIDENCE.

Abstract of Hourly Observations made during the months of January and February 1849.

# MAGNETICAL OBSERVATIONS.

# FORT CONFIDENCE.

Abstract of Hourly Observations made during the months of January and February 1849.

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Date.	• 1µ	2 ^h	3 ^h	4 ^h	5 ^h	6	7 ^h	<u>8</u> h		10 ^h	11 ^h	Noon.	1h		2 ^h	3h	4 ^h			· 71		9h	10 ^h	. 11 ^h	Mid	n ^t . Sum	s. Means.
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#### FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of March and April 1849.

# MAGNETICAL OBSERVATIONS.

# FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of March and April 1849.

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* On the 4th at 8 hours 45 minutes A.M. 1° 25'.

Increasing numbers denote a movement of the North end of the needle towards the West.

11

## METEOROLOGICAL OBSERVATIONS

# BY SIR JOHN RICHARDSON.

The following meteorological observations were made at Fort Confidence, on Great Bear Lake, in connection with the magnetic experiments. The fort (a mere log-house) stood on the banks of the lake, on limestone strata about ten feet above the level of the water, in lat. 66° 54' N.; long. 118° 48' 45" W. of Greenwich or 8h 35m 01.5 W. of Göttingen. The observatory (a small log building, without a fire-place) was built for the reception of the Declinometer and Unifilar Magnetometer, in front of the house, or between it and the The temperature of this isolated apartment was regularly lake. recorded as often as the Declinometer was observed. On the north end of the store-house (which formed the west side of the square or yard of the house, and was parallel to the observatory), were hung a dozen spirit thermometers, constructed by Adie, for the observation of the temperature of the atmosphere in the shade. These were generally compared with each other at each observation, but one was selected for record which stood, in a mean of various trials, at  $-36^{\circ}$ when plunged into freezing mercury. The temperature of a thermometer, having a bulb blackened with China ink and indigo, and enclosed in a glass bottle exposed to the sun's rays, was also noted hourly during the day. Delcros's barometer was suspended in my sleeping apartment, with the cistern about 14 feet above the surface of the lake. This barometer is constructed with a moveable brass scale, which is adjusted to the surface of the mercury in the cistern by an ivory point. The degrees were read off on the millimeter scale, and a correction made by the addition of 0.34 mill. as the mean error for capillarity and deviation from the standard barometer of Fortin.* The actual indication of the barometer was written down at the time, with the temperature shown by the attached thermometer in contact with the mercurial column; the corrections were made afterwards, and for December, January, and February were reduced to English inches for each hour, and corrected for temperature 32° Fahr. by Schumacher's table appended to the Report of the Committee of the

The corrections for the barometer furnished by the maker were, more exactly, Correction moyenne totale de capillarité - - - + 0,446
 Correction du baromètre 269 donné par bar. typal. - -0,108

Equation des Observations brutes - - + 0,338 or as applied on the tables + 0,34.

Royal Society for 1840. In that form they are presented in the tables for these three months. For October, November, March and April, the observations are printed on the millimetric scale after the correction for the mean error; and at the bottom of each column the reduction to English inches with the corrections for temperature 32° are added. Care was taken to suspend the barometer in a part of the room out of the direct radiation from the fire, and where it was sheltered as much as possible from currents of air; but it was unavoidably exposed to rapid fluctuations of temperature, since the fire when well built up heated the room rapidly, but when the door of the apartment was left open for the ten minutes which the bringing in of the daily supply of fire-wood occupied, the temperature would fall at once to the amount of 30 or 40 degrees, if at the time the external air happened to be very cold. These rapid transitions were doubtless the occasional cause of more or less error. As the surface of the mercury in the cistern tarnished rapidly, that fluid was thrice cleaned by filtering through paper in the course of the winter, the construction of the instrument permitting this to be readily done without disturbing the mercury in the tube. The wooden cistern, however, was found to shrink considerably in the extremely dry air of the apartment, and it was necessary to wind a little floss silk round it to cause it to fill its place accurately; this may perhaps have produced a little change in its capacity, but as the scale was a sliding one the error of its indications could be very triffing. An aneroid barometer was hung alongside Delcros's instrument, and a record kept of its indications; but as it was one of the earliest of its kind, and in some degree imperfect, it has not been thought necessary to print the observations made by it. In December, January and February, the aneroid stood generally between 0'020 and 0'060 inches below the Delcros's barometer when the latter was corrected for temperature 32°, no correction being made for the aneroid, but the differences were not uniform, and sometimes exceeded 0'100 inches. No correction for temperature was furnished to us with the aneroid.

The thermometers employed for ascertaining the temperatures were constructed by Mr. Adie of Edinburgh. On former expeditions I had used thermometers made by London artists of great eminence; but finding that the instruments varied greatly from each other at very low temperatures, I applied to Professor Forbes of Edinburgh, who kindly undertook to superintend the making of instruments which might be more comparable with each other in great degrees of cold. The following is an extract from a letter written on the subject by him subsequent to my return from America :-- " My Dear Sir,

Edinburgh, 10th April 1851.

"My idea was in constructing the thermometers (or rather in superintending their construction) to ensure comparability, and definiteness in the principles of graduation, which you are aware does not exist in alcohol thermometers as usually made, both from uncertainty in the density of the spirit used and, especially, because only one fixed point (freezing water) is employed, the other points being taken by comparison with a mercurial thermometer. But as alcohol and mercury do not expand alike, the value of 1° of the alcohol thermometer will depend upon the point of comparison with the mercurial one.

"What I intended, and should recommend in principle, would be to use *absolute alcohol* (or as nearly so as possible), to fix the freezing point of water and of mercury, to call the latter  $-40^{\circ}$  either on the centigrade or Fahrenheit's scale (which here coincide), and to divide the space uniformly, and also to graduate uniformly above 32°. There can be no possible harm in defining freezing mercury to be at 40° Fahrenheit.

"I intended to verify these fixed points myself, but I was rather seriously unwell that winter, and as your time was limited, I abandoned the freezing of mercury on a large scale, and satisfied myself with general instructions to Mr. Adie, which, I think, the results show to have been well carried out.

"The alcohol was prepared on purpose by Dr. George Wilson, chemist, and his report is enclosed. It shows that the alcohol is very nearly absolute. The tubes had round bores, and were examined in the usual way, by passing columns of mercury along them; a variation of the apparent length of the column of mercury, amounting to  $\frac{1}{50}$  inch, and that, in any part of the tube, causing the rejection of the tube.

"The fixed points were 32° in ice, and 62° by comparison with a carefully corrected mercurial standard thermometer. The degrees were run up and down to the same measure.

"As you have accurately ascertained the freezing point of mercury on these thermometers, it would be easy to infer the change which my proposed method of graduation would have produced.

"Yours sincerely,

"(Signed) JAMES D. FORBES."

1

# " 'EXTRACT of a LETTER from Dr. WILSON to Professor FORBES.""

" ' Dear Sir,

"'I enclose a note* of the specific gravity of the alcohol, with such other particulars as it seemed desirable to put on record for the sake of subsequent comparison, should that be made. The uncoloured alcohol was determined with a 1,000 grain bottle. The residual coloured spirit amounted to little more than 100 grains. Its Sp. Gr. was ascertained with a bottle containing 124.18 grains of distilled water at 60°. The unused coloured alcohol, barely amounting to a quantity equal in volume to 1,000 grains of water, could not be made to fill entirely a 1,000 grain Sp. Gr. bottle when transferred from the vessel containing it; I thought it best, therefore, to determine its density in the bottle made use of for the residual alcohol. The coloured alcohols are thus directly comparable; and as the balance was delicate, and three hours were spent on the two determinations, which were repeated in each case three times, I think the results may be considered tolerably accurate.

" 'It is gratifying to perceive that the difference in density between the coloured alcohols is so small, that when spread over the twentyfour thermometers (which may be supposed to contain an increasing dense spirit, in the order of their formation), it will be inappreciable.

" 'Yours very sincerely, " '(Signed) GEO. WILSON."

The mean height of the mercury in Delcros's barometer at temp. 32° Fahr. for seven months,  $\dagger$  observed sixteen or seventeen times daily (the hours between 10 P.M. and 6 A.M. being omitted), was 29 046 inch. The lowest pressure recorded in the seven months occurred at 7 A.M. on the 25th of October, being 28 265 inches, and the highest at 8 P.M. in January, being 29 900 inch, which gives a range of 1 635 inch within little more than half a year. The last page of Table I., however, shows that the mean horary variation is very small, being only 0 006 for the same period. As during the very low winter temperatures of that locality the atmosphere

* Note.—Specific Gravity, at 60° Fahr., of alcohol employed in filling thermometers for Sir J. Richardson.

Uncoloured alcohol, rectified from fused carbonate of potass and unslaked quick	
lime	794.65
Same alcohol after being coloured with extract of cudbear (prepared by evapo-	
rating the tincture made with absolute alcohol), to dryness in a water bath,	
and leaving the extract over oil of vitriol in vacuo for two days	795.37
Residue of coloured alcohol after thermometers were filled -	795.41
Feb. 28, 1848. (Signed) GEO. WI	LSON.

 $\dagger$  In the first nine days of October the barometer was rarely examined, and less regularly during the remainder of that month than in the six following ones.

holds very little moisture in solution, the very small diurnal oscillation supports the opinion that it depends on the presence of vapour. The depression is greatest at night, and at noon, and in the afternoon; but the regular recurrence of two daily maxima and minima cannot be made out either in the individual months or in the aggregate of the seven months. The casual fluctuations arising from snow storms and other sudden changes in the constitution of the atmosphere appear to overlie and conceal the diurnal curves.

As there are no corresponding observations on the Arctic Sea for comparison, we can scarcely venture to assign the height of Fort Confidence from these observations. By employing Sir Edward Parry's observations at Winter Island, in latitude 66° 11' N.* made in 1821-22, we may indeed get, as a very rough approximation, 640 feet for the altitude of Bear Lake above the sea. This is liable to the errors arising from the great distance between the places of observation, also to that from the annual fluctuations of pressure, and to the differences which most probably existed between the barometers, which were not compared with each other, nor with the same standard. From calculating the rate of descent of Bear Lake River, and of the Mackenzie below its influx, when compared with other rivers whose velocity and rate of descent were known. I had assigned 500 feet as the altitude of the lake above the sea; but this estimate is also liable to much error.

All the metcorological instruments were observed at the exact hours mean time at the station, kept by chronometers whose rate and errors were frequently ascertained by astronomical observations of the fixed stars. Göttingen time was used only on the term days, for observations on the magnets.

During the winter dense clouds or *cumuli* were never seen. The clouds generally were of the nature of thin *stratus* and *cirri*, or rarely *cirro-cumuli*, and the mean extent to which these overspread the blue sky is shown in Table VII. Very often the *stratus* was so rare that the stars shone through them previous to the rising of the moon, and their actual existence and extent became known only in the bright moonlight. It seems to be a cloud of this kind which forms the dark space near the horizon from behind which the arches of the Aurora Borealis are frequently observed to spring. On several occasions an arch of filmy cloud, of a greyish hue, was observed in the twilight crossing the magnetic meridian at or near a right angle. On watching this until daylight had wholly departed, it was seen to assume

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^{*} The mean height of the mercury in the barometer at Fort Confidence for seven months is 29'046 at 32° Fahr., the mean temperature of the air in the shade being -12'28 Fahr. At Winter Island the mean height of barometer for one year (1821-22) was 29'798 at 32° Fahr., and the mean annual temperature +9'8 Fahr.

gradually the yellow hue and brilliancy of the usual auroral arch. The clouds which accompany the most brilliant displays of the aurora are seldom so dense as to hide the larger stars, except when the moon is shining. Sometimes the stars shone through sheets of auroral light, at other times they were altogether obscured by it. I am inclined to believe that the appearance or non-appearance of the stars during displays of the aurora depends on the density of the accompanying stratus cloud. This cloud may be so rare as merely to communicate a greyish tinge to the apparently clear sky, and yet become sufficiently visible by the refraction of the moon's rays to show its true nature and extent.

Several times during the winter the auroral light was seen, both by myself and Mr. Rae, to pass in front of a mass of cloud. As we were both aware of the ease with which the eve may be deceived in such observations, we watched the displays of the phenomenon with sufficient scepticism to keep the attention on the alert, and no doubt remained on our minds of the reality of the fact. In former years I had seen seen similar occurrences more frequently, and even more Thirty years previously I had entertained the belief manifestly.* that the aurora was connected with the formation of cloud, and other changes in the constitution of the atmosphere, and the nightly observations of this winter all tended to strengthen that opinion. The great dryness of the winter atmosphere in the interior of Arctic North America may, perhaps, be the cause of the more frequent emissions of the electric light than in more southern and moister Fine spiculæ of ice or minute snow were often seen localities. falling from a clear sky, especially after a brilliant display of This I had also noticed many years ago. auroral lights.

I have written out *in extenso* the descriptions of the aurora at the hours of observation for two months. To have done so for the whole seven months would have occupied too much space. A few brief notices are substituted for the months in which the full details have been omitted. The compass bearings hereafter mentioned are true, not magnetic, unless when so expressed.

October (1848).—Aurora observed on the 1th, 13th, 17th, 18th, 19th, 20th, 21st, 23rd, 24th, 25th, 26th, 27th, 28th, and 30th. Did not occur or was not noted on the other evenings. On the 19th, after the sky had been overspread for the first half of the night by a very thin stratus, scarcely obscuring the blue vault, and from which fine icy spiculæ fell, between three and four in the morning there was a bright blue sky with flocculent clouds,

* These appearances are, however, to be understood as very rare in comparison with the common phenomenon of the auroral light issuing from behind a cloud.

which occasionally became luminous, sometimes in one quarter of the sky, sometimes in another. At 7½ P.M. in the evening of the 23rd the Declinometer was observed to move suddenly 10', simultaneously with some quick flashes of auroral light. The aurora disappeared in a few minutes, and the needle remained On the 29th the Declinometer fluctuated stationary afterwards. upwards of 1°, the sky being wholly obscured during the whole day, without any auroral light shining through. A small snow fell in the evening. On the 31st the Declinometer ranged 2°. During the previous night there was a deposit of moisture from the atmosphere, and all the instruments in the observatory were found to be encrusted with fine crystals of ice, particularly the rough lines and lettering of the scales. The auroral arch in the evening crossed the magnetic meridian at right angles, and the light as it flashed over the stars was bright enough to dim their lustre, but not to hide the larger ones.

November 1.—Fine snow falling for seven or eight hours in the day. At 6 P.M. all the northern and part of the western horizon banked by luminous clouds, through which stars of the first magnitude shone. A few patches of light in the south also. Fine snow falling from a cloudy zenith. At 7 P.M. a curtain-like arch of the aurora, bearing north about  $25^{\circ}$  degrees high, partially in motion. A faint sheet of light spread over the rest of the sky, here and there obscured by cloud-like dark patches. Stars visible through the aurora in every part, except in the northern arch which hid them. At 8 an arch about  $80^{\circ}$  high, on the south side of the zenith. At 9 the arch in same position but fainter.

November 2.—At 6 A.M. an auroral arch, rather faint, crossing the zenith in a due east and west direction. At 9 P.M. an auroral cloud bearing south, emitting the usual yellow light. Elsewhere an uniform haze or cloud overspread the sky. At midnight a remarkably deep blue cloudless sky, with bright stars, an auroral arch rising in the N.N.W. point of the horizon, crossing the zenith, including the whole constellation of the Little Bear, and passing over Orion in the east. The arch, which often changed its form, occupied a considerable breadth of sky, and was generally made up of oval oblique bars. The moon had set before this hour.

November 3.—At 9 P.M. sky cloudless. Bright moonlight. Stars somewhat dim. An auroral arch, composed of parallel beams of light rising in the N.N.W. to the height of the Great Bear only. Auroral clouds at a greater altitude bearing north-east. At 8 P.M. several arches of light rising from one point near the N.N.E. horizon, and crossing the sky at various altitudes, so as to occupy

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most of the northern half of the heavens, and part also of the southern half. They became fainter after passing the zenith, and were lost in a diffused sheet of light which spread over the eastern part of the sky. The principal arch, which was brighter and more continuous than the others, passed over the tail of the Great Bear, covered the whole of the Little Bear, and as it descended in the east made a curve to the north. At 9 the aurora faint.

November 4.—At 6 P.M. aurora hanging like a curtain in the northern sky, at an altitude of about 15°, and spreading from N.N.W. to N.E. Beams of light shooting upwards from the curtain, the largest ones bearing N.N.E., but some also bearing north. The sky cloudless, and still tinged red in the west, though the sun had been set three hours. At 8 P.M. long variable streams of light rising from the N.N.W. and north to the zenith. At 9 a narrow auroral arch, extending from N.N.W. to S.S.E., its crown having an altitude of about 80°.

November 5.—At 8 P.M. oblique bars of auroral light, lying over each other, and rising from the horizon in the N.W. by N., and then dividing into several arches, one of which, crossing the Great Bear, kept to the north of the zenith. Another crossing Cassiopeia and passing to the south of the zenith, and others, which were brighter, taking a still more southerly course, but disappearing before they reached the south-west horizon. Bright moonlight in a cloudless sky. Stars not shining brightly. At 9 aurora fainter, and the arches lying for the most part to the south of the zenith.

November 6.—At 5 A.M. sky clear, with bright stars, except a dark space skirting the southern horizon, and looking like a heavy cloud, but one bright star shining through it. Along the upper border of this dark space the auroral light had the form of a series of cumulo-stratus, above which there was a light blue sky. At 11 A.M. some light cirri clouds in the north and west resembling some forms of the auroral light.

November 7.—At 1 P.M. a halo round the sun, with red rays reflected from a cloud on each side, forming small segments of an arc.

November 9.—Faint arch of the aurora in the west at 5 A.M.

November 10.—At 7 A.M. the moon, when near the horizon, had a very oval shape, the long axis being transverse. At 6 P.M. the aurora in cirrus-like streaks, 30° high, bearing south. At  $6\frac{1}{2}$  P.M. a falling star passed from east to west, close by Lyra. A low auroral arch terminating abruptly, as if rolled back on itself on reaching its greatest altitude in the magnetic meridian, but becoming some time afterwards more lengthened out, and at the same time fainter. The ice in the lake, which was frozen over everywhere within six or seven miles, making a rumbling noise. At 7 P.M. the aurora was in It generally formed a complete arch, along which active motion. waves of light moved rapidly, and most so about 15° above the southern horizon. The beams lay at right angles across the magnetic meridian, but their wave-like line of motion was in that meridian. The compass needles steady; sky cloudless. At  $7\frac{1}{4}$  P.M. a slender auroral arch, waving to and fro, extended from the N.W. to S.E., passing across the zenith. The magnet, suspended in the Unifilar Magnetometer and loaded with the large ring (No. 5.), which was previously steady, began at this time to vibrate from 315 to 380, and the Declinometer moved from 4° 35' to 4° 25'. At 7.50 The unifilar magnet was now vibrating the aurora wholly gone. from 270 to 340, and the Declinometer had gone back to 4° 35'. Sky clear. At 8 no aurora. Sky cloudless. Declinometer 4° 30'. At 9 P.M. a faint auroral arch lying to the south of the zenith. The Declinometer vibrating from 4° 30' to 4° 35'. At 10^h 45^m long banks of auroral light in the south resembling stratus cloud, the uppermost of them arched, assuming at times a brighter hue, but always yellowish; the end of the arch curling back like cirro-stratus, but in a contrary direction to the light wind then blowing.

November 11.—At 5 A.M. a narrow auroral arch in the west, 30° At 6 P.M. the moon in the north-east quarter of the heavens high. grazing the upper edge of a cloud-bank, which produced a burr round The bank sunk below the horizon on the north point. her. Auroral light in detached masses and beams, the latter in form of arcs, which cross the magnetic meridian in various directions. These cloud-like masses resembled thin clouds illuminated by the moon, but were distinguishable by their variableness both in form and in the intensity of their yellowish light. At 7 P.M. the sky generally overspread by a rare stratus cloud, most visible in parts directly opposite the moon, permitting the blue sky to be seen through it elsewhere. Auroral light in arcs and streaks. The moon surrounded by an imperfect halo, 22° in semi-diameter, produced by somewhat oblique The paraselenæ yielded prismatic tints. At 71 P.M. stratus clouds. the aurora suddenly became active and variable, the great body of light being in the southern half of the sky. Of the prismatic tints exhibited yellow was the predominating colour, but green was occasionally seen, and the lower ends of the fringes when most vivid were crimson. In its motions the auroral light resembled the folds of a curtain made to wave to and fro; that is, the prismatic tints became visible and disappeared again in rapid succession along an arc or bar of light, first in one direction, then back in the opposite one.

This kind of motion has been denominated by some writers pulsation. After a continuance of this phenomenon in a variety of forms and places, the southern ends of the arches and of the banks of light lying to the eastward began to twist and curl on themselves, and to sway backwards and forwards before the stratus cloud, which they concealed in their passage. The cloud was strongly illuminated by the moonlight, and would have been seen had the auroral light been beyond it. In the course of the rapid evolutions of the lights, large sheets of it seemed several times to pass before the cloud, entirely concealing it, and consequently appearing to the eye to be much nearer. The needle of the Declinometer was steady at 7 P.M., but when the aurora began in the eastern part of the sky to exhibit prismatic light, it vibrated from 4° 32' to 4° 25', and at 7h 45m it had settled quietly at 4° 49', the aurora at that hour having become comparatively inert. At this period a streak of auroral light crossed the stratus clouds under the moon, traversing the blue spaces between the clouds, and forming a continuous line in front of them, well defined on their The upper bar of the lunar halo had disappeared by surface. this time; the space within the limb of the halo, which was now three quarters of a circle, being mostly blue sky. The oval paraselenæ still gave out prismatic tints. At 8 P.M. the moon, having risen into a blue space in the heavens, the stratus cloud was less visible. The prismatic paraselenæ now emitted rays of light outwards, and a beam of auroral light stretching towards the north, and, passing near the zenith, cut off a portion of the circumference of the halo. At this time the Declinometer was vibrating slowly from 5^h 10^m to 5^h 15^m, the numbers increasing slowly. At  $8\frac{1}{2}$  P.M. fine snow or minute spiculæ of ice falling, occasioned a haze sufficiently dense to conceal the blue sky, but not to prevent the stars of the first magnitude from appearing. The lunar halo was this time complete, the paraselenæ distinct, and an arc showing above the halo at the distance of a quarter of its diameter. Aurora in arcs faintly seen through the mist. At 10 P.M. hazy, circle of the lunar halo very distinct, but the paraselenæ scarcely to be made out. Stars invisible, and no auroral lights.

November 12.—Hazy. At 4 P.M. the Declinometer vibrating from  $4^{\circ}$  15' to  $4^{\circ}$  20'.

November 13.—Hazy.

November 14.—At 4 A.M. auroral clouds, emitting yellow light near the zenith. At 5 P.M. clear blue sky; a complete auroral arch from N.W. by N. to S.E. by S., crossing the magnetic meridian in the zenith at right angles; the arch composed of oblique yellowish beams, often moving and changing. At 6 P.M. the auroral arch occupying the same general position, but waving backwards and forwards; a few scattered masses of light in other parts of the sky. Needle steady. At 7 clear blue sky. No auroral light. At 8 a north-east wind setting in, the mercury in the barometer fell suddenly to a small extent. At 9 small, round, fleecy clouds, not dense, covering most of the sky, with blue intervals. No aurora.

November 15.—At 5 A.M. light N.E. winds, clouds coming from the N.W. At 1.40 P.M. the sun set in a halo. At 5 P.M. a broad auroral arch rising at its summit, about 18° or 20° above the southern horizon, vivid on its lower border, with quick motion backwards and forwards along the line of the arch. The upper border not defined, but fading gradually away. At 6 P.M. auroral arch in the same position, but not so bright. At 7 P.M. an auroral arch springing from the S.S.E. horizon and crossing to the N.N.W., occupying in the middle a space extending from near the zenith to within 16° of the S.S.W. horizon, but tapering towards the ends. The arch was composed of brighter streams of light, lying in the direction of its length and connected by fainter diffused lights. No auroral light was emitted from any part of the sky north of the zenith. At 8 P.M. only a few patches of auroral light remained; no clouds were visible. but the sky, generally, was greyish-blue. At 9 P.M. masses of auroral light shone dimly through the haze in the southern quarter of the sky. A very fine and slight deposition of snow, more readily felt than seen, was taking place at this hour.

November 16.— Air to-day inclined to part with moisture, evinced by the parchment windows becoming slack.

November 17.—This day the magnetic needles moved much. At 11 A.M. the magnet, suspended in the Unifilar Magnetometer, was vibrating between 520 and 540, and, subsequently, beyond the scale; and at noon the Declinometer moved suddenly from 1° 21' to 0° 29'. At 6 P.M. clear blue sky, with some stratus cloud near the horizon, above which there was a bank of luminous clouds, having a slightly reddish tint, resembling clouds tinged with the rays of the setting sun. Shortly afterwards the red tints became more vivid. and the quick east-and-west to-and-fro movement of vertical bars was exhibited. At 7 auroral light spreading from south to west. A falling star shot from east to west past Altair, having an apparent angle of descent of 40°. At 8 the Declinometer needle was 5° 5', but ten minutes afterwards returned to 4° 45', the auroral light having then disappeared. At 9 P.M. a dark cloud, concealing the stars in the southern quarter of the sky, to the height of 8°. Along the arched edge of this bank a yellowish light was emitted. Unifilar magnet moved back to 95. At 10 P.M. the auroral light diverged

from a point in the sky, adjoining Cassiopeia, to all parts of the horizon. The beams of light varied and moved rapidly. Soon afterwards the light had disappeared from the southern sky, and the auroral light was mostly in the north-west quarter. At the hour the Declinometer stood at  $1^{\circ}$  50', but moved quickly to 5°, and at  $10^{\circ}$  15^m the northern rays of the aurora had vanished, and then the needle had moved to 6° 28'.

November 18.—At 5 A.M. an auroral streak crossing the zenith from east to west.

November 19.-Snow. Sun very dimly seen at 1.

November 20.—At 6 P.M. an arch of the aurora, much like the *via lactea*, crossing the zenith from N.E. to S.W. At 7 auroral arches, having the above direction. At 8, and subsequently, no aurora.

November 21.—A burr round the crescent moon at 5 and 6 A.M. At the latter hour faint auroral light in the zenith. At 6 P.M. a bank of clouds along the southern horizon, emitting a white light. At 8 a broad low bank of yellowish light extending along the southern sky, and indented by dark clouds. Higher up several auroral arches crossed the blue sky, barred at their origin in the south-west by stratus clouds, and seated therefore beyond them. These arches did not go much beyond the zenith, but curved there in various directions. Stars pretty bright. The Declinometer moved 30' after the aurora shone out.

November 24.—At 6 and 7 P.M. faint auroral light near the zenith. At 11 auroral clouds. At midnight a patch of an arc to S.E. by E., and another bearing S. by W., about 8° high.

November 25.—At 2 A.M. patches of auroral light in many parts of the sky. At 4 many auroral arcs. At 5 and 6 A.M. patches and beams of auroral light. At 4, 6, 7, and 8 P.M. auroral light in various forms, banks, beams, and arcs, mostly of a yellowish hue. At 9 P.M. a more than usually fine auroral display. A great curtain extended from the east to the north-west quarters of the sky, at an altitude of about 60°, appearing as if suspended from a deep blue starry sky. This luminous curtain waved up and down, narrowed and expanded, and rolled back on itself at the ends. In the south part of the sky there were clouds, from behind which flashes of light were occasionally seen to shoot.

November 26.—At 9 AM. a mackerel sky, that is, short cirro-stratus lying across a line running north and south, and a long tract of cloud stretching from the N.W. in a S.E. direction, commencing about 12° from the horizon, and rising to about 70°; very thin and delicate, so as to be almost transparent, but appearing to the eye to

lie under the mackerel sky which it crossed. Part of this cloud had a wavy and flickering motion like the ordinary auroral light, and in a few minutes it faded entirely away like the aurora. It re-- appeared again more to the south somewhat altered in form, and in a minute or two vanished again. The motions of this stratus identify it with the auroral light, but had it been stationary it could not have been distinguished from a filmy cloud. I have no doubt but this variable cloud would have been luminous in the absence of daylight. At 4 P.M. an auroral arc, having a direction from N.W. to S.E., composed of detached and somewhat oblique and twisted bars. This arc occupied the site of the aurora-like cloud seen in the morning. Elsewhere a clear blue starry sky. At 5 P.M. much of the sky occupied by patches and banks of light. Several nearly contiguous arches crossed the zenith in a N.W. and S.E. direction, their ends uniting into single twisted stems as they approached the horizon. At 6 P.M. the whole sky nearly covered with auroral lights in different shapes. At 7 P.M. an arch crossing the zenith in the ordinary N.W. and S.E. directions. Patches of light elsewhere; all more or less changeable. At 9 P.M. several concentric arches, covering all the southern half of the sky from the zenith downwards. Brilliant fringes of light rising obliquely from the upper borders of the arches in continual motion; the lower edges of the arches were of more continuous light. At 10 р.м. а continuous sheet of light spread over all the southern half of the sky, but was traversed by brighter arches; a space near the horizon was the only dark part.

November 27.—At 6 A.M. auroral light in various quarters of the sky. At 7 A.M. banks of auroral light bearing south. Dawn just appearing in the east.

November 28.—At 4 P.M. an auroral arch crossed the zenith. Sky greyish; a few stars visible. At 9 a sheet of light shining faintly through clouds in the southern quarter of the sky.

November 29.—At 4 A.M. faint sheets of light in the S.W. At 5 and 6 A.M. auroral light as before, and at 7 auroral streaks still visible though the day was breaking. At 10 A.M. the suspended magnet moved in the course of two or three minutes from 330 to 350, with quick minor vibrations. At noon the magnet was vibrating in arcs of 12', and at 4 P.M. in arcs of 10'. At 5 P.M. beams of aurora rising in the north and tending to the east, the greatest altitude 15°. At 6 P.M. a bright curtain-formed arch rising to 50° in the north, extending from N.W. to N.E. with oblique fringes of light rising from its upper edge, and inclining to the eastward. At 7 P.M. two arches rising in the N.W., and crossing the magnetic

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meridian; their ends on attaining the zenith curling back. At 8 P.M. an auroral arch; and at 9 P.M. an arc, not very bright, rising in the N.W., and holding a flexuouse course to Cassiopeia, where it terminated. Several rays diverging from its end there towards the south, north, east, and west.

November 30.—At 5 A.M. faint auroral beams. At 8 dawn. Suspended magnet vibrated all day in arcs varying from 5' to 15' in extent; and had a progressive but not uniform motion from 309' to 254'. At 5 P.M. a broad auroral arch crossing the sky in a N.E. and S.E. direction, passing over the zenith. At 6 P.M. auroral light in patches. At 7 P.M. the arch interrupted in places, having a direction from N.W. to S.E., and touching both horizons. It was composed of detached bars and masses of light, not uniform in direction, but mostly crossing the general line of the arch obliquely. Clear blue starry sky. At 9 P.M. a faint arch having a direction from N.W. to S., and reaching both horizons; its greatest altitude about 70°. A dark cloud ranging along the southern horizon, and emitting pale light from its upper edge.

On the 7th the Declinometer fluctuated 1°, and the aurora was active in the evening. On the 8th the fluctuation was even greater. On the 17th the Declinometer ranged from 1° 20' to 6°, its motions being unusually great. On the succeeding day it fluctuated about 3°.

December 1.—At 7 A.M. no aurora. At 9 A.M. was able to write comfortably by daylight near the window. Sun hidden at noon by Fishery Island, but visible from a gentle eminence behind the house. Aurora invisible till 8 P.M., when an arch of yellowish lights about 16° high stretched from N.W. to N.E. The arch on a north bearing was a broad sheet of light, but near the N.W. horizon it was a twisted stem. Several broad pale sheets of white light. like the Milky Way, in the northern and eastern quarters of the heavens. At 9 P.M. the sky clear and starry, several arches of light springing from the N.W. horizon, and passing through the northern half of the heavens to the E.S.E. or S.E. by E. point of the horizon. The uppermost crossed the constellation of the Great Bear, passed a little south of Cassiopeia, and faded away in the S.S.E. Elsewhere some streams and banks of yellowish near the horizon. light existed. These arches vanished, and re-appeared at short intervals, and also moved from their sites, but had little internal motion.

December 2.—At 4 A.M. faint auroral light in the north and west. At 5 an auroral arch bearing south, at an altitude of 14° and extending for 160°. At 7 A.M. considerable deposition of rime on the thermometer scales. Arch of light bearing north, 16° high; also beams of light near the zenith. Dawn of day at 7, being an hour earlier than on the 30th November. Open water in the lake producing mist. At 6 P.M. auroral light near the northern horizon. At 8 and 9 P.M. faint auroral light, ditto.

December 3.—Mercury froze solidly this day. At 5 P.M. rays of auroral light in the north 10° high. At 7 P.M. an arc of the aurora in the east, and also one in the north-west, the middle part of the arch being deficient. Deep blue sky at 8, little activity in the auroral lights.

December 4.—At  $4\frac{1}{2}$  A.M. bright auroral arch, with patches of light in the W. At 6 A.M. patches of yellow light near the zenith, and also in the N.W. At 7 fragments of an arch shooting up from the N.W. horizon to near the zenith, and having a direction at right angles to the magnetic meridian. [At  $6\frac{1}{4}$  P.M. Dr. Rae, being then in latitude 67° 12' N., longitude 118° 16' 24" W., saw a falling star descending vertically on a nearly due north bearing, and passing a few degrees to the eastward of the pointers of the Great Bear.]

December 5.—[At  $6\frac{1}{4}$  A.M., in latitude  $67^{\circ}$   $7\frac{1}{2}^{\prime}$  N., longitude 117° 58', a falling star was observed by Mr. Rae, about 10° from the horizon, a little to the westward of north, travelling horizontally towards the east.] At 5^h 40^m A.M. an auroral arc, directed towards the east, rose from the west as high as the zenith. At 6 л.м. а bright beam of yellowish light rose from the N.E. horizon, to the height of 20°. At 7 first appearance of dawn. Mercury crystallizing in the open air in the middle of the day. At 5 P.M. faint beams of light rising from the N.W. to the height of 18°, vanishing and reappearing rapidly. At 6 P.M. a curve of auroral light, rising abruptly and interruptedly by steps in the N.W., continued to the S.E. in a parabolic curve, but formed throughout of slender vertical rays in motion. At 7 P.M. a faint belt of light crossed the zenith at right angles to the magnetic meridian. At 8 P.M. an arch crossed the zenith from N.W. to S.E., being nearly at right angles to the A few minutes before 9 P.M. a rather brilliant magnetic meridian. The light rose in the N.E. in successive steps, like the folds aurora. of a curtain hanging obliquely, and then dividing into three streams, held on across the zenith, and making a bold convex bend to the S., the ends curved to the N.N.W., but did not approach within 30° of The light had a yellowish colour, and a quick lateral the zenith. pulsation of the fine vertical rays of which the streams were composed.

December 6.—At 6 A.M. a broad beam of light rising from the N.W. horizon to  $30^{\circ}$ , and in the S. a dull bank of light occupying the space between the horizon and  $6^{\circ}$  altitude. At 9 A.M. was

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able to write near the window by daylight, and at 2^h 12^m P.M. was unable to do so distinctly,—the window looking S.S.E.

December 7.—Great refraction this morning. At 7 P.M. a slight burr round the moon. Faint streaks and bands of auroral light near the zenith, the masses mostly lying across the magnetic meridian. At 8 P.M. no aurora. At 9 bright moonlight. Blue sky, with stratus cloud near the southern horizon only, an auroral arch springing from the N.W. and crossing the magnetic meridian at right angles. It frequently changed place, being sometimes in the zenith and at other times more to the southward.

December 8.—Considerable refraction; distant land much raised. At 5 P.M. a stream of auroral light rising from the N.W., crossing the zenith at right angles to the magnetic meridian, but not going onwards to the S.E. Soon afterwards this stream moved to the southward and vanished. It had an internal waving motion. At 6 P.M. a broad arch of yellowish light, extending from N.W. by W. to S. by E., and having an altitude of 20° at its crown, rose from the N.W. horizon, and without anywhere exceeding an altitude of 20°,... bent round to the S. in a flexuose band, with obtuse projections to the E.S.E. It exhibited rapid changes of form, during which the suspended magnet vibrated 30', and the Declinometer was also in At 8 P.M. a broad sheet of light, including two brighter motion. arcs, now occupied the place of the above-mentioned band, but did not extend farther to the eastward than a south bearing. At 9 only a small part of an auroral arch remained, including merely one point of the compass, and bearing S.W. and S.W. by W.

December 9.—At 7 this morning, on approaching my hand to the iron latch of my bedroom door, a spark was emitted. I was then dressed merely in my night dress, with flannel drawers. At 9.10 A.M. able to read minion type of a bible by daylight. At 4 P.M. a series of bars of light, rising obliquely in the S.E. by E., and a similar steplike succession of bars in the N.W.; there was no continuous arch across the zenith connecting these two groups of bars, but in place of it a very narrow streak of light curved boldly and convexly to the north in the zenith, and a mass of yellowish light lay more to the south. At 5, 6, 7, 8, and 9 P.M. no auroral light. Moon very clear and bright.

December 10.—At 6 A.M. bright moonlight; no aurora. At 7 A.M. some thin sheets of light distributed irregularly, several of them in the S., S.E., and S.W., having a convergence towards the zenith. At this instant the suspended magnet was observed to be moving from 390' to 405', and, after vibrating somewhat irregularly in a mean arc of 10°, to settle for a time at 420°. The Declinometer was then 3° 17'. After recording this observation in the bedroom, and returning to the open air, the aurora had ceased to be visible, and the suspended magnet was found at 370'. A burr at this time round the moon. At 8 A.M. faint streaks of light near the zenith, stretching to S.S.W., or nearly in the magnetic meridian; these streaks vanished and reappeared with rapidity. Burr round the moon. At 9 and 10 mist near the horizon. At 11 and noon the sun below horizon, but beams of light shooting up from it into the sky. Full moon at 3^h 48^m this morning, Fort Confidence time. At 6 P.M. an auroral arch from N.W. by W. stretching across the zenith, and disappearing on a S.E. bearing. A burr round the moon, but the sky elsewhere cloudless blue. 7, 8, and 9 P.M. no aurora.

December 11.—At 5 and 6 A.M. no aurora. At 7 a faint burr round the moon; and at 8 and 9 paraselenæ. At 10 great refraction. At 11 redness in the sky above the sun's place, bright and circumscribed, the sun itself hid by Fishery Island. At noon a parahelion seen to the east, where the island is lower; the sun itself invisible. At 1 the same appearance, but less distinct. (At 6.15 P.M., in latitude 67° 6', longitude 118° 22', Mr. Rae saw a bright falling star in the west, making in its descent an angle of 45° with the horizon. It vanished when about 14° high. At  $6^{h} 40^{m}$  he observed another star falling from near the zenith towards the west, and passing to the south of Lyra. At 7^h 10^m he saw a falling star in the same quarter of the sky as the one he noticed at 6^h 15^m, and taking the same direction.) At 8 and 9 P.M., at Fort Confidence, an arch of clouds in the S.W., brightly illuminated by the moon, and not to be distinguished from some exhibitions of aurora in the absence of that luminary.

December 12.—[At  $2^h$   $32^m$  A.M., in latitude  $67^\circ$   $6\frac{1}{2}'$  N., longitude 118° 22' W., Mr. Rae saw a falling star descending almost vertically, or slightly inclined northwards.] At 6 A.M., at Fort Corfidence, the sky almost wholly overspread by a filmy stratus, which was rendered visible by the bright moonlight. Stars of the first magnitude visible through it. At 7 A.M. a general mistiness, with a deposit of fine snow. A dim lunar halo, with a semidiameter of 22°. Snow occasionally in the day. At 4 P.M. a broad yellowish auroral arch rising from the S.E. horizon, and passing south of the zenith in a S.W. direction, but terminating in a luminous cloud, at an altitude of 60°. At 5 P.M. two parallel arches of light rising in the S.E. and proceeding to the N.W., occupying a middle height between the southern horizon and the zenith. Considerable motion, resembling that which would be caused by a

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dark bar carried with extreme rapidity towards the west in front of the light. At 6 P.M. the arches of the aurora rather lower and not in motion. Their crowns are in the magnetic meridian. At 7. P.M. an arch of the aurora bearing south, and reaching from the S.E. to N.W. its crown about 20° high. It was rather broad, yellowish, and nearly motionless. At 8 P.M. two broad and fainter arches, partly blended into each other in the south, about 12° high; also some masses of light near the zenith. At 9 P.M. the southern arch now reached from N.W. only to about S., where it terminated at the height of 25°. There was no auroral light in the S.E.; but five or six arches passed from N.E. to N.W., the uppermost of them crossing the zenith, and the lowest one running near the horizon.

December 13.—At 7 A.M, early dawn. No aurora until 9 P.M., when a broad arch of yellowish light in oblique bars extended between the N.W. and S.E. horizons, passing about 30° to the north of the zenith.

December 14.—No aurora in the morning. Some fine snow deposited about noon. At 6 P.M. sky greyish, but no visible clouds; a few stars shining out. A faint but broad arch extending from N.W. to S.E., appearing and disappearing in 'rapid succession. At 3 P.M. a belt of pale light about 10° broad, extending from N.W. to S.E. horizons, and crossing the zenith. Sky clearer and bluer, with more stars, but a fine snow continuing to fall;—the stars shining through the auroral light. At 9 minute snow. Sky not quite so clear. Arches of light bearing south, and some masses scattered over the sky.

December 15.—About a quarter of an inch of fine snow fell in the night. At 7, 8, and 9 A.M. lunar halos. At 10 A.M. there was a light air from the W.S.W. at the height of twenty feet, and one from the N.N.E. nearer the ground, as shown by a zig-zag column of smoke from our chimney. At 6 P.M. O Sextantis occulted by the moon. No aurora this evening. Deep blue sky, with many stars. Fine spiculæ of snow falling thickly.

December 16th. — At 5 P.M. a sheet of pale light like the Milky Way, overspreading the southern half of the sky, with dark, narrow, oblique bars crossing it. The rapid shifting of these dark bars across the light showed it to be the aurora, otherwise it might have been thought to be twilight lingering in the sky. At 6 P.M. faint streaks of aurora rising from the N.W. horizon to past the zenith in a S.E. direction, but ending short of the Pleiades. In a few minutes this stream changed into several fainter rivulets, having the same direction, and occupying greater breadth in all. Sky dark blue, and starry. At 10 P.M. a broad luminous arch in the south.

December 17.—At 1 P.M. temperature of the atmosphere,  $-61^{\circ}$ . Long prismatic crystals were formed in nitric acid, having the strength recommended in the London pharmacopeia, and at 3 P.M., when the temperature had fallen to  $-63.8^{\circ}$  Fahrenheit, almost the whole of the acid in the vial (2 oz.) was frozen. Sulphuric acid had frozen solidly long before. Mercury at this time could be cut with a knife more easily and more smoothly than lead. At 7 P.M. two bright auroral arches to the southward, having a curtain-form, and a rapid to-andfro bar-like movement; the highest was 20° from horizon. At 8 only a few patches of dull light in the south. At 9 two bright arches in the south; very changeable. They reached from W. to S.S.E., but did not in general rise above 20°. Sometimes they appeared as if twisted and bent or broken, occasionally sending shoots down towards the horizon, and exhibiting in their upper borders the quick bar-like motion, with fringes shooting upwards ometimes to the extent of 15° or 20°, or nearly half-way to the zenith. The Declinometer varied 35' between 8 and 9. The temperature of the atmosphere was now  $-61^{\circ}$  Fahrenheit; the nitric and sulphuric acids, and of course mercury, remained solidly frozen. Muriatic or hydrochloric acid was perfectly fluid.

December 18.—At 5 A.M. beams of aurora in the west. The temperature of the air at 9 A.M. was  $-63^{\circ}9^{\circ}$ , being the lowest observed in the winter.* Sulphuric acid had an opake white colour. At 6 P.M. a slender auroral arch from N.W. to S.E. passed across the zenith. At 7 and 8 no aurora. At 9 faint beams of light shooting towards the west from near Cassiopeia. The mean temperature for forty-eight hours was  $-61^{\circ}$  Fah., or  $93^{\circ}$  below the freezing point of water. We had travelling parties out at this time.

December 19.—At 7 A.M. two beams of light rising in the west, one of them taking a course to the S.E., the other diverging from it to the E., or E. by N. They did not reach the meridian, but approached it. At noon the suspended magnet was vibrating irregularly. At 7 P.M. two broad arches crossed the zenith from N.W. to S.E. Sky generally bluish-grey. Abundance of stars overhead; none within 20° of horizon. No other sign of clouds. At 8 P.M. five broad streams of light rising in the E.S.E., and diverging in their ascent so as to spread over most of the sky. The light more dilute towards the edges of the streams, which in some points touched each other. The central streams crossed the zenith. The arches were rapid in their changes of form and extent.

* A spirit thermometer by Nosotti, constructed probably in the ordinary way alluded to by Professor Forbes at page 40, stood at  $-81.5^{\circ}$ , having sunk nearly to the bulb.

December 20.—At 10 A.M. could not write by daylight at this hour. Sulphuric acid freezing partially at a temperature of  $-8^{\circ}$  Fahrenheit. Nitric acid limpid. At 6 P.M. faint auroral light in the north. At 7 no aurora. At 8 P.M. faint arches rising N. by W., and extending towards the south. At 9 two faint arches of light in the south, having an altitude of 14°, and 6° at their crowns. At 10 the arches had an altitude of from 40° to 45°. At midnight patches of auroral light scattered over the sky.

December 21.—At 1 A.M. stars shining very brightly. A brilliant aurora in rapid motion, and momentarily changing its form. Its lower edge had a fine lake colour, and it was brightest on the S.W. and the W. bearings. At 2 A.M. a very bright display of auroral light. Declinometer and Dipping Needle vibrating much. At 4 A.M. faint beams of aurora in the north. At 6 A.M. curtain-shaped aurora extending north and south, with active motion. At 7 A.M. no aurora. Light variable winds. Temperature, 47^{'3°}. At 7 P.M. a faint auroral arch rising from the N.W. to past the zenith. At 8 P.M. an auroral arch rising from the S.E. for  $35^{\circ}$ ; some short beams in the N.W. At 9 P.M. a beam of light in the north.

December 22.—No aurora observed in the morning. At 5 P.M. beams of light on a S.E. bearing, and some also bearing N.W. At 6 P.M. beams in the same quarters more faint. At 7 P.M. faint auroral light bearing north. At 8 an arch of faint light crossing the zenith from the N.N.W. to the S.S.E. At 9 P.M. an arch 10° high in the S.W. extending from S.S.E. to N.N.W.

December 23.—At 5 A.M. a broad arch of light standing from W.N.W. to E.N.E. and crossing the zenith. At 6 A.M. faint rays of light in the N.W. and also to the east. At 7 A.M. an arch of light 6° high bearing S.S.W. Was able to write by daylight, when close to the window, this day for  $4\frac{1}{2}$  hours, viz., from 10 A.M. to  $2\frac{1}{2}$  P.M. At 5 P.M. auroral light rising vertically from the north horizon. At 6 P.M. a broad, irregular, and broken arch of light having a direction from N.N.W. to S.S.E., and passing south of the zenith. Its greatest altitude, 45°. At 7 P.M. a mass of light in the S.S.E. about 6° high. At 8 P.M. beams of the aurora in the south and S.W. At 9 P.M. auroral light bearing S.S.W.

December 24.—At 6 A.M. rays of light rising vertically from the eastern horizon. At 7 A.M. a faint auroral arch, its crown bearing north, and having an altitude of 12°. Another arch bearing S.W. with an altitude of 7°. At 10 A.M. stratus cloud along the E.S.E.; horizon beautifully tinged red by the sun's light. Intervals of

mountain green sky in that quarter. Rest of the heavens grevish blue. At noon the sky very bright on the southern meridian for some distance above the horizon. The southern sky retained the red tints of a rising and setting sun from 10 A.M. till 2 P.M. At 6 P.M. an arch of light formed of oblique rays crossed the zenith and reached the N.W. and S.E. horizons. At 7 P.M. a similar arch in the same portion, with its tranverse bars in motion. Masses of light near the horizon all round the sky. At 8 P.M. curtain-shaped, interrupted arcs of light directed across the magnetic meridian at right angles. One of them lay a little to the south of the zenith; the others were situated a little more to the northward. The arches were separated from each other, and also interrupted in the direction of their lengths, by vertical dark spaces, which were continually changing their places and dimensions, but did not exhibit the rapid to-and-fro bar-like motion so conspicuous on other occasions. Stars moderately bright. New moon. At 9 P.M. there existed five handsome curtain-formed arches more or less twisted and uneven. One crossed the zenith; the rest were more to the southward. They occupied the whole southern half of the sky, and were directed at right angles across the magnetic meridian. The brightness of the arches varied continually, and they were occasionally connected by beams of light shooting between the contiguous arches.

December 25.-At 5 A.M. snow drift. Masses and beams of light bore E. and N.W. At 6 A.M. an auroral arch whose crown, 6° high, bore S.W. At 7 beams of aurora in the N.E. having a direction to the S.W. At 8 A.M. dawn. At 5 P.M. a bank of auroral light extending near the horizon from the N.W. by N. point of the compass round to N. and onwards to E. by N. Numerous beams shot up from it to the height of from 8° to 12° or 14°. At 6 P.M. rounded and oblong patches of auroral light near the zenith, and also in other quarters of the sky, particularly in the north. A bank of light lying along the southern horizon. At 7 P.M. faint patches of auroral light. At 8 P.M. a horizontal band of light at the height of 30° in the north. A stream of brighter light rising in the north joined the west end of the band. Faint patches of light existed elsewhere. At 9 A.M. irregular masses of aurora-like columns of mist resembling smoke in various parts of the sky; the most conspicuous are rising from the N.W. by N. points of the horizon.

December 26.—At 4 A.M. a fine auroral arch having an extent of 80° and rising in the south to an altitude of 20°; also masses of light in the east and vertical beams in the N.N.W. At 5 A.M. faint rays having a N.N.W. and S.S.E. direction. Their changes of position were rapid. At 7 A.M. aurora in masses and beams in the S.W.

quarter of the sky. Faint appearance of dawn in the east. At 7 P.M. two faint arches crossing the zenith and having a direction of from S.E. to N.W.

December 27.—At 21 A.M. a patch of light in the N.W. at an altitude of 45°. At 7 a narrow arch crossing the zenith from the eastern to the western horizon. At 4 P.M. temperature of the air, -43'9° Fahrenheit. Nitric acid crystallized in beautiful clear crystals. At 6 P.M. a broad, yellowish, quiescent arch, extending from the N. by W. horizon to the N.E. one. Its summit not rising more than 9°. Many rounded cloud-like patches of polar light between Cassiopeia and the Great Bear. At 7 P.M. the arch near the northern horizon continued, and there was an inverted cone of light, having its base elevated 12°, and its apex touching the N.W. horizon. Also some patches of light near the zenith. At 8 A.M. the arch in the north less complete and less bright. Large masses of yellowish light lying a little to the west of the zenith. Some beams rising from the S.E. horizon and a solitary one from the N.W. At 9 P.M. two bright arches springing from the N.W. by N. point of the horizon, and spreading wider as they rose towards the zenith, where they covered 40°; thence narrowing as they advanced to the S.E.

December 28.—At 5 P.M. masses of pale light in the north forming a low, broken arch. A few patches to the north of the zenith. At 7 a dull yellowish arch from the N.W. to S.E. passing to the north of the zenith. No clouds visible, but only stars of the first magnitude shining out. At 8 P.M. the same arch, more interrupted and also connected with large cloud-like patches of light. Sky dullish, not cloudy. At 9 no aurora.

December 29.—At 4 A.M. an arch of light standing across the zenith, with patches in the S.W. and N. by W. At 5 A.M. faint patches in the east and north and near the zenith. At 6 A.M. no aurora. At 4 P.M. sky tinged yellowish in the western horizon by the sun's rays, though that luminary was considerably under the horizon. At 7 P.M. an arch of light from N.W. to S.E. passing a little to the north of the zenith. It was barred across near the zenith by layers of stratus cloud. At 8 P.M. the extremities of the arch had the same bearings, but its crown had passed to some distance south of the zenith, against the wind. At 9 P.M. five arches covering the sky from  $30^{\circ}$  north of the arches converged in the N.W. and S.E. points of the horizon. Some internal motion existed in the arches.

December 30.—At 5 A.M. auroral rays rising vertically from the N.N.W. horizon. At 6 A.M. an arch of light crossing the zenith

from east to west. At 7 A.M. an arch from W.N.W. to S.S.E., rising about 20° above the southern horizon. A cloud-like patch of light in the N.W. by W. near the horizon, and a slender curved stream passing from the same point towards the arch. A pale sheet of light diffused over the northern half of the sky, and widely spread in the east also. At 9 temperature of air  $-39.6^{\circ}$ . Mercury wholly Nitric acid solidly crystallized. Sulphuric acid solid, and fluid. semitranslucent. Hydrochloric acid fluid. At 10^h 40^m temperature of the air  $-40.5^{\circ}$  Fahrenheit.* About the fifth part of the mercury exposed in a shallow basin frozen; the solid part lying at the bottom, and having serrated edges as usual. At 11 A.M. rays of light shooting up from the sun's place. The men who went for meat two days ago, in passing over a hill saw the sun a good way above the horizon. At 2 P.M. a bright vertical beam of light rose from the sun's place. The quantity of frozen mercury has rather increased, the temperature of the air having been for two hours  $-39.5^{\circ}$  Fahrenheit. At 4 P.M. red sky in the S.W. At 5 P.M. broad vertical beams of auroral light in the north, extending from N. by W. to N. by E., separated from each other by considerable intervals of blue sky, but arranged so as to form a low interrupted arch, whose summit was 18° high. The westernmost beams were midway between the horizon and Great Bear. At 6 P.M. the interrupted arch in the northern sky had risen to the elevation of 35°. It was broadest and brightest in the N.E. At 7 P.M. two bright contiguous arches, emitting yellowish light, spanned the sky from N.W. to S.E., the uppermost of the two crossing the zenith. Their breadth varied greatly, and their limbs in approaching the horizon were much curved and twisted. At 8 P.M. a bright arch crossed from N.W. to S.E. passing above 20° south of the zenith. It was composed of oblique beams of yellowish light, and was twisted near the horizon. Two pale arches, of the intensity of the Milky Way, and covering about 30° in breadth, existed to the north of the zenith. At 9 P.M. two arches springing from the N.W. by N. part of the horizon, became fainter as they rose to near the zenith, where one disappeared; the other, passing a little north of the zenith, was prolonged to the S.E.

December 31.—At 5 A.M. rays of light bearing S. and S.W., in rapid motion. At 6 A.M. patches of light and rays in the S., S.W., and W. near the horizon. At 8 P.M. vertical beams of light in the N., and N.W. by N., and a horizontal bank bearing north. At 9 P.M. an obscure but broad arch of the aurora bearing south,

^{*} The temperatures noted in these remarks were corrected for the error of the thermometer on the assumption that  $-40^{\circ}$  is the proper freezing point of mercury. The temperature actually read off at  $10^{h} 40^{m}$  A.M. was  $-36\cdot8^{\circ}$  F.

with large inactive masses of light a little way above it. Stratus cloud running all round the horizon.

On the 1st of December the Declinometer fluctuated 1°. On the 20th the fluctuation amounted to  $1\frac{1}{2}^{\circ}$ , the sky being cloudless, but a deposition of crystals of ice on glass and rough metallic surfaces going on. On the 10th the fluctuations of the needle exceeded a degree. On the 18th it was as great. On the 26th it was  $1\frac{1}{2}^{\circ}$ . On other days it was generally below a degree, as may be observed by a reference to the table of variations of the Declinometer, the most remarkable movements only being pointed out in this summary.

On the 4th January 1849 the Declinometer fluctuated 1°. No aurora was visible, a thin haze overspreading the sky in the evening. During the low temperatures of the 6th and 7th there was little fluctuation of the needle. On the 11th the movement of the card exceeded a degree, and in the evening sheets of auroral light, with considerable changes and flashes, overspread the sky. On the 16th the needle moved 2°. Only faint appearances of aurora were observed, and the sky was perfectly cloudless all day and in the evening. On the 25th the movements of the needle again exceeded a degree; the sky was completely obscured. A fine snow fell in the evening, and no aurora was visible. This was one of a number of instances in which the needle was observed to be affected considerably when the sky was inclined to deposit a minute crystalline snow.

The aurora was comparatively seldom seen in this month. It was noticed at the hours of observation, only on the 10th, 11th, 14th, 15th, 16th, 17th, 19th, 20th, 22nd, 23rd, 24th, 27th, 28th, and 30th.

February, 1829.—The aurora was visible at one or more hours on the 1st, 2nd, 10th, 11th, 12th, 13th, 16th, 17th, 19th, 20th, 21st, 23rd, 24th, 25th, 26th, and 27th.

On the 13th the movement of the Declinometer exceeded 1°. Mackarel sky, with sheets of auroral light. On the 20th the movement was  $1\frac{1}{4}^{\circ}$ , and there were considerable displays of auroral light at all the hours of observation in the evening. On the 21st, at 3 A.M., the temperature of the air in the shade, when corrected for the error of the thermometer for the freezing point of mercury at  $-40^{\circ}$ Fahrenheit, was  $-56^{\circ}7^{\circ}$  Fahrenheit. At this time an ounce of nitric acid, which had been standing in a vial with a glass stopper in the open air all night, was fluid; but at 5 A.M., when the temperature of the air was  $-56^{\circ}4^{\circ}$ , it was solidly frozen. Sulphuric acid was also at the latter time frozen, and its upper part of an opake white colour. A bottle of creosote (4 oz.), which had been out of doors all day, began to show round opake balls at the bottom. At 4 P.M., the tempe-

rature of the air having then risen to -35 7° Fahrenheit, two or three round flat cakes existed at the sides also of the creosote bottle; the rest of the fluid was transparent, but thicker than usual. Each of the round patches was marked with concentric rings of a darker colour, like the frond of *ulva pavonia*, or a section of maple wood. At 7 P.M. these cakes had augmented in size, and had a central point. The appearances of the aurora this day are detailed in the term day observations.

On the 22d February the fluctuation of the Declinometer amounted to  $1\frac{1}{2}^{\circ}$ , the sky being overcast most of the day and no auroral light visible. On the 23rd at 3 P.M. the phials of sulphuric and nitric acids and of creecote were wholly frozen, the temperature of the air being  $-39^{\circ}$  Fahrenheit, and colder than it had been previously in the day. On the 27th the fluctuation of the Declinometer was  $1\frac{1}{2}^{\circ}$ and there were some curtain-shaped, arch-like displays of the aurora.

March 1849.—The auroral light was visible on the 1st, 3rd, 6th, 8th, 11th, 12th, 14th, 15th, 17th, 18th, 19th, 20th, 21st, 22nd, 24th, 25th, 26th, and 30th.

The fluctuation of the Declinometer amounted to 1° on the 6th. The sky was wholly obscured most of the day, but in the evening there was an arc of aurora extending from the N.W. to the S.E. horizon, and passing about 50° south of the zenith; the sky then being almost cloudless and Venus shining most beautifully. On the 18th the next fluctuation of the needle to the same extent was observed, the displays of aurora being very faint, and in the southern quarter of the sky. On the 19th the Declinometer varied more than 2°. At 9 P.M. an arch of the aurora sprang from the N.W. horizon, and, passing over the zenith, descended to the S.E. On the 20th the fluctuation was  $1\frac{1}{2}$ °. A cloudless sky with streams of auroral light and long fringes in the S.E. part of the sky. Also at 10 P.M. curtain-like expansions, rolling occasionally inwards like a scroll, and expanding again.

On the 21st the fluctuation of the Declinometer at the hours was more than  $1\frac{1}{2}^{\circ}$ . The appearances of the aurora are detailed in the term day observations. On the 22nd the Declinometer varied more than  $1\frac{1}{4}^{\circ}$ , and a few patches of aurora early in the morning were all that were seen; the sky remaining perfectly cloudless the whole 24 hours. On the 24th the Declinometer varied 2°. The sky was obscured wholly till 7 P.M., when it cleared up entirely, and as had been observed in such cases, the north end of the needle then moved more towards the east. The displays of the aurora in the evening were faint.

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April 1852.—From the extent of daylight in this month the aurora was seldom seen before 10 P.M., at which hour our observations ceased for the day. It appeared, however, on the 4th, 8th, 13th, 14th, 15th, 18th, and 21st. The Declination observed by eight sets of azimuths in the fore and afternoon of March 31st, was found to be  $50^{\circ}$  16' 52 '7" easterly, the Declinometer being 4° 22'. On the 16th the Declination was by the mean of six sets of azimuths, 51° 58' 52", the north end of the Declinometer having at the time a mean direction of 3° 37'. The needle fluctuated much during these observations. On the 21st the mean variation deduced from six sets of azimuths was 49° 54' 36" E., the mean direction of the north end of the Declinometer being 4° 25' The mean easterly variation by the three series was 50° 44' 14 '2", and the mean direction of the north end of the Declinometer during the observations for azimuth, 4° 04 '1'.

On the 2nd of April the fluctuation of the Declinometer was 2° 28', the sky being obscured the whole day, and no aurora visible. On the 3rd the fluctuation was  $1\frac{3}{4}^{\circ}$ , the sky continuing obscured, On the 4th the sky was nearly cloudless the whole without aurora. day; only a faint arch of aurora at one time in the evening; but the fluctuations of the needle were 3° 40' in the day. On the 6th the fluctuation of the Declinometer exceeded 1°. The sky, which was cloudless all day, was obscured after sunset. On the 9th the Declinometer fluctuated 31°. The sky was partially cloudy in the day, quite cloudless after sunset, and no aurora was seen. On the 10th the fluctuation exceeded 1°. The sky, as on the preceding day, being cloudless till 7 P.M.; after which it was more or less cloudy, but no auroral light was seen. The red tints of the setting sun had scarcely departed entirely from the sky before 10 P.M., when our observations ceased. On the 14th, the Declinometer varied more than 1°. The sky was wholly cloudless till 10 P.M., when three-tenths of the vault was cloudy, and an auroral arch crossed the zenith, having a direction from N.W. to S.E. On the 16th the fluctuation of the needle exceeded 11°; the sky being almost wholly covered with clouds till 10 P.M., when seven-tenths of it was cloudless; no aurora was seen, On the 18th fluctuation to the extent of  $1\frac{1}{2}^{\circ}$  occurred. The sky was wholly cloudless, and a faint auroral arch was seen at 10 P.M. in the usual direction, or crossing the magnetic meridian at right angles. Daylight not wholly gone, and the red tints of the western sky extensive.

On the 19th the Declinometer varied 1°. A cloudless sky, and no aurora. On the 20th the fluctuation was also about 1°, the sky being wholly covered with clouds till 10 P.M., when it cleared up, nine-tenths becoming blue, but no aurora was seen. On the 21st the Declinometer varied  $1\frac{1}{4}^{\circ}$ , and very suddenly at 9 P.M., when the sky, after being quite cloudless, had become rapidly overspread. Some of the clouds resembled auroral arches; but emitted no light, the daylight not having gone. At 10 P.M. auroral arches contended with the twilight, and half an hour later their peculiar light was more apparent. After this date no aurora was recorded, the daylight being too powerful for its display at 10 P.M. The degrees of the thermometer could be read in the open air by daylight between 9 and 10 P.M. on the 23rd. The fluctuations of the Declinometer exceeded a degree on some of the subsequent days of the month, as may be perceived by a reference to the tables.

On a review of the observations made during the seven months, many instances of the simultaneous occurrence of fluctuations of the needle with movements in the auroral light were noticed; but there were also examples of fluctuations of the needle in the absence of the aurora, and very numerous ones of brilliant auroras accompanied by a stationary or sluggish needle. I cannot therefore venture to ascribe the movements of the needle in any case to those of the aurora, or to any particular direction of the beams and arches. I think, however, that the needle varied more frequently during the sudden formation of clouds than at other times; and I am also inclined to say that the formation of clouds often followed brilliant and active auroras. It is a popular belief in the fur districts that very fine displays of the aurora presage windy weather.

With respect to sounds of the aurora, the belief prevails in the arctic regions that it is occasionally audible when very bright and active, at which times it is believed by the natives to be near the earth. Having witnessed the phenomena some thousands of times without hearing it, I have become sceptical of its ever producing sounds audible on the surface of the earth. The sounds it is said to cause are likened by many to the rustling of silk; and I may observe that the curtain-like appearances and motions of the brightest auroras are likely to be associated with the remembrance of such sounds, and also that the formation of minute icy spiculæ in very cold clear nights is accompanied by a crackling in the air.

Haslar Hospital, 12 January, 1852.

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DELCROS'S BAROMETER.

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FORT CONFIDENCE.

Abstract of Hourly Observations in the month of October 1851.

## FORT CONFIDENCE.

from Standard Baromotor but not for tommometur

#### Abstract of Hourly Observations in the month of October 1848.

Delcros's Barometer, corrected for capillarity and mean deviation Day. Noon 11. 10. 7. 8. 9. Civil Time. 5. 6. 4. í., 3. 2. Mill^m. 738 · 69 39 · 34 35 · 71 Mill^m. 738.82 38.09 35.83 33.69 29.00 44.12 Mill^m. 738 · 34 40 · 79 35 · 16 Millm. Mill Mill^m. Millm. Mill^m. Mill^m. Mill^m. Mill^m. Mill^m. _ 737 742.00 41 33 9 -----728.74 ----32·54 45·19 33·06 39·68 32·99 27·24  $\begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 19\\ 21\\ 22\\ 23\\ 45\\ 26\\ 78\\ 90\\ 31\\ \end{array}$ \$3.0 32.0 44.1 32.0 732-19 _ 31.14 35.19  $34.29 \\ 30.02$ 39 29.82 32.84  $\frac{32.04}{28.19}$ 731.54 25.7 27.34  $\begin{array}{c} --\\ 27\cdot84\\ 33\cdot34\\ 31\cdot99\\ 33\cdot34\\ 33\cdot79\\ 26\cdot34\\ 17\cdot49\\ 24\cdot04\\ 24\cdot04\\ 24\cdot19\\ 27\cdot85\\ 37\cdot94\\ 43\cdot64\\ 35\cdot89\end{array}$  $33 \cdot 29 \\ 31 \cdot 72 \\ 31 \cdot 84$  $\begin{array}{c} 33 \cdot 19 \\ 32 \cdot 89 \\ 33 \cdot 74 \\ 24 \cdot 89 \\ 18 \cdot 19 \\ 24 \cdot 59 \\ 24 \cdot 29 \\ 29 \cdot 04 \\ 38 \cdot 09 \\ 43 \cdot 84 \\ 34 \cdot 34 \end{array}$ 32.54 32.66 32.66 33.79 23.74 18.34 24.34 24.49 29.74 38.59 44.34 34.0930°1 32°9 33°4 34°( 23°1 18°( 23°1 24°1 30°  $\begin{array}{r} 33.89\\ 31.59\\ 33.54\\ 33.84\\ 27.69\\ 10.79\\ 24.19\\ 24.14\\ 28.09\\ 37.99\\ 43.64\\ 36.79 \end{array}$ 31.84 33.54 25.89 17.79 23.54 24.34 28.59 38.09 43.74 35.29724.14 27.04 44 33 42.82 35.89 731.28 732.70 732728.74 729.99732.51 732.14 731.87 731.54 ----724.14Millimètres ____ 28.847 28.8 28.840  $28 \cdot 825$ 28'813 28.79128.690 28.740 28.80128.509 ----Inches ____ 28.788 28.7 Corrected for 32° Fahrenheit 28.729 28.691 28.78328.768 28.752----------_ 0.092 0.0 0.022 0.061 0.038 ----0.000 0.095 ~ **.....** ----Oscillation ----Highest, 29.278. Range, 1.102 inches.

	stanuaru	Barome	ter, but i	not for te	mperatu	re.						
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midn ^t .	Means.
$ \begin{array}{c c} \text{Mill}^{m}, \\ 736 \cdot 42 \\ 41 \cdot 82 \\ \hline \\ 33 \cdot 59 \\ \hline \\ 32 \cdot 34 \\ 30 \cdot 09 \\ 32 \cdot 79 \\ 25 \cdot 79 \\ 25 \cdot 79 \\ 27 \cdot 24 \\ 33 \cdot 66 \\ 32 \cdot 34 \\ 33 \cdot 64 \\ 22 \cdot 74 \\ 19 \cdot 04 \\ 24 \cdot 14 \\ 24 \cdot 14 \\ 24 \cdot 14 \\ 24 \cdot 14 \\ 24 \cdot 14 \\ 24 \cdot 23 \\ 39 \cdot 94 \\ 44 \cdot 60 \\ 32 \cdot 94 \end{array} $	$ \begin{array}{c} \text{Mill}^{\text{m}}, \\ \textbf{736}, \textbf{34}, \\ \textbf{42}, \textbf{29} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ \textbf{-} \\ $	$ \begin{array}{c c} \text{Mill}^{\text{m}}, \\ 735\cdot 69 \\ 43\cdot 29 \\ - \\ 44\cdot 92 \\ 32\cdot 29 \\ 32\cdot 29 \\ 32\cdot 94 \\ 32\cdot 94 \\ 32\cdot 94 \\ 32\cdot 94 \\ 32\cdot 94 \\ 23\cdot 94 \\ 23\cdot 94 \\ 23\cdot 94 \\ 23\cdot 94 \\ 35\cdot 90 \\ 44\cdot 33 \\ 23\cdot 24 \end{array} $	Mill ^m . 735:39 42:90 35:92 - - - - - - - - - - - - -	$ \begin{array}{c} \text{Mill}^{\text{m.}}, \\ 734 \cdot 93 \\ 42 \cdot 99 \\ 31 \cdot 72 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ $	Mill ^m . 4 2·39 	$\begin{array}{c c} \text{Mill}^{m}.\\ & & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\$	$\begin{array}{c} \text{Mill}^{\text{m}},\\ \textbf{741}\cdot\textbf{94}\\ \textbf{-}\\  $ \begin{array}{c c} \text{Mill}^{\text{m}}, & \\ \textbf{732'49} \\ \hline \\ \textbf{30'69} \\ \hline \\ \textbf{30'69} \\ \hline \\ \textbf{33'21} \\ \textbf{33'21} \\ \textbf{33'21} \\ \textbf{33'22} \\ \textbf{33'24} \\ \textbf{33'29} \\ \textbf{33'24} \\ \textbf{24'04} \\ \textbf{24'79} \\ \textbf{24'24} \\ \textbf{24'79} \\ \textbf{24'54} \\ \textbf{24'63} \\ \textbf{33'89} \\ \textbf{33'89} \end{array} $	Mill ^m .	Mill ^m .	Mill ^m .	Mill ^m . 736 44 41 65 34 57 32 94 31 55 44 60 32 99 32 52 32 26 25 98 22 68 32 26 32 67 32 71 32 87 32 87 32 87 32 87 32 90 19 59 23 90 23 90 24 58 30 32 39 75 44 61 34 60	
731.66	731.49	732.49	782.05	731.54	731.87	730.70	731.61	730.44	725.54	726.34	726.44	731.69
28.806	28.799	28*839	28.821	28.801	28.814	28.768	28.804	28.758	28.565	28.597	28.600	28.807
28.742	28.736	28.778	28.760	28.737	28.748	28.705	28.740	28.692	-	-		28.746
0.021	0.042	0.082	0.049	0.046	0.022	0.014	0.049	0.001			-	0.024

Lowest, 28.165 inches, corrected for 32

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# METEOROLOGICAL OBSERVATIONS.

# FORT CONFIDENCE-continued.

Abstract of Hourly Observations in the months of November and December 1848.

Tra					Delcros's	Barome	ter, corr	ected for	capillar	ity and r	nean dev	iation		
Day. Civil Time.	1.	2.	3,	4.	5.	6, ]	7.	8.	9.	10.	11.	Noon.		1 1 1
CIVIL TILLE.					Mill ^m .	Mill ^m .	Mill ^m .	Mill ^m .	Mill ^m .	Mill ^m .	Mill ^m .	Mill ^m .		
1	Mill ^m .	Mill ^m .	Mill ^m .	Mill ^m .	733.59	734.04	733 79	734 24	734.09	734.64 44.19	734·69 44·09	735.34 44.37		
2	=	=	=	=	=	=	43.54 41.89	42.29	42.09	41.29	40.94	40.59		
4	=		-	-	- 1	-	44·39 53·94	45°14 54'74	45·44 54·79	46.84	47·34 55·34	56.14		
56	=	-	=	=	53.54	=	55.19	54 84	54'64	54.04	54.09 45.19	53·19   44·74		1
7	-	-		-	=	_	45.09	$45.39 \\ 36.09$	45.59 36.34	45 44 35 80	35*59	35.34		l I
8	=	=	_	-	-		32.44	83.14	33·19 38·01	$33.19 \\ 38.52$	33·04 38·52	32.64 38.79		
10	-	-	_	-	=	36·34 40·97	37·39 41·12	37·49 41·06	41.42	41.60	42.12	42.02	1	l l
11 12	=	-		-		29.54	28 · 32 29 · 87	$28.32 \\ 30.49$	28·44 31·39	$27.94 \\ 31.96$	$27.19 \\ 32.46$	27.09 33.00		j –
18 14	_	-	_		28.59	35.86	36.34	37.09	37.84	38.29	38.66	39.06 43.02		
15			-		28.89	28.54	42.74 28.16	$43.59 \\ 27.84$	$43.56 \\ 25.86$	43·04 25·19	43 · 18 24 · 22 28 · 87	23.92		
16 17	-	-	_	-	25 84		26.89	27.92	27.92	$28.46 \\ 25.84$	$28 \cdot 87$ $25 \cdot 59$	29.09 25.60		
18	-	-		-	26.54	26.89	$25.89 \\ 22.59$	26·19 23·71	26·14 24·14	24.69	24.96	25.54		
19 20	-	=	-		-		27.92	28.94 26.19	28.09 25.86	29·04 26·09	29.04 26.09	29.04 26.04		
21	_	-	-	=	-	25.84	26 24 26 59	28.29	27.79	28.34	27.79	27.79		i i
22 23 24	=	-	-		-	40.29		$32.91 \\ 41.33$	33.64	33.59 41.89	33·77 42·29	33.69 42.96	2	
24 95	742.97	742.89	742.44	742.12	42.09	41.69	40 52 41.69	41 '91	41.49	42.07	40.79	40.89 42.56		
25 26 27 28			-	-	-		40.14	40.10 39.82	41.94	41·59 39·84	$41.96 \\ 39.72$	38.24		
27 98	_	1			=		31.44	32.04	31.99	32.04	$32.16 \\ 37.07$	32·16 36·94		
29		-	=	1 2	-	35.14	34·14 34·94	35.84 35.84	36.24	36.69	36.49	87.09		1
30				.								T00.00		
Mean Millimetres	742.97	742.89	742.44	742.10	734-41	735.86	735.93	736.23	736.68	736.79	736.77	736.83		
Inches -	29.251	29.248	29.230	29.217	28.914	28.971	28.974	28.248	29.104	29.008	29.007	29.010		
Corrected >				-		28.938	28.940	28.954	28.957	28.961	28-960	28.963		
for 32°Fahr.	1	1								1				
					-	0.000	0.005	0.016	0.019	0.053	0.025	0.025		2
Osc_lation								-	1		1	0.025	<u> </u>	
Osc_lation	In.	In.	In.	In.	In.	In.	In. 29 819	In. 29*822	In, 29*315	In. 29'355	In. 29.371	'In. 29°391		نىت ا
Osc_lation	In.	In.	-				'In. 29·319 ·569	In.	In.	In.	In. 29·371 •520 •691	In. 29°391 510 692		
Osc_iation	In.	· · · ·				In. 29 [•] 577 •552	In. 29°319 569 687 575	In. 29·322 ·587 ·684 ·544	In, 29*315 *606 *678 *531	In. 29`355 •625 •688 •526	In. 29·371 ·520 ·691 ·532	In. 29°391 510 692 530		
Osc_iation	In.	· · · ·	-			In. 29 [•] 577 •552 •340	In. 29°319 *569 *687	In. 29·322 ·587 ·684 ·544 ·312 ·268	In. 29*315 *606 *678 *531 *820 *290	In. 29·355 ·625 ·688 ·526 ·315 ·307	In. 29·371 ·520 ·691 ·532 ·301 ·320	'In. 29`391 `510 `692 `530 `297 `341		
Osciation 2 3 4 5 6 7	In.	· · · ·	-			In. 29 [•] 577 •552 •340 •240	In. 29°319 *669 *687 *575 *324 *255 *463	In. 29·322 ·587 ·684 ·544 ·312 ·268 ·463	In. 29*315 *606 *678 *531 *320 *220 *452	In. 29*355 •625 •688 •526 •315 •307 •445	In. 29`\$71 `520 `691 `532 `301 `320 `424	In. 29·391 ·510 ·692 ·530 ·297 ·341 ·434	•	
Osciation 2 3 4 5 6 7	In.	Ш. Ш.			In.	In. 29 [•] 577 •552 •340 •240	In. 29'319 569 687 575 324 255 463 136 250	In. 29*322 *587 *684 *544 *312 *268 *463 *132 *198	In. 29°315 606 678 531 820 220 452 126 202	In. 29'855 •625 •688 •526 •315 •307 •445 •120 •214	In. 29 [.] 371 .520 .691 .532 .301 .320 .424 .137 .213	In. 29'391 510 692 530 297 341 434 434 147 211		
Osc.lation 	In.		<b>THUND</b>			In. 29·577 ·552 ·340 ·240 	In. 29°319 569 687 575 324 255 463 136 250 192	In. 29°322 *587 *684 *544 *312 *268 *463 *182 *182 *181	In. 29*315 606 678 531 820 220 452 126 202 127	In. 29`355 •625 •688 •526 •815 •307 •445 •120 •214 •167	In. 29°871 *520 *691 *532 *301 *320 *424 *137 *213 *161 28°968	In. 29'391 '510 '692 '530 '297 '341 '434 '147 '211 '152 28'991		
Osc. lation 2 3 4 5 6 7 8 9 10 11	In.	Ш. Ш.	<u>TITITI</u>		In. 	In. 29 [•] 577 •552 •340 •240 	In. 29°319 569 687 575 324 255 463 136 250 192 28°931 887	In. 29`322 587 684 544 312 268 463 132 108 181 28`950 *879	In. 29°315 606 678 531 320 220 452 126 202 177 28°947 *883	In. 29°355 •625 •688 •526 •315 •307 •445 •120 •214 •167 28°959 •861	In. 29.371 .520 .691 .532 .301 .320 .424 .137 .213 .161 28.968 .849	In. 29'391 '510 692 530 297 '341 '434 '147 '211 '152 28'991 '846		
Osc.lation 2 3 4 5 6 7 8 9 10 11 12 13	In.					In. 29·577 ·552 ·340 ·240  28·939 ·892 ·678	In. 29·319 569 687 575 324 255 463 136 250 192 28·331 685	In. 29•322 •684 •544 •312 •268 •463 •132 •132 •132 •138 •181 28•950	In. 29*315 •606 •678 •531 •820 •220 •452 •126 •202 •126 •202 •177 28*947 •883 •702 •922	In. 29*855 •625 •688 •526 •815 •307 •445 •120 •214 •167 28*959 •861 •691 •933	In. 29'371 *520 *691 *532 *301 *320 *424 *137 *213 *161 28'968 *698 *698 *698	In. 29'391 510 692 530 297 341 434 147 211 152 28'991 846 710 932		
Osc. lation 			<b>THUND</b>			In. 29 [•] 577 •552 •340 •240 	In. 29'319 *687 *575 *463 *136 *250 *192 28'931 *887 *685 *907 *761	In. 29'322 *587 *684 *544 *312 *268 *463 *132 *181 28'950 *579 *680 *952 *735	In. 29'315 606 678 531 *320 •220 *452 *126 202 *126 202 *177 28'947 *883 *702 922 *739	In. 29'355 625 625 688 526 315 120 214 167 28'955 861 691 933 741	In. 29'371 *520 *691 *532 *301 *320 *424 *137 *213 *161 28'968 *698 *698 *933 *733	In. 29'391 510 692 530 297 341 434 *147 211 152 28'991 846 *710 932 727		
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# METEOROLOGICAL OBSERVATIONS.

# FORT CONFIDENCE—continued.

Abstract of Hourly Observations in the months of November and December 1848.

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	736.63	736.94	736.89	786.99	737.01	736-88	736.73	737.22	737.18	739.06	741.84	741.78	736.86
	29.002	29.014	29.012	29.016	29.017	29.011	29.005	29.025	29.023	29.198	29.207	29.204	29.011
	28 • 951	28·961	28.959	28.960	28.963	28.953	28.948	28.973	28.969				. 28*961
	0.018	0.053	0.021	0.022	0.022	0.012	0.010	0.032	0.031	-	-	-	0.014
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348\\	$\begin{array}{c} {\rm In.}\\ {\rm 29}\cdot 437\\ {\rm +627}\\ {\rm +627}\\ {\rm +624}\\ {\rm +150}\\ {\rm +150}\\ {\rm +238}\\ {\rm +411}\\ {\rm +351}\\ {\rm +150}\\ {\rm +223}\\ {\rm +097}\\ {\rm +233}\\ {\rm +097}\\ {\rm +735}\\ {\rm +920}\\ {\rm +735}\\ {\rm +920}\\ {\rm +735}\\ {\rm +920}\\ {\rm +292}\\ {\rm +292$	$\begin{array}{c} \text{In.}\\ \textbf{29'449}\\ \textbf{-607}\\ \textbf{-607}\\ \textbf{-632}\\ \textbf{-526}\\ \textbf{-526}\\ \textbf{-526}\\ \textbf{-526}\\ \textbf{-220}\\ \textbf{-220}\\ \textbf{-223}\\ \textbf{-155}\\ \textbf{-232}\\ \textbf{-011}\\ \textbf{-256}\\ \textbf{-232}\\ \textbf{-011}\\ \textbf{-256}\\ -2$	$\begin{array}{c} {\rm In.}\\ 29^{*}465\\ {}^{\circ}610\\ {}^{\circ}627\\ {}^{\circ}506\\ {}^{\circ}216\\ {}^{\circ}223\\ {}^{\circ}223\\ {}^{\circ}223\\ {}^{\circ}088\\ {}^{\circ}783\\ {}^{\circ}783\\ {}^{\circ}772\\ {}^{\circ}913\\ {}^{\circ}716\\ {}^{\circ}556\\ {}^{\circ}975\\ {}^{\circ}556\\ {}^{\circ}29{}^{\circ}77\\ {}^{\circ}288\\ {}^{\circ}28\\ {}^{\circ}29{}^{\circ}07\\ {}^{\circ}850\\ {}^{\circ}677\\ {}^{\circ}856\\ {}^{\circ}950\\ {}^{\circ}677\\ {}^{\circ}856\\ {}^{\circ}950\\ {}^{\circ}677\\ {}^{\circ}856\\ {}^{\circ}950\\ {}^{\circ}79\\ {}^{\circ}316\\ {}^{\circ}242\\ {}^{\circ}328\\ {}^{\circ}918\\ {}^{\circ}29{}^{\circ}011\\ {}^{\circ}29{}^{\circ}01\\ {$	$\begin{array}{c} {\rm In.}\\ 29^{\circ}469\\ \circ 600\\ \circ 601\\ \circ 201\\ \circ 204\\ \circ 2$	$\begin{array}{c} {\rm In.}\\ 29^{\circ}491\\ \circ 610\\ \circ 609\\ \circ 508\\ \circ 203\\ \circ 543\\ \circ 255\\ \circ 156\\ \circ 228\\ \circ 048\\ 25 \\ \cdot 928\\ \circ 756\\ \circ 794\\ \circ 914\\ \circ 593\\ 29 \\ \cdot 107\\ \circ 777\\ \circ 703\\ \circ 894\\ \circ 593\\ \circ 29107\\ \circ 777\\ \circ 773\\ \circ 773\\ \circ 894\\ \circ 593\\ \circ 8981\\ 29 \\ \circ 555\\ \circ 304\\ \end{array}$	In. 29:486 -604 -607 -687 -987 -191 -567 -223 -168 -226 -022 -28:98 -266 -022 -28:98 -751 -879 -671 -608 -28:98 -28:980 -28:980 -28:981 -631 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In.	In. 29'421 555 664 559 269 275 873 142 219 125 28'971 825 730 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 976 29'274 983 948 983 9719 481 526 304 817 20'483 348 29'009
~	0.013	0.018	0.015	0.014	0.017 736.85	0.018	0.020	0.021	0.023	-			0.012
		1	1.00.00	1.00 10	100 00	100 01	100 00	100 00	101 00		1	1	<u>  </u>

Lowest, 32° Fahrenheit, 28*423 inches.

The Barometer in English measure is reduced

Highest, 29'731. Range, 1'308 inches. to a temperature of 32° Fahrenheit. Highest, 29.692 inches. Range, 1.440 inches.

# FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of January and February 1849.

Day.	De	lcros's B	arometer	r, reduce	d to Eng	lish mea	sure, and	l correct	ed for de	viation f	rom the	Standard
Civil Time.	1.	2,	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
$\begin{array}{c} 1\\ 2\\ 8\\ 4\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 20\\ 22\\ 23\\ 24\\ 25\\ 27\\ 28\\ 26\\ 27\\ 28\\ 31\\ 31\\ \end{array}$	In.	In.	In.	In.	In. 29:336 	In. 28*820 29*3820 *806 -481 -093 - 28*502 29*486 - 28*557 *915 - 29*233 29*233 29*233 - 29*233 - 29*3830 - - - - - - - - - - - - -	$\begin{bmatrix} In, \\ 29^{+}160 \\ 28^{+}781 \\ 863 \\ 29^{-}373 \\ 813 \\ 832 \\ 833 \\ 832 \\ 833 \\ 832 \\ 833 \\ 832 \\ 917 \\ 29^{-}514 \\ 648 \\ 208 \\ 944 \\ 208 \\ 944 \\ 208 \\ 944 \\ 944 \\ 29^{-}021 \\ 169 \\ 245 \\ 29^{-}021 \\ 169 \\ 245 \\ 29^{-}475 \\ 28^{-}916 \\ 881 \\ 29^{-}475 \\ 28^{-}916 \\ 881 \\ 29^{-}475 \\ 28^{-}916 \\ 881 \\ 29^{-}475 \\ 28^{-}916 \\ 881 \\ 29^{-}475 \\ 28^{-}916 \\ 881 \\ 29^{-}475 \\ 28^{-}916 \\ 881 \\ 29^{-}475 \\ 28^{-}916 \\ 881 \\ 28^{-}916 \\ 881 \\ 28^{-}916 \\ 881 \\ 28^{-}916 \\ 881 \\ 28^{-}916 \\ 881 \\ 28^{-}916 \\ 881 \\ 881 \\ 28^{-}916 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 \\ 881 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Means -	28.884	28.935	29.037	28.869	29.045	29.131	29.129	·736 29·128	29.135	·775 29·139	29.140	$\frac{\cdot 813}{29 \cdot 139}$
Diurnal ?												
Oscillations 5	•••••						0.001	0.000	0.002	0.011	0.012	0.011
Millimetres	n	-	-	-		-	739.88	739.85	740.02	740.13	740.13	740.13
$1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 21 \\ 22 \\ 23 \\ 24 \\ 25 \\ 26 \\ 27 \\ 28 $	29·143	29·155	28·9906	28.912 28.912 9.538 9.016 9.178 9.598		$\begin{array}{c} 29 \cdot 076 \\ 8 \cdot 834 \\ 8 \cdot 951 \\ 8 \cdot 831 \\ 9 \cdot 228 \\ 8 \cdot 909 \\ 9 \cdot 228 \\ 8 \cdot 771 \\ 5 \cdot 967 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 \\ 9 \cdot 228 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\cdot 923 \\ 9 \cdot 109 \\ 8 \cdot 923 \\ 9 \cdot 108 \\ 8 \cdot 816 \\ 8 \cdot 913 \\ 8 \cdot 278 \\ 8 \cdot 816 \\ 9 \cdot 421 \\ 9 \cdot 606 \\ 9 \cdot 458 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 348 \\ 9 \cdot 458 \\ 9 \cdot 458 \\ 9 \cdot 458 \\ 9 \cdot 458 \\ 9 \cdot 458 \\ 9 \cdot 458 \\ 9 \cdot 458 \\ 9 \cdot 458 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 \\ 9 \cdot 468 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9 915\\ 9 915\\ 9 915\\ 9 915\\ 9 915\\ 9 915\\ 9 915\\ 9 915\\ 9 91$		$\begin{array}{c} 29^{\circ}112\\ 8^{\circ}850\\ 8^{\circ}913\\ 8^{\circ}889\\ 9^{\circ}039\\ 8^{\circ}990\\ 9^{\circ}106\\ 8^{\circ}833\\ 9^{\circ}045\\ 9^{\circ}304\\ 9^{\circ}304\\ 9^{\circ}304\\ 9^{\circ}304\\ 9^{\circ}308\\ 9^{\circ}308\\ 9^{\circ}308\\ 9^{\circ}308\\ 9^{\circ}308\\ 9^{\circ}308\\ 9^{\circ}308\\ 9^{\circ}308\\ 9^{\circ}308\\ 8^{\circ}792\\ 8^{\circ}848\\ 9^{\circ}023\\ 8^{\circ}792\\ 8^{\circ}848\\ 9^{\circ}023\\ 8^{\circ}792\\ 8^{\circ}848\\ 9^{\circ}023\\ 8^{\circ}792\\ 8^{\circ}848\\ 9^{\circ}023\\ 8^{\circ}792\\ 9^{\circ}653\\ 9^{\circ}437\\ 9^{\circ}653\\ 9^{\circ}553\\ 9^{\circ}470\\ 9^{\circ}418\\ 9^{\circ}418\\ 9^{\circ}418\\ 9^{\circ}418\\ 9^{\circ}63\\ 9^{\circ}418\\ 9^{\circ}63\\ 9^{\circ}418\\ 9^{\circ}63\\ 9^{\circ}63\\ 9^{\circ}418\\ 9^{\circ}63\\
Means -	29.340	29.354	22.285	29.228	29.163	29.202	29.200	29.201	29.208	29.208	29.207	29.206
Diurnal Oscillations }	-			-		0.005	0.000	0.001	0.008	0.008	0.002	0.006
Millimetres	-	-	-	-		- 1						

Lowest at 32° Fahrenheit, 28°388 inches. Highest, 29°900 inches. Lowest at 32° Fahrenheit, 28°686 inches. Highest, 23°679 inches.

# METEOROLOGICAL OBSERVATIONS.

# FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of January and February 1849.

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1 1	i <b>1.</b>	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midnt.	Mea
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		T	T						·[			-[		
22 9645       23 967       22 9635       23 967       23 967       23 967       23 967       23 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967       25 967		29.127	29.130			In.	in.				In.	In.	In.	In
290414       29043       29005       29005       29015       29016       29021       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025       29025 <t< td=""><td></td><td>28.645</td><td>28.667</td><td>23.645</td><td>28.634</td><td></td><td>28.642</td><td>29 093</td><td>29 050</td><td>29.010</td><td>29.000</td><td>28.950</td><td>28.952</td><td></td></t<>		28.645	28.667	23.645	28.634		28.642	29 093	29 050	29.010	29.000	28.950	28.952	
$ \begin{array}{c} 769 \\ 769 \\ 769 \\ 769 \\ 769 \\ 769 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 768 \\ 778 \\ 788 \\ 768 \\ 768 \\ 778 \\ 788 \\ 768 \\ 778 \\ 788 \\ 768 \\ 778 \\ 788 \\ 768 \\ 778 \\ 788 \\ 768 \\ 778 \\ 788 \\ 780 \\ 788 \\ 778 \\ 788 \\ 780 \\ 788 \\ 778 \\ 788 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 \\ 780 $	1	29.014	29.043	29.059	29.100	23.119	29.155	29.168	29.201		20 049	1 =	1 = 1	28'0
5833         5835         5835         7847         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347         7347 <th< td=""><td></td><td>452</td><td>473</td><td>•489</td><td>•494</td><td>•490</td><td>.519</td><td>.528</td><td>.539</td><td>*557</td><td>.559</td><td></td><td></td><td>29.</td></th<>		452	473	•489	•494	•490	.519	.528	.539	*557	.559			29.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			759	767	778	•778	•769	•786	.791	.780	•786	1	1 ~ 1	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		*783	-752	756	-8/7	874	- 593	1888	:900	*894	•896		1 ~ 1	1 .6
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1	•276	238	1 .217	187	171	155	692		670	•665		1~1	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		106	1 '096	•098	103	103	115	108	1114	•114	•119			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	- 1	174	174	•191	• 20.4	•222	225	• 222	•229	2:24	• 225			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		241	239	228	230	29.242	•254	274	283	•277	·263	29.257	-	•2
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	- 1	-751	20 000	28 622	23 938			28.490	28.460	98.470	28.471		1 - 1	28.6
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1	·873	.861			-700		977	.991	29.014	29.038		-	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		29.079	29.098	29.252	29.245				90.999	28 758	28.749	-	1 - 1	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1	•584			620	.636		.652	.655	1658		-		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1	'541	523		•492			•397	403		·392	-		.,
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		168	170	163	182			•196		•245	266	-		·i
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		28.998	0012	.039	• 095	.303	234	139	161	•118	•051	-	1 - 1	•3
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		•429		98.407	1 28.408	28.406	28.300	99.300	23.991	28.971	00.102	001450	1 201000	28.5
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	- 1	29.074	29.063	99.075	29.069	29.077	29.068	29 081	20.083	20100	25 420	25.459	28.203	-4
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		•058	*069	076	. 080	*097	.096	109	.121	.104	108	20 010	40 004	90.0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1	171	183	1 176		160	•149	) 151	156	•142	•148	154	•167	<i>20</i> 1
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	ł		28.700	99.775	217	214	184	185	•151	•138		-		•2
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		29.199		29.271	23 702	23 747	28.729	28.712	28.702	28.711	28.704	- 1	1 - 1	28.7
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	- 1	•407	406	*383	-380	348		20 317	20 401	29.410	29.414	-	1 - 1	29.1
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	- 1	28.722	28.714	28.681	28.653	28.641		28.653				1 2		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		*845	848		•852	*850	·828	.808	*806	1 .784				20 7
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-									•956	•975	-		•8
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	ŀ	29.142	29.139	29.144	29.140	29.138	29.134	29.133	29.131	29.129	29.145	28.967	28.919	29.1
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		0.014	0.011	0.016	0.015	0.010	0.006	0.002	0.003	0.001	0.012	-	-	0.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		740.20	740.13	740.25	740.15	740.10	740.00	739.98	739.93	739.88	740.27	-		739.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	j	00+111	001105		]	1	}					1		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	- 1	8.858	29.105	29.098	29.099	29.073	29.057							29.0
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		8.906	8.916	8.889	8.869	8.859	8.830	8.011	8.931	8.949	8.953	-	~	28.8
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		8.013	8.938	8.961	8.968	i araaa	9.023	9.040	0.023	0.020				28.9
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		9.023	9.021	9.029	9.043	9.017	9.001	8.989	8.969	8.954	8.937			28.8
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		9.003	9 9 034	9.056	9.029	9.106	9.144	9.157	9.179	9.101			-	29.0
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		9 114/ 8 85A	1 81979	8.988	8.972	8.913		8.826	8.832	8.801	8.761	25.743		29.0
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		9.053	9.051	0.010	0.011	0.110	8-887	8.892	8*896	8.899	8.913	-		28.8
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	- 1	9.305	9.039	9.312	9.306	9:313		9.308	0.305	0.200	9.175	-	-	29.0
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		9.477	9.491	9.204	9.525	9.527	9 536	9.236	9.552	9.225	9.550			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1	9.608	9*619	9.609	9.608	9.627	9.650	1 9.615	9.616	9.008	9.611	_		20 4 20 4
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1	9.408	9*405	9.401	9.399	9.411	9.379	9.378	9.362	9.384	9.386		-	29.4
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		9.393	0.314	9.292	9.283	9.282	9.252	9.254	9.242	9.212	9.196		- 1	29*2
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1	8.955	8 935	8.206	9 350	9.007		9.346	9.368	9.358	9.319	-	- 1	29.3
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1	9.048	9.058	9.061	9.066	9.059	9:054	9.038	9:000		8.0.0			20.00
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	1	8.289	8.759	8.736	8.721	8.712	8.694	8.680	8.686	8.691	8-456	-		29.0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		8.855	8.861	8.876	8.870	8.894	8.880	8.897	8.921	8.930	8.936		~  }	28.8
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1	9.056	9.062	9.063	9.076	9.093	9.099	9.117	9.116	9.115	9.113		29.135	29.07
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1	9.494	0 241 9 506	0.208	9.253	9.263	9.282	9.297	9.301		9.314	9.336	9.356	<b>29*2</b>
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		9.439	9.444	9.453			9 209	9.012	9.218		9.210			29.48
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		9.625	9.651	9.606	0'645	9.635	9.632	9.627	9.616	0.491	9.493	9.912	9.234	29.4
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	E	9.208	9.209	9.499	9.202	9.201	9.202	9.515	9.524	9.524	9.533	=		29.61
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1			9.620	9.600	9.256	9.561	9.547	9.522	9.517	9.474			
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		9.480	9.485			9.483	9.429	9.532	9.233	9.541	9.547	9.556		29.49
											9.381			29.4
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	ľ	40 204	29.511	29.206	29.208	29.211	29.209	29.210	29.213	29.212	29.209	29.255	29.342	29.21
	-	×										[	[[-	

Range, 1.512 inches. Range, 0.993 inches.

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# FORT CONFIDENCE-continued.

Abstract of Hourly Observations in the months of March and April 1849.

# FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of March and April 1849.

		Delcros's Barometer, corrected for capillarity and Mean de												10000						ade dur	ing me	monus	or marc		три 18	*7.
Day.		-	1	<u>`</u>	1	1	1	1	l lor cap	liarity a	Id mean	(	4	from s	tandard	Baromet	er, but n	ot for ter	nperatu	re.	1	·		<del></del>	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
Civil Time		2.	8.	4.	5.	6.	7.	8.	9.	10.		Noor	~	1:	2.	· 3.	4.	-5.	6	7	8.	9. ~	10.	11.	Midn ^t .	Means:
1 2	Mill	n. Millm	Mill ^m	1 -		Mill 744.1 39.7	4 744.8	1 744.8	9 744 8	9 744 4		4 744 7		Mill ^m 744 44	Mill ^m . 744.59	Mill th . 744.64	Mill ^m . 744.54	Mill ^m . 744.14	Mill ^m . 743 82	Mill ^m . 743'94	Mill ¹⁰ 748 • 54	Mill ^m . 743.19	Mill ^m . 743 · 24	Millm.	Mill ^m .	Mill ^m . 744*26
8		-	=	=		34.3	9 38.40	) 34.0	6 33.9	6 34.08	34.0	9 84.1		38.64 34.14	88.74 33.79	87 · 74 33 · 74	37.84 33.94	37 94	87.59 32.89	87.64 32~49	37.04 32.69	36.24	-36-26 34-94	+	=	88.27 33.63
5		=		=	-	27·7 22`8	9 22.84	28.4	4 28.14	4 23.14	4 23.1	9 26·0 4 23·1		25 84 23 24	25.84	25 32	24 84 23 74	24.34 23.64	24 09 23 74	24.24	23.54	23.14	22.64	ΪΞ	1	25:89
07		=	1 =	=	=	23.6 82.0			9 25.01 9 34.21		25.8	4 26.6		26.68 36.44	27.34 36.14	28.14	28.54	29.14	28.94	29.59	29·34 37·34	29.44	29.94		<u> </u>	27.23
9		=	1 =	=	=	41.5			43.10	43.88	44.6	9 44.7		45·10 45·86	45.44 46.09	45.54	46'04	46.44	46.49	46.84	46.89	46.89	46.89	• = •	=	35·79 45·02
	Ē	=	=	1 =	=	42.10	3 43.99	43.4	42.79	43.14	43.7	6 43.4	1 🛛	43.18	42.94	46 09 42 94	46.00	45 74	45 44	45.70	45.64 44.09	45.01	44.94		Ξ.	45.61
12	=	1 =	=	1 =	=	52·74	53.84	53.6 51.0	L 54.04	54.84	54.3	4 54.78		54.89	51·84 54·86	51·94 54·24	51 84 53 84	52·44 53·74	52.59 53.74	53 14 54 09	53·44 52·84	53·49 53·49	54.09 53.39	=	=	51.14
14 15	l İ	1 =	=	=	=	41.64	42.20	41.79	40.48	40.84	\$9.8	4 89.14		50·39 89·04	50.04 37.64	50·09 37·24	49.04 86.34	48.84 85.99	48 49 84 64	48.09	47 74	47.84. 81.11	46°94 30°28	· Ξ	=	49.59
16	1 =	1 =	-	-	-	25.24	25.19	29 94	05,02	25.10	25.8	25.04		25.14	25.04	25 24	25.64	25·64 25·19	26 24 25 29	26.54	26.44 25.24	27.29	27.24	=	=	25.66
18	=		=	=	=	26*58 40*89	42.54	28.19	42.84	43.50	43.0	42.94		32·79 42·94	33·34 43·24	34·89 43·14	35 84 43 44	36.34 42.84	87·54 43·19	37.94	38·34 43·29	38·84 42·94	89.84	=	Ľ I	33·89 42·88
20 21	-		=	=	=	39·24 30·32	39.89 31.04	39.99 30.94	39°64 30°64		89·1	)  39·14		38·74 31·54	38·44 31·34	88·49 32·14	38·14 31·34	38.19	87.09 31.74	36·94 32·34	35.74 32.14	. 35 44. 32 24	. 85 84. 32 39	732.54	732.84	88·19 31·55
22	733.84		734'12 36'96		733.59	37.24	37.04	85°84 87°24	84.94 37.84	35.54	85 · 64 37 · 84	35 84		36.04 38.26	36 54 38 94	87 09 38 34	86.74 39.04	36·84 38·79	37 14 38 64	37·08 38·64	36.85	37·14 88·59	37.34	36.77	88.91	35.70 87.83
23 24	=	1 =	=	=	=	38.14	39.84	40·29 39·89	40.19	40.22	40·34 39·34	40.29		40.34	40.74	40·79 88·59	41 54 38 54	41.24	42.29	42.14	42.34	41.84	41.64	<b>-</b>	Ē	40.84
25 26	=	=	=	=	=	86·30 85·09	38.04 35.44	37.69 35.84	87.24	37.29	87 · 86 36 · 04	37.44		37.52	37.34	37.04	37 54	37 94	37.74	38.34	- 36 94	38·34 37·74	38·34 37·94	Ξ	·	38.87 37.50
27 28		1 =	=	=	=	33.53 38.29	84·54 39·94	34.89 39.84	34.94		35.34	35.54		35.94	35 4	35 64 36 49	35.44	35·19 38·14	35.04 38.24	34.74 37.84	35·54 37·89	34.59 . 38.14	34·44 38·44	1		85·43 86·37
29 30		=	=	=	=	35.90	87.14	37.79	34.97 37.84	34·59 38·14	83.79 38.64			33.44	39.54	33.24	33.44	33.94	34.09	.83.99	34.79	34.74	34.64	=	=	\$ 35.02
81					<u> </u>	87.96	89.19	39.14	38.49	38.44	37.94	38.56 38.16		38·89 38·14	39.04 37.54	89.09 37.64	89·24 37·59	39•44 .36•99	41 32 37 39	40 29 37 29	39°94 36'49	39.94 36.64	40.32 36.32	=	=	38·91 37·73
Millimetres Inches -	28.957	735.54 28.959	735 · 54 28 · 959	28.971	28.946	28.997	737·25 29·026	737.56 29.038	737·22 29·025	737.36	737.40	787.54		737.61	737.61	737.68	737.75	737.73	737.82	737.83	737.63	737.57	737.66	734.65	734.87	737-46
Corrected }						29.005					29.034			29.040	-29.040	29.043	29.046	29.045	29.049	29-049	29.041	29.039	29.042	-28:924	28.933	29.034
for 32° Fahr. ) Oscillations	1					0.012	29.000	29.001	28.997	28.992	28.988			28.993	28.988	28.990	28.988	28.990	28.993	28.992	28.993	28.990	28.996			28.991
	1	<del>   </del>			1	0 015	0 012	0 013	0.009	0.004	0.000	0.001		0.002	0.000	0.005	0.000	0.005	0.002	0.004	0.002	0.005	0.008			0.002
1 2	=	=	=		=	$734.09 \\ 35.04$	735°22 34°29	735°29 33°44	735.89 32.44	735·74 32·24	736·79 31·84	736.84		736°64 30°64	737.21	737.84	737.99	738.24	738.79	738.94	738.94	738.94	738.94			737.16
3	=		=		_	$33.62 \\ 39.14$	34·46 40·79	84·44 41·24	34.79 41.99	34·82 41·64	34.84	31.84		36.72	30.69 37.64	$30.84 \\ 37.54$	$30.64 \\ 38.74$	$31.04 \\ 38.64$	$31.29 \\ 39.04$	$31.14 \\ 39.26$	$31.24 \\ 39.54$	$31.24 \\ 39.64$	$31.44 \\ 39.69$		_	31.84 37.03
5	=	=	=		11	35·39 34·74	36.54	36.24 36.14	36.14	36.19	42.44 36.16	42.64 35.78		43°16 35°89	43·44 35·74	$43.34 \\ 35.94$	43.49 35.84	$42.84 \\ 36.14$	43·74 36·34	43·14 37·54	$42.14 \\ 36.24$	42.24 36.49	41.94 36.74	=		42·31 36·18
: 7	=	=	=	_		38.04 43.84	35.84 39.44	39.74	$35.89 \\ 40.04$	$\begin{array}{c} 36.77\\ 40.34 \end{array}$	36·94 40·74	36·72 41·54		36·74 42·04	$36.54 \\ 42.06$	36.64 43.14	36 64 42 94	36.64 42.84	36 54 44 64	36·44 43·19	$36.54 \\ 43.79$	36·19 43·14	36.84 43.24	=	=	36°40 41°82
9 10	=	=	-			49.14	41°54 43°64	$44.32 \\ 50.04$	$43.84 \\ 50.59$	44.04 51.49	44.14 52.59	41.44 52.84		44.69 53.54	45 29 53 74	45.74 54.14	46.64	47.04	47.19	47.29	47 • 69 54 • 94	47.64 54.79	48.12 55.19	=	Ξ	45.67 52.99
11 12	=	=	-			55.70 38.34	$55.14 \\ 39.94$	$55.24 \\ 39.62$	54°64 39°74	54.54 39.74	54°34 39°84	53.49 39.94		52·74 40·04	52·79 41·24	51.64 41.04	50.94 41.04	49·34 41·24	48.34 41.94	47.54 41.94	$47.04 \\ 42.34$	45.14	44·29 44·24	-	=	51·35 40·90
13 14	-	-	=	=	747.84	47·74 57·74	48·34 59·04 54·74	48.54 59.54	48.94 59.59	49*44 59*84	$49.84 \\ 59.64$	51.74 59.69		52·14 59·84	$52.94 \\ 59.64$	53.14 59.04	53·54 59·04	55.04 59.34	55·54 59·04	$55.94 \\ 58.84$	$57.04 \\ 58.94$	56.74	56·84 57·34	=	=	52·30 59·05
15	=	=	=	=		$53 \cdot 34 \\ 43 \cdot 89$	54°74 44°84	53 44 45 84	52'84 45'34	$53.14 \\ 45.04$	59.64 52.74 44.44	52'64 44'04		51·44 43·94	50.84 43.34	$50.24 \\ 42.84$	49.84	49·44 41·69	49.54	49.54 41.34	48.94 41.29	48.04	47.94 40.44	=	=	51.10
16	=	=	=	=	42.84	$37.89 \\ 43.34$	44.84 38.44 45.12	38 74 45 34	38·94 45·54	39.14	39 · 14 47 · 24	39.49 47.64		39·39 47·94	39·94 48·34	40.29	39.99	40.32	40.94	40.74	40.84	40.94	41·20 51·34	-	-	43°08 39°79
18 19	=	=	=	=	=	50.84 49.14	52.69 49.84	$52.24 \\ 49.74$	52.74 49.04	46.04 52.84 48.14	52.89 48.09	53 64		53.39	53.24	48.84 53.04	49.64	50·34 53·24	50.84 53.49	52.84	51.74 52.99	52.64	52.24	=	=	48.03 52.83
20 21	=	=	=	(	40·34 44·34	41.14 45.34	41.14 45.84	41.14 46.54	41.24	41.44	41.04	48.09 41.54		48°24 42°04	47.14	47.04	45.84 41.29	45.84 41.26	45·14 40·74	44.24	$43.74 \\ 41.89$	43·34 41·34	43.09 41.54	741.74	741.94	46*81 45*58
22 23	_	=	=	Ξ	_	41.44	42.84	42.74	46.94	$47.34 \\ 42.59$	$48.34 \\ 42.84$	48 99 42 74		49.04 42.84	$49 \cdot 24 \\ 42 \cdot 84$	49.74 43.14	49·14 43·19	$   \begin{array}{r}     48.99 \\     43.04   \end{array} $	48.54 43.74	$43.14 \\ 42.88$	$47.84 \\ 42.54$	47.64	$47.34 \\ 40.19$	=	Ξ	47.74 42.58
24	=	=	-	Ξ	46.44	47.14	47.59	42°94 47°14	43.19 46.74	43.14 46.64	43°74 46°64	44 64 46 24		44·99 45·94		44 94 44 64	44·89 44·54	45.09 41.01	45·44 43·74	45°74 43°74	$45.84 \\ 42.69$	$\begin{array}{c c} 46.24 \\ 42.14 \\ 42.74 \end{array}$	46·34 42·14	=	=	44.44 45.21
26 27	=	=	Ξ	_	42.04	39°54 42°84	40.84 43.14	41.34 43.04	40.74 43.84	40.94 44.64	41 ° 04 45 ° 44	41 44 46 34		41.89 47.54	42.04	42·24 48·81	42·34 49·14	42·49 50·14	42.54 50.64	$42.74 \\ 50.74$	$43.24 \\ 50.84$	42.74 51.24	43·34 51·44		=	41.85 47.24
28 29	Ξ	=	-	=	-	$52.14 \\ 52.04$	$53 \cdot 34 \\ 52 \cdot 44$	53·44 53·34	$53.14 \\ 52.64$	$52.84 \\ 52.94$	53·14 53·64	53·34 52·74		58·34 52·74	53.14	53·14 52·14	53·14 52·14	52.91 51.74	53·14 51·34	$52.94 \\ 50.74$	$52.94 \\ 50.54$	52.34	53·14 50·14	49.74	49.84	53.03 51.80
30			=	=	-	48·34 43·84	47 • 34 44 • 54	48·14 44·20	48.34 43.84	48.04 43.64	47 • 84 43 • 64	47.14 43.84		46.84 44.04	46.74	46.64 43.74	46.24	46.84	45.84	45.74 43.84	45.84 43.84		45.84		_	46'91 43'86
Millimetres					743.97	743.86	744.66	744.77	744.74	744.84	745.07	745.27		745.35		745.43	745.42	745.48	745.58	745.48	745.47	745.16	745.19	745.74	745.89	745.12
Inches -					29.291	29.286	29.318	29.322	29.321	29.325	29.334	29.342		29.345	29.348	29.348	29.348	29.350	29.354	29.350	29.350	29.338	29.339	29.300	29.366	29.336
for 32° Fahr. 5		-	-		29.256	29-263	29•267	29.268	29.274	29.220	29.277	29.278		29.280	29.284	29.280	29.278	29.280	29.282	20 280	29*286	29.280	29.278	29.282	29 · 297	29.277
Oscillations	-	-	-	-	-	0.000	0.004	0.002	0.011	0.002	0.014	0.012	8	0.012	0.051	0.012	0.012	0.012	0.019	0.012	0.053	0.012	0.012	-	-	0.019
		Terret	1 000 73	hrenhei					· · · · · · · · · · · · · · · · · · ·				18	g'	-	<u>,</u>		1	•	1		<u></u>		•	1	·

Lowest at 32° Fahrenheit, 28°396 inches; highest, 29°664 inches. Lowest at 32° Fahrenheit, 28°710 inches; highest, 29°865 inches.

Range, 1.268 inches. Range, 1.155 inches.

# METEOROLOGICAL OBSERVATIONS.

FORT CONFIDENCE-continued.

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Mea	n heigh	t of the	Baromet	ter for Se	even mon	ths, and m	onthly <b>h</b>	leans for	the seve	ral hours	of Obse	rvation,	
Months.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.	
1848-9. October -	In.	In.	Įn.	In.	In.	In. 28.691	In. 28·783	In. 28.768	In. 28.752	In. 28·729	In. 28·788	In. 28*790	
November -	-	-	-	-	-	· 8*938	8.940	8.954	8.957	8.661	8 <b>.9</b> 60	8-963	
December -	-	-	-	-	-	9.009	9.001	8.993	8.889	8.997	8.997	9.002	
January -	-	ļ	-	-	-	9.180	9•129	9.128	9.135	9·159	9.140	9.139	
February -	-	-	-	-	-	9.202	9*200	9.201	9.208	9.208	9.207	9.206	
March -	-		-	-	-	9.002	9.000	9.001	8.997	8.992	8.988	8.889	
April -		-	-	-	-	9*263	9.267	9.268	9.274	9.270	9.277	9.278	
Means -	i		-		-	29.033	29.046	29.045	29.046	29.042	29.021	29.052	
Oscillation -	-		-	-	· ·_		0.006	0.002	0.008	<b>0.002</b>	0.011	0.015	

# FORT CONFIDENCE-continued.

correct	ed for caj	pacity, ca	pillarity	, Mean d	eviation	from Sta	ndard, a	nd for te	mperatu	re 32° Fa	hrenheit.	,
1.	2.	8.	4.	5.	6.	7.	8.	9.	10.	_. 11.	Midn ^t .	Means.
In. 28.742	In. 28·786	In. 28·778	In. 28·760	In. 28·737	In. 28·748	In. 28·705	In. 28·740	In. 28.692	In.	In.	In.	In. 28`746
8.921	8 961	8.929	8.960	8.063	8.953	8.948	8.973	8.969	-	-	-	8.961
<b>9.00</b> §	9.008	0.008	9.002	9.010	9.011	9.013	9.014	9.016			-	9.009
9.142	9.139	0.144	9.140	9.138	9.134	9.133	9.131	9.129	29 <b>·1</b> 45	-		9.130
9.204	9.211	9.206	9.208	9.211	9.209	9.210	9.213	9.212	9.209		·	9.210
8.993	8.088	8.990	8.088	8.880	8.893	8.092	8.993	8-990	8.996		-	8.991
. 9.280	0.284	9•280	9.228	9.280	9.585	9.280	9•286	9.580	9.278		-	9*277
29.045	29.040	29.022	20.049	29.047	29.047	29.040	29.020	29.041	29.157	-	-	29.046
0.002	0.008	0.015	0.009	0.002	0.002	0.000	0.010	0.001	-		-	0.000

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## METEOROLOGICAL OBSERVATIONS.

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## FORT CONFIDENCE.

#### Abstract of Hourly Observations in the month of October 1848.

Abstract of Hourly Observations in the month of October 1848.

FORT CONFIDENCE.

Centigrade Thermometer attached to Delcros's Barometer, Day. Civil Time 1. 2. 3. 4. 5. 6. 7. 8. 10. 9. 11, Noon ٥ • <u>.</u> <u>°</u> <u>°</u> <u>°</u> <u>°</u> <u>°</u> 1  $\hat{2}$ 9.4 _ ----13:4 11:6 17:4 _ ...... 3 ~~**~~** _____ _____ 10.0 8.6 5 8 10.4  $\begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 920\\ 223\\ 24\\ 25\\ 27\\ 28\\ 29\end{array}$ 4'1 15.8 13'5 7'6 11'4 8.6 14.4 14 4 11.7 9.1 12.1 3.6 7.6 9.9 11.6 14·1 8·4 10.4 9.6 10.8 <u>...</u> 11·1 10.6  $\begin{array}{r}
 14.6 \\
 12.6 \\
 6.6 \\
 11.1 \\
 9.6 \\
 13.2 \\
 13.6 \\
 10.1 \\
 8.6 \\
 \hline
 10.1 \\
 10.1 \\
 10.1
\end{array}$ 12·1 6·6 14·1 13·8 11·6 11·1 12·1 7·6 14.6 7.6 9.7 7.4 10.7 11.1 10.6 11.8 6.0 13.6 12.1 13.2 14.2 15.1 11.1 13.4 13'5 _  $\begin{array}{c} 6.4\\ 12.0\\ 11.1\\ 5.1\\ 12.6\\ 11.6\\ 11.0\\ 10.8\\ 7.6\\ 10.6\\ 11.1\end{array}$  $\begin{array}{r}
10.4 \\
10.6 \\
11.6 \\
11.6 \\
14.1 \\
9.2 \\
11.1 \\
11.8 \\
14.8 \\
6.1 \\
\end{array}$ 6.4 9.7 10.1 10.6 9.1 8.6 9.6 11.1 8.6  $13^{+}6^{-}11^{+}6^{-}$ 9.1 -9.6 10.6 9.6 13.1 9·1 10·1 30 31 4.6 2.2 13.6 8.6 12.8 Hourly Means ____ ----8.00 9.40 9.10 8.57 10.36 10.43 11.00 11.38 10.88 11.12 48'9247.43 Fahr. Scale 48.38 47.43 58·75 ----5**0**.66 51°80 51°58 52°03 52·48

corrected for Mean deviation from Paris Standard Thermometer, -0.33. Midn^t. 1. 5. . 10. . 11. Means. - 2. 3. 4. в. 7. 8. 9.-• <u>°</u> °. ° <mark>--</mark> <u>°</u> <u>°</u> <u>_</u> <u>°</u>___ 9.1 -----11.6 10.4 16.2 14.0 7.6 10.4  $\begin{array}{c|c} & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & &$ 11.90 8.82 11.83 Ξ 13.8 12·4 9·4 12·6 ____ 8.5 12.9 12.92 7.05 9.959 10.45 10.639 13.17 12.39 977 11.71 11.70 10.03 12.54 11.39 11.03 11.03 11.03 11.03 11.232 ----_ 12.4 9.6 13.1 7.6 7.6 5.4 ______ _____ _ 12·8 7·6 -4·1  $\begin{array}{c} \hline 10 \cdot 1 \\ 12 \cdot 1 \\ 11 \cdot 6 \\ 13 \cdot 5 \\ 15 \cdot 8 \\ 6 \cdot 8 \\ 13 \cdot 1 \\ 5 \cdot 4 \\ 11 \cdot 9 \\ 14 \cdot 1 \\ 9 \cdot 16 \\ 14 \cdot 0 \\ 16 \cdot 8 \end{array}$ 9.6 14.6 8.6 10.6  $15.0 \\ 14.6 \\ 13.6$  $\begin{array}{r} 4.6\\ 13.4\\ 12.1\\ 11.4\\ 13.1\\ 12.1\\ 12.3\\ 13.8\\ 10.1\\ 10.1 \end{array}$  $14.6 \\ 11.4 \\ 11.1 \\ 13.8 \\ 8.6 \\ 9.4 \\ 12.1 \\ 13.4 \\ 10.8 \\ 6.9 \\ 12.6 \\ 13.6 \\ 14.4 \\ 14.4$  $\begin{array}{c} \hline 11.8 \\ 10.1 \\ 11.4 \\ 17.1 \\ 6.0 \\ 9.6 \\ 10.6 \\ 14.6 \\ 13.6 \\ 12.0 \\ 13.8 \\ 10.6 \\ 10.6 \\ \end{array}$  $\begin{array}{c} \hline 10.6 \\ 7.6 \\ 14.6 \\ 10.4 \\ 8.6 \\ 12.1 \\ 9.4 \\ 11.6 \\ 13.8 \\ 9.2 \\ 14.6 \\ 14.6 \\ 14.6 \end{array}$  $\frac{11.7}{11.6} \\
\frac{10.6}{10.6} \\
\frac{11.4}{8.9} \\
\frac{9.1}{10.6} \\
\frac{13.6}{12.1} \\
\frac{15.6}{15.6}$ 10.8 15.1 10.2 13·8 16·1 12·1 10.6 11.6 10.6 13.0 11.6 17.1 9·2 13·1 8.6 14.6 12.6 13.6 9.6 13.6 -----11.48 11.61 11.07 14.20 11.35 11.06 11'68 12.19 11.28 12.02 12.29 13.80 11.20 14.00 52°90 51°91 51.93 52°43 53°94  $52 \cdot 84$ 53°64 57.56 56.84 52°16 53°02 5**4**.12 58°28

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#### FORT CONFIDENCE - continued.

Abstract of Hourly Observations in the months of November and December 1848.

METEOROLOGICAL	OBSERVATIONS.
FORT CONFIDENC	ce-continued.

Abstract of Hourly Observations in the months of November and December 1848.

Day.		Centigrade Thermometer attached to De										ometor,	correcte	d for Me	an deviat	ion from	Paris St	andard I	Thermom	eter.				×	
Civil Time.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midn ^t .	Means.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 20 30 	°	°	° 	°	8·1 7·6 2·1 4·6 7·8 6·6 1·8 1·8 1·8	$ \begin{array}{c} 12^{\circ} \cdot 1 \\  \\  \\  \\  \\  \\  \\  \\  \\  \\  \\  \\  \\  $	$\begin{array}{c} & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & 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& \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\$	$\begin{array}{c} \overset{\circ}{3} \overset{\circ}{.6} \\ 9 \overset{\circ}{.1} \\ 7 \overset{\circ}{.6} \\ 5 \overset{\circ}{.6} \\ 12 \overset{\circ}{.4} \\ 9 \overset{\circ}{.4} \\ 9 \overset{\circ}{.4} \\ 9 \overset{\circ}{.4} \\ 5 \overset{\circ}{.1} \\ 8 \overset{\circ}{.6} \\ 13 \overset{\circ}{.8} \\ 10 \overset{\circ}{.5} \\ 13 \overset{\circ}{.8} \\ 10 \overset{\circ}{.1} \\ 13 \overset{\circ}{.1} \\ 10 \overset{\circ}{.1} \\ 13 \overset{\circ}{.1} \\ 10 \overset{\circ}{.1} \\ 13 \overset{\circ}{.1} \\ 3 \overset{\circ}{.5} \\ 11 \overset{\circ}{.3} \\ 5 \overset{\circ}{.1} \\ 3 \overset{\circ}{.5} \\ 11 \overset{\circ}{.3} \\ 3 \overset{\circ}{.6} \\ 4 \overset{\circ}{.6} \\ 2 \overset{\circ}{.6} \\ 8 \overset{\circ}{.19} \end{array}$	$\begin{array}{c} 9.1\\ 10.4\\ 10.6\\ -4.1\\ 6.4\\ 7.0\\ 11.1\\ 2.5\\ 7.5\\ 2.7\\ 7.48\\ 2.68\\ 11.1\\ 10.6\\ 6.1\\ 3.1\\ 4.6\\ 9.1\\ 3.24\\ 3.24\\ 12.4\\ 3.24\\ 3.24\\ 7.21\\ \hline 7.62\end{array}$	$\begin{array}{c} & 9.8 \\ 12.1 \\ 11.1 \\ 15.1 \\ 2.6 \\ 8.4 \\ 9.7 \\ -0.6 \\ 8.4 \\ 9.7 \\ -0.6 \\ 8.4 \\ 3.6 \\ 9.1 \\ 13.4 \\ 3.9 \\ 15.1 \\ 15.8 \\ 10.2 \\ 5.9 \\ 0 \\ 11.6 \\ 13.4 \\ 5.6 \\ 4.6 \\ -1.2 \\ 5.4 \\ 5.4 \\ 5.4 \\ 5.4 \\ 5.4 \\ 5.4 \\ 5.4 \\ 5.4 \\ 5.4 \\ 5.13 \\ \end{array}$	$\begin{array}{c} \stackrel{0}{10^{\circ}6}\\ \stackrel{10^{\circ}6}{14^{\circ}1}\\ \stackrel{11^{\circ}6}{16^{\circ}2}\\ \stackrel{9}{10^{\circ}5}\\ \stackrel{10^{\circ}7}{16}\\ \stackrel{10^{\circ}1}{16^{\circ}8}\\ \stackrel{10^{\circ}3}{16^{\circ}8}\\ \stackrel{10^{\circ}3}{18^{\circ}8}\\ \stackrel{10^{\circ}3}{12^{\circ}8}\\  $\begin{array}{c} 3.6\\ 14.6\\ 18.2\\ 10.1\\ 5.8\\ 4.7.4\\ 10.1\\ 9.2\\ 8.84\\ 3.24\\ 12.4\\ 3.24\\ 12.4\\ 4.7.1\\ 14.5\\ 7.1\\ 14.5\\ 7.1\\ 14.5\\ 7.6\\ 2.1\\ 1.64.1\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 1.66.4\\ 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10^{\circ} \\ 8^{\circ} 10 \\ 8^{\circ} 63 \\ \end{array}$	
Fahr. }						-	41°-29	45.72	4 ⁶ .60	48.74	45.72	46.63	47.97	<b>48</b> .99	49·08	50.00	49·26	51.12	50.83	48.83	49·24		-	_	47.53
1 3 4 6 7 8 9 10 11 13 14 15 16 17 18 20 21 22 23 4 25 26 27 28 20 30 30	°	°	• 	°	° 23·18  4·28  36·50 	20.84 20.84 16.88 7.88  20.12 26.96 12.92 26.78 20.48  13.28 15.08 13.28 15.08 13.28 30.38  -           	$\begin{array}{c} 4 \\ 14 \\ 14 \\ 14 \\ 11 \\ 48 \\ 41 \\ 72 \\ 39 \\ 38 \\ 25 \\ 52 \\ 35 \\ 78 \\ 42 \\ 35 \\ 78 \\ 42 \\ 35 \\ 78 \\ 42 \\ 44 \\ 32 \\ 90 \\ 41 \\ 18 \\ 32 \\ 42 \\ 44 \\ 32 \\ 90 \\ 22 \\ 46 \\ 33 \\ 90 \\ 22 \\ 28 \\ 04 \\ 18 \\ 68 \\ 33 \\ 90 \\ 22 \\ 28 \\ 20 \\ 12 \\ 22 \\ 18 \\ 68 \\ 33 \\ 90 \\ 22 \\ 28 \\ 20 \\ 12 \\ 22 \\ 18 \\ 68 \\ 33 \\ 90 \\ 22 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 12 \\ 28 \\ 20 \\ 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Means •	42.62	41.00	47.12	42.80	21.32	19.22	26.95	36.92	34.96	37.06	37.52	37.88	38.42	38.97	41.49	44.54	42.13	43.18	41.79	39.23	39.73	43.34	40.46	41.81	38.29

The temperature observed in December is reduced to 32° Fahrenheit,

and corrected for deviation from Paris Standard Thermometer.

### FORT CONFIDENCE-continued.

# Abstract of Hourly Observations in the months of January and February 1849

	FORT CONFIDENCE—continued.
ruary 1849.	Abstract of Hourly Observations in the months of January and February 1849.

METEOROLOGICAL OBSERVATIONS.

Day.	Centigrade Thermometer, attached to Delcros's Barometer corrected												for mean deviation from Paris Standard Thermometer, and reduced to Fahrenheit Scale.												
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### FORT CONFIDENCE-continued.

Abstract of Hourly Observations in the months of March and April 1849.

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<b>9</b>\cdot<b>5</b>\\ <b>13</b>\cdot<b>9</b>\\ <b>11</b>\cdot<b>8</b>\\ <b>6</b>\cdot<b>11</b>\cdot<b>6</b>\\ <b>3</b>\cdot<b>6</b>\\ <b>10</b>\cdot<b>7</b>\\ <b>8</b>\cdot<b>6</b>\\ <b>7</b>\cdot<b>8</b>\\ <b>7</b>\cdot<b>8</b>\\ <b>7</b>\cdot<b>8</b>\\ <b>7</b>\cdot<b>8</b>\\ <b>11</b>\cdot<b>0</b>\end{array}</math></td> <td></td>	$\begin{array}{c} \circ^{7,0} \\ 11.9 \\ 10.1 \\ 8.0 \\ 10.4 \\ 2.1 \\ 0.77 \\ 10.6 \\ 8.8 \\ 2.1 \\ 0.77 \\ 10.6 \\ 8.8 \\ 11.6 \\ 3.3 \\ 7.1 \\ 12.4 \\ 8.8 \\ 11.6 \\ 3.5 \\ 2.6 \\ 7.1 \\ 7.1 \\ 8.8 \\ 6.2 \\ \end{array}$	$\begin{array}{c} \overset{\circ}{5} \overset{\circ}{6} \overset{\circ}{5} \overset{\circ}{15} \overset{\circ}{6} \overset{\circ}{15} \overset{\circ}{11} \overset{\circ}{10} \overset{\circ}{12} \overset{\circ}{6} \overset{\circ}{6} \overset{\circ}{14} \overset{\circ}{4} \overset{\circ}{4} \overset{\circ}{8} \overset{\circ}{2} \overset{\circ}{6} \overset{\circ}{2} \overset{\circ}{6} \overset{\circ}{2} \overset{\circ}{7} 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Means -	9.50	7.20	4.20	1.45	-0.20	-3.75	3.28	5.96	4.28	6.09	7.62	· 8·09	8.07	9.04	9.54	10
Fahrenheit -	48° • 56	44° • 96	40° 46	34° • 61	31°'10	25° 25	38°•44	42° • 73	39°•70	42° • 96	45° • 72	46° • 56	46° • 53	48° • 27	49°•17	500
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### METEOROLOGICAL OBSERVATIONS.

### FORT CONFIDENCE—continued.

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Abstract of Hourly Observations in the months of March and April 1849.

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\cdot 11 \\ 9 \cdot 108 \\ 12 \cdot 45 \\ 13 \cdot 60 \\ 14 \cdot 98 \\ 11 \cdot 72 \\ 12 \cdot 82 \\ 11 \cdot 82 \\ 14 \cdot 25 \\ 10 \cdot 82 \\ 5 \cdot 99 \\ 6 \cdot 85 \\ 7 \cdot 85 \\ 6 \cdot 31 \\ \hline \end{array}$
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\end{array}$		$10^{\circ}8\\17^{\circ}8\\11^{\circ}1\\13^{\circ}8\\12^{\circ}6\\0^{\circ}6\\0^{\circ}6\\14^{\circ}8\\0^{\circ}2\\15^{\circ}1\\10^{\circ}4\\8^{\circ}8\\12^{\circ}6\\11^{\circ}6\\12^{\circ}6\\11^{\circ}6\\10^{\circ}8\\18^{\circ}6\\17^{\circ}6\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\18^{\circ}5\\$	$12^{\cdot 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14^{\cdot 1} \\ 16^{\cdot 2} \\ 12^{\cdot 0} \\ 14^{\cdot 6} \\ 14^{\cdot 1} \\ 16^{\cdot 2} \\ 26^{\cdot 2} \\ 6^{\cdot 2} \\ 0^{\cdot 1} \\ 5^{\cdot 4} \end{array}$	$\begin{array}{c} 9\cdot 3\\ 10\cdot 8\\ 11\cdot 4\\ 13\cdot 6\\ 12\cdot 1\\ 7\cdot 9\\ 10\cdot 2\\ 8\cdot 0\\ 12\cdot 1\\ 14\cdot 1\\ 11\cdot 2\\ 9\cdot 1\\ 11\cdot 6\\ 13\cdot 8\\ 9\cdot 6\\ 13\cdot 6\\ 13\cdot 6\\ 13\cdot 8\\ 9\cdot 8\\ 9\cdot 6\\ 16\cdot 4\\ 9\cdot 9\\ 12\cdot 6\\ 10\cdot 1\\ 11\cdot 8\\ 2\cdot 6\\ -0\cdot 2\\ 12\cdot $	$\begin{array}{c} 10.6\\ 10.2\\ 11.7\\ 14.4\\ 13.6\\ 7.6\\ 8.6\\ 11.6\\ 11.6\\ 11.6\\ 12.5\\ 13.8\\ 14.1\\ 10.0\\ 7.6\\ 8.6\\ 12.5\\ 12.8\\ 18.6\\ 14.0\\ 2.5\\ 12.8\\ 18.6\\ 14.0\\ 2.5\\ 12.6\\ 14.0\\ 2.5\\ 12.6\\ 14.0\\ 2.5\\ 12.6\\ 14.0\\ 2.5\\ 12.6\\ 14.0\\ 2.5\\ 12.6\\ 14.0\\ 2.5\\ 12.6\\ 14.0\\ 2.5\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 14.0\\ 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1054\\ 1056\\ 1468\\ 961\\ 841\\ 1087\\ 1057\\ 1057\\ 1057\\ 1057\\ 1057\\ 1262\\ 1111\\ 9908\\ 1245\\ 1360\\ 1498\\ 1172\\ 1262\\ 1182\\ 1182\\ 1425\\ 1082\\ 599\\ 685\\ 785\\ 631\\ \end{array}$

368

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Means

Fahrenheit

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5.52

41° · 94 37° · 35

2.97

8.86

47° • 95

9.73

49°.51

7.92

46° · 26

10.30

50° · 54

9.21

490.48

**369** 

#### METEOROLOGICAL OBSERVATIONS.

FORT CONFIDENCE.

#### Abstract of Hourly Observations made during the month of October 1848.

<u></u>

8.

22.0 20.8

 $\begin{array}{r} 12 \cdot 0 \\ 8 \cdot 5 \\ 23 \cdot 2 \\ 21 \cdot 0 \\ 28 \cdot 5 \\ 22 \cdot 0 \\ 16 \cdot 0 \\ 23 \cdot 2 \\ 20 \cdot 0 \end{array}$ 

18.8

-3.0 18'0

17.93

1.37

9.

9·4 22:08 20:8 11:0 22:23:0 22:5 23:0 12:0 11:0 22:22 23:0 22:5 23:0 16:0 24:0

19.2

-1.0 19.0

17.82

1.26

10.

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23.0

23.00

11.

24.00

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Midn^t.

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Means.

29.67 18.02 23.81 16.62 21.45 16.00 22.00 25.07 20.37 20.37 20.340 25.40

22.04 14.83 9.65 17.77 24.76 26.61 26.55 21.64

23·72 22·24 19·19

3.93

20.01

Spirit Thermometer constructed by Adie. Spirit Thermometer constructed by Adie. 1. Noon 2. 9. 10. 11. 3. 4. 5. 6. 7. 7. 8. 6. 5.  $\begin{array}{c} \circ \\ \hline \\ \end{array} \\ \hline \\ \end{array} \\ \begin{array}{c} 30\cdot0 \\ 19\cdot0 \\ 25\cdot0 \\ 18\cdot2 \\ 23\cdot2 \\ 23\cdot2 \\ 23\cdot2 \\ 23\cdot2 \\ 23\cdot2 \\ 23\cdot2 \\ 22\cdot1 \\ 22\cdot5 \\ 27\cdot1 \\ 22\cdot5 \\ 27\cdot1 \\ 22\cdot5 \\ 27\cdot2 \\ 24\cdot9 \\ 22\cdot5 \\ 24\cdot9 \\ 22\cdot5 \\ 24\cdot9 \\ 21\cdot6 \\ 10\cdot6  |||||||| <u>°</u> ____ 0 ° 29.0 18.0 22.5 19.0 11.2 <u>°</u> _ ° 29.0 18.0 22.0 19.0 12.0 6.0 32·0 19·0 25·0 _____ 29.0 17.0 25.0 ----<u>___</u> ____ ----_____ ____ _____ 29.0 28.0 15.5 24.8 31.0 18.2 29.0 18.0 23.0 29.0 18.0 29.0 18.0 19.0 14.0 18.0 23.0 27.0 19.5 30.0 22·0 16·0 20.0 17.0 22.0 12.0 22.8 26.0 17.0 11.8 20.0 27.7 8 27.9 23.1 26.3 23.5 16.8 9.0 18.0 12.0 _ 23·0 15·0 21.0 22.9 28.0  $\begin{array}{c} - \\ 22^{\circ}0 \\ 23^{\circ}0 \\ 16^{\circ}0 \\ 22^{\circ}0 \\ 15^{\circ}2 \\ 9^{\circ}5 \\ 10^{\circ}0 \\ 24^{\circ}0 \\ 24^{\circ}0 \\ 24^{\circ}0 \\ 24^{\circ}0 \\ 24^{\circ}0 \\ 24^{\circ}0 \\ 21^{\circ}7 \\ 21^{\circ}2 \\ 9^{\circ}7 \\ 5^{\circ}3 \end{array}$ 24.0 24.0 27.0  $\begin{array}{c} 23 \cdot 2 \\ 25 \cdot 0 \\ 18 \cdot 0 \\ 16 \cdot 0 \\ 13 \cdot 0 \\ 11 \cdot 8 \\ 26 \cdot 4 \\ 27 \cdot 4 \\ 27 \cdot 3 \\ 25 \cdot 7 \\ 25 \cdot 1 \\ 23 \cdot 6 \\ 21 \cdot 8 \end{array}$  $\begin{array}{c} 23.0\\ 16.0\\ 25.0\\ 23.0\\ 15.0\\ 9.0\\ 11.0\\ 24.0\\ 27.0\\ 27.0\\ 25.0\\ 21.0\\ 21.5\\ 21.0\end{array}$  $\begin{array}{c} 24.0\\ 80.0\\ 26.0\\ 17.2\\ 11.0\\ 28.0\\ 28.0\\ 28.8\\ 25.7\\ 26.8\\ 19.5\\ 10.5\\ 20.0\end{array}$ 23.2 23.0 ____  $\begin{array}{c} 21 \cdot 0 \\ 22 \cdot 0 \\ 12 \cdot 7 \\ 7 \cdot 0 \\ 22 \cdot 5 \\ 17 \cdot 0 \\ 28 \cdot 0 \\ 24 \cdot 3 \\ 16 \cdot 0 \\ 24 \cdot 0 \\ 20 \cdot 6 \\ 17 \cdot 2 \end{array}$  $\begin{array}{c} - \\ 24 \cdot 0 \\ 13 \cdot 2 \\ 3 \cdot 5 \\ 22 \cdot 0 \\ 25 \cdot 2 \\ 25 \cdot 2 \\ 25 \cdot 2 \\ 17 \cdot 0 \\ 25 \cdot 4 \\ 16 \cdot 7 \\ - 5 \cdot 0 \\ 16 \cdot 0 \end{array}$  $\begin{array}{c} 16.0 \\ 13.0 \\ 14.5 \\ 27.6 \\ 27.5 \\ 28.0 \\ 27.3 \\ 25.6 \\ 25.0 \end{array}$  $\begin{array}{c} 15.8\\ 11.0\\ 21.5\\ 26.2\\ 28.1\\ 28.1\\ 20.4\\ 26.2\\ 22.9\\ 16.0\\ 7.0\\ 16.6\end{array}$ 16.0  $\begin{array}{c} 10.5 \\ 12.0 \\ 25.3 \\ 26.3 \\ 26.7 \\ 21.4 \\ 24.0 \\ 22.5 \\ 22.0 \end{array}$ 25.0 23.0 21.0 9.0 20.0 6·5 10·4 6.0 16.0 -6.0 -6'5 14'2 8·8 9·0 4.3 20.0 22.42 22.01 22.40 21.29 19.95 19.32 16.26 16.80 18.90 20.03 20.74 21.52 18.26 24.00 20.28 5.84 5.86 4.18 4.96 5.45 4.23 3.39 2.76 0.00 0.24 3.47 3.72 2.002.34 ----_ for five hours in the afternoon of the 30th. No corrections made this month. the ground, facing the north. Fahrenheit's scale.

Norg .-- All the numbers are above zero this month, except

No corrections made this month. Thermometer suspended in the shade, five feet above

вв 2

FORT CONFIDENCE. Abstract of Hourly Observations made during the month of October 1848. Day. Mean Time 1. 2. 8. 4. at Station. <u></u> <u></u> 29.0 3 6 8 9 10 11 12 13 14 15 6 17 18 19 20 21 22 23 24 25 26 27 28 9 30 31 24.0 10.0 ----28.0 18.0 19.4 ----____ ____ ..... -24.0 23.20 19.13 Means Oscillations ۰**۰**۰۰۰ ..... -----

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### FORT CONFIDENCE—continued.

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Abstract of Hourly Observations made during the months of November and December 1848.

Day.	1			S	pirit The	rmomete	er constru	icted by	Adie.				
Mean Time at Station.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noor	2.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 20 27 28 20 27 28 20 27 28 30 <b>Means</b>				12. 	$ \begin{array}{c} -12 \\ -12 \\ -3 \\ -3 \\ -3 \\ -3 \\ -10 \\ -17 \\ -9 \\ -17 \\ -9 \\ -17 \\ -9 \\ -17 \\ -9 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ -10 \\ $	$\begin{array}{c c} & -0 \\ -0 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\ -5 \\$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 0 \\ -5^{\circ} \\ -2^{\circ} \\ -2^{\circ} \\ -17^{\circ} \\ 0 \\ -9^{\circ} \\ -17^{\circ} \\ 0 \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -28^{\circ} \\ -16^{\circ} \\ -$	$\begin{array}{c} 0 \\ 0 \\ 0 \\ -2^{\circ} \\ 0 \\ -3^{\circ} \\ 0 \\$	$\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 $	$\begin{array}{c} 1 \\ 2^{\circ} \\ 1 \\ 0 \\ 1 \\ 0 \\ 1 \\ 0 \\ 1 \\ 0 \\ 1 \\ 0 \\ 1 \\ 1$	83558005880018837701550021110005100015000000000000000000
Means - Corrections	-9.00	-8.60	-3.00	-3.15	-4.15	2.83			-3.03	-2.14		0.11	-
Oscillations	-			-		1.45			0.95	1.94		4.39	-
1 $2$ $3$ $4$ $6$ $7$ $8$ $9$ $10$ $11$ $12$ $13$ $14$ $15$ $16$ $17$ $18$ $19$ $20$ $21$ $23$ $24$ $25$ $26$ $27$ $28$ $29$ $30$ $31$	-41.2	-43.6	-44.0			$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\left \begin{array}{c} -30^{\circ}8\\ -30^{\circ}8\\ 38^{\circ}5\\ 38^{\circ}3\\ 24^{\circ}0\\ 37^{\circ}6\\ 39^{\circ}8\\ 38^{\circ}0\\ 27^{\circ}8\\ 38^{\circ}0\\ 27^{\circ}8\\ 39^{\circ}0\\ 43^{\circ}0\\ 43^{\circ}0\\ 43^{\circ}8\\ 37^{\circ}2\\ 39^{\circ}0\\ 43^{\circ}0\\ 43^{\circ}0\\ 43^{\circ}8\\ 37^{\circ}2\\ 39^{\circ}0\\ 44^{\circ}8\\ 37^{\circ}2\\ 39^{\circ}0\\ 44^{\circ}0\\ 9^{\circ}5\\ 22^{\circ}5\\ 24^{\circ}5\\ 22^{\circ}5\\ 24^{\circ}5\\ 22^{\circ}5\\ 27^{\circ}5\\ 34^{\circ}0\\ 18^{\circ}0\\ 18^{\circ}0\\ 18^{\circ}0\\ 18^{\circ}0\\ 18^{\circ}0\\ 18^{\circ}0\\ 18^{\circ}0\\ 18^{\circ}0\\ 16^{\circ}0\\ 18^{\circ}0\\ 16^{\circ}0\\ 18^{\circ}0\\ 16^{\circ}0\\ 16$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\left \begin{array}{c} -25 \cdot 0 \\ 36^{\circ} 8 \\ 39^{\circ} 5 \\ 39^{\circ} 5 \\ 37^{\circ} 0 \\ 37^{\circ} 0 \\ 37^{\circ} 0 \\ 40^{\circ} 4 \\ 42^{\circ} 5 \\ 44^{\circ} 7 \\ 44^{\circ} 7 \\ 34^{\circ} 8 \\ 44^{\circ} 7 \\ 34^{\circ} 5 \\ 57^{\circ} 0 \\ 42^{\circ} 0 \\ 35^{\circ} 5 \\ 44^{\circ} 0 \\ 44^{\circ} 0 \\ 44^{\circ} 0 \\ 35^{\circ} 5 \\ 44^{\circ} 0 \\ 44^{\circ} 0 \\ 44^{\circ} 0 \\ 19^{\circ} 0 \\ 20^{\circ} 5 \\ 34^{\circ} 2 \\ 14^{\circ} 0 \\ 19^{\circ} 0 \\ 20^{\circ} 5 \\ 34^{\circ} 2 \\ 14^{\circ} 0 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 11^{\circ} 2 \\ 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11^{\circ} 11^{\circ}$	$\left \begin{array}{c} -27.8\\ 35'8\\ 36'7\\ 22'2\\ 34'0\\ 35'0\\ 32'2\\ 22'2\\ 34'0\\ 35'0\\ 32'2\\ 22'2\\ 42'5\\ 35'0\\ 42'5\\ 35'5\\ 36'5\\ 55'0\\ 8'0\\ 8'0\\ 41'6\\ 37'0\\ 18'5\\ 19'0\\ 35'5\\ 14'2\\ 14'0\\ 37'0\\ 9'9\end{array}\right $	$ \begin{vmatrix} -26 \cdot 5 \\ 33 \cdot 0 \\ 33 \cdot 0 \\ 37 \cdot 2 \\ 21 \cdot 8 \\ 36 \cdot 0 \\ 27 \cdot 0 \\ 54 \cdot 0 \\ 41 \cdot 0 \\ 41 \cdot 8 \\ 39 \cdot 5 \\ 42 \cdot 3 \\ 36 \cdot 0 \\ 24 \cdot 0 \\ 44 \cdot 1 \\ 42 \cdot 3 \\ 36 \cdot 0 \\ 38 \cdot 0 \\ 55 \cdot 5 \\ 54 \cdot 0 \\ 32 \cdot 0 \\ 7 \cdot 0 \\ 38 \cdot 0 \\ 38 \cdot 0 \\ 14 \cdot 0 \\ 18 \cdot 8 \\ 36 \cdot 0 \\ 11 \cdot 0 \\ 15 \cdot 2 \\ 8 \cdot 6 \\ 11 \cdot 0 \\ 15 \cdot 2 \\ 8 \cdot 6 \\ 11 \cdot 0 \\ 15 \cdot 2 \\ 8 \cdot 6 \\ 11 \cdot 0 \\ 11 \cdot 0 \\ 15 \cdot 2 \\ 8 \cdot 6 \\ 11 \cdot 0 \\ 11 \cdot 0 \\ 15 \cdot 2 \\ 8 \cdot 6 \\ 11 \cdot 0 \\ 11 \cdot 0 \\ 11 \cdot 0 \\ 15 \cdot 2 \\ 10 \cdot 0 \\ 11 \cdot 0 \\ 11 \cdot 0 \\ 15 \cdot 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Means -	-41.5	-35.2	-44.0	-28.43	-33.12	-36.26	-34.80	-34.06	-34.12	-33.82	-33.12	-32.23	
Corrections						-40.22	-38.28	-37.47	-37.56	-37.20	-30.46	-35.78	
Oscillations	- ]	-	-		-	0.00	1.94	2.75	2.66	3.05	3.76	4.44	

#### METEOROLOGICAL OBSERVATIONS.

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#### FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of November and December 1848.

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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	-10.9	8-5	$\begin{array}{c} 5\cdot 57\\ 7\cdot 67\\ 4\cdot 71\\ -24\cdot 60\\ -22\cdot 20\\ -0\cdot 72\\ -13\cdot 94\\ -16\cdot 92\\ -8\cdot 84\\ 12\cdot 77\\ 3\cdot 58\\ 14\cdot 80\\ 8\cdot 26\\ 11\cdot 06\\ 13\cdot 74\\ 10\cdot 68\\ -12\cdot 63\\ 12\cdot 63\\ -12\cdot $
$- \begin{bmatrix} 0.41 & -0.08 & -0.96 & -1.64 & -2.57 & -3.02 & -3.61 & -3.51 & -3.89 & -13.37 \\ \hline 0.41 & -0.09 & -1.06 & -1.80 & -2.83 & -3.32 & -3.97 & -3.86 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 & -4.28 &$	-20.42	-8.20	-2.41
<u>4'69</u> 1'19 3'22 2'48 1'45 0'96 0'31 0'42 0'00 -			-2 40
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	-35.55		$\begin{array}{c} -28 \cdot 26 \\ 84 \cdot 77 \\ 85 \cdot 45 \\ 25 \cdot 94 \\ 36 \cdot 45 \\ 37 \cdot 62 \\ 31 \cdot 78 \\ 33 \cdot 79 \\ 40 \cdot 91 \\ 41 \cdot 31 \\ 39 \cdot 06 \\ 28 \cdot 34 \\ 44 \cdot 17 \\ 41 \cdot 61 \\ 37 \cdot 90 \\ 38 \cdot 42 \\ 56 \cdot 63 \\ 54 \cdot 20 \\ 29 \cdot 94 \\ 16 \cdot 61 \\ 42 \cdot 05 \\ 37 \cdot 90 \\ 44 \cdot 32 \\ 41 \cdot 63 \\ 25 \cdot 91 \\ 16 \cdot 59 \\ 13 \cdot 52 \\ 16 \cdot 59 \\ 13 \cdot 52 \\ 36 \cdot 48 \\ 9 \cdot 69 \\ -34 \cdot 78 \end{array}$
$\frac{-35.78}{-35.78} = \frac{-37.07}{-37.45} = \frac{-37.37}{-37.37} = \frac{-37.81}{-37.64} = \frac{-37.78}{-37.78} = \frac{-37.82}{-37.72} = \frac{-37.72}{-37.72} = -37.72$	-01 20		-34 78
<u>4.44</u> <u>3.12</u> <u>2.77</u> <u>2.85</u> <u>2.41</u> <u>2.58</u> <u>2.44</u> <u>2.40</u> <u>2.50</u> <u></u>	-		-

the north, five feet above the ground. Fahrenheit's scale –. Observations recorded without correction. December are –quantities.

-Thermometer suspended in the shade facing Freezing point of mercury -36°0 in thermometer used. The whole of the readings for

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### FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of January and February 1849.

| Day.                                                                                                                                                                                                          |                          |       |      | Spi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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Suspended in the shade.

Fahrenheit's scale. Cbservations recorded without correction.

## METEOROLOGICAL 'OBSERVATIONS. FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of January and February 1849.

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375

Means,

 $\begin{array}{c} -1.86\\ -4.459\\ -4.59\\ -10.77\\ -38.62\\ -42.09\\ -87.13\\ -14.79\\ -87.13\\ -14.79\\ -25.89\\ -97.13\\ -14.79\\ -25.89\\ -97.13\\ -14.82\\ -97.55\\ -24.01\\ -14.82\\ -37.55\\ -24.01\\ -14.82\\ -37.55\\ -24.01\\ -13.56\\ -23.55\\ -24.01\\ -13.56\\ -23.55\\ -24.01\\ -13.56\\ -23.55\\ -24.01\\ -13.56\\ -23.55\\ -24.01\\ -13.56\\ -23.55\\ -24.01\\ -13.56\\ -23.55\\ -24.01\\ -13.56\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -23.55\\ -$ 

-18.82 -20.86-----

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-20.09 -22.10

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374

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-9·8 -21·0

 $\begin{array}{c} -11.5 \\ -6.0 \\ -2.5 \\ -1.0 \\ \end{array}$ 

6.0

-6.26

-6.89

2'81

0.00

-26.5

-17.2

-20.2

 $\begin{array}{r}
 0.7 \\
 -15.0 \\
 -11.3 \\
 3.8 \\
 -21.5 \\
\end{array}$ 

-34.0

-5.5-12.0

-24.0-18.5-2.0

 $\begin{array}{r} -2.0 \\ 4.8 \\ -11.0 \\ -22.5 \\ -18.9 \\ -8.0 \\ -2.0 \\ 3.5 \\ 17.0 \\ 2.0 \\ 15.0 \\ 2.0 \\ 0 \\ 15.0 \\ 2.0 \end{array}$ 

6.0 -17.5 -9.0

 $-5.0 \\ -7.0$ 

-8.85

-9.20

0.00

-4.68

-5.15

4.55

-1.84

-2.05

7.68

-36.52

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### METEOROLOGICAL OBSERVATIONS.

FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of March and April 1849.

### FORT CONFIDENCE-continued.

Abstract of Hourly Observations made during the months of March and April 1849.

Spir	it Therm	ometer o	construct	ted by Ad	lie.			1	I					Spirit T	hermomo	ete <del>r</del> consi	tructed l	oy Adie.			
4,	5.	6.	7.	8.	9.	10.	11.	Noon.		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midnt.
	• 	$\begin{array}{c} -18^{\circ}.0\\ -4^{\circ}.2\\ -15^{\circ}.4\\ -17^{\circ}.6\\ -30^{\circ}.5\\ -21^{\circ}.9\\ -38^{\circ}.5\\ -21^{\circ}.9\\ -26^{\circ}.3\\ -26^{\circ}.3\\ -21^{\circ}.5\\ -21^{\circ}.9\\ -26^{\circ}.3\\ -21^{\circ}.5\\ -24^{\circ}.3\\ -31^{\circ}.5\\ -24^{\circ}.8\\ -31^{\circ}.8\\ -31^{\circ}.8\\ -31^{\circ}.8\\ -31^{\circ}.3\\ -31^{\circ}.6\\ -39^{\circ}.0\\ -34^{\circ}.7\\ -23^{\circ}.63\\ -32^{\circ}.63\\ $	$\begin{array}{c} -243\\ -7.6\\ -138\\ -177\\ -137\\ -177\\ -137\\ -216\\ -2215\\ -3410\\ -225\\ -3425\\ -284\\ -226\\ -342\\ -284\\ -226\\ -342\\ -284\\ -226\\ -342\\ -284\\ -226\\ -382\\ -182\\ -2994\\ -227\\ -2994\\ -287\\ -2994\\ -287\\ -2994\\ -287\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ -2994\\ 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- 1	{		-17.2	-17.7	-9.0	-4.0	0.5	4.0	6.0		5.8
- 1			-1.6	-1.3	-1.0	1.0	2.2	5.0	6.0	. Bill .	7.0
		-	3.0	2.5	2.6	3.2	8.8	4.5	6.5		6.5
- 1			-30.2	-31.0	-25.0	-20.2	-16'5	-13.8	-0.0		-10.2
	- 1	·	-21.9	-22.5	-21.7	-20.1	-19'0	-17.0	-16.0		-15.0
- 1		-	-35.6	-34.0	-32.4	-28.0	-24.5	-22.8	-19.0		-21.0
[			-44.0	-43.4	-41.0	-31.8	-25.0	-20.0	-19.8		-18.6
	- 1	-	-26.3	-26.3	-25.2	-23.0	-21.0	-18.3	-17.5		-19.2
	~	-	+-30.3	-28.4	-24.0	-21.0	-18:0	-15.5	-13.5		-14.5
	-		-21.2	-22.0	-19.8	-17.0	-12.4	-10.2	-10.0		8.8
			-17.5	-17.2	-16.0	-13.0	-12.0	-11'5	( -9.8		-10.0
		-	-9.7	8.5	-7.0	-3.2	-1.2	3.0	1.0		5.0
1			-1.3	-1.0	1.8	4.3	8.0	7.5	10.0	1.1	9.0
~	-	l	-16.2	-18.2	-16.8	-16.0	-16.0	-16.0	-15'5		-15.8
			-32.2	-29.4	-26.0	-21.0	-22.2	-20.8	-18.2		-17.0
		l I	-41.5	-37.2	-32.6	-27.0	-22.8	-20.0	-18.2		-18.0
		[ ' ;	-24.8	-21'8	-17.4	-12.4	-11.5	-9.8	~9.0		-6.8
-29.5	-32.3	-31.6	-35.3	-28.6	-27.0	-21.0	-15.8	-14.8	-12:5		-12.4
-37.2	-40.2	-40.2	-39.8	-37.2	-32.2	-25.4	-21.5	-20.6	-18.0		-15.0
		- 1	-29.0	-25.5	-21.7	-20.0	-15.8	-12.2	11.0		-13.0
	- 1	1	-31.8	-27.0	-21.7	-15.0	-12.2	-9.8	-8.4		-7.5
-		- 1	-31.3	-29.4	-25.2	-21.0	-20.0	-18.3	-16.2		1-16.6
	-		-29.0	-28.5	-26.0	-20.0	-16.2	-15.2	-13.0		-12.0
	1	I	-39.0	-33.2	-27.0	-20.8	-16.0	-12.0	-13.0		-11.0
-	-	1	-42.5	-35.3	-28.5	-21.4	-15.2	-12.2	-9.6		5.5
	1 - 1	1	-1.0	0.0	1.2	2.0	4.0	6.3	9.0		9.6
- 1	- 1	1	-12.0	-4.8	-1.3	2.0	3.0	0.0	2.0		1.8
-			-34.7	-30.4	-24.5	-18.2	-17 5	-12.2	-10.5		-9.8
1	1	1	1	1	1	1	1	1	1		1

1.69

1.69

11.39

3.23

3.23

13.23

4.71

4.71

14.41

5.21

5.71

15.41

	-	-		
$\begin{array}{c} -19 \cdot 5 \\ -9 \cdot 5 \\ 5 \cdot 2 \\ -13 \cdot 8 \\ -8 \cdot 8 \\ -8 \cdot 8 \\ -8 \cdot 8 \\ -8 \cdot 8 \\ -8 \cdot 8 \\ -18 \cdot 0 \\ -28 \cdot 5 \\ -128 \cdot 0 \\ -18 \cdot 0 \\ -18 \cdot 0 \\ -18 \cdot 0 \\ -18 \cdot 0 \\ -18 \cdot 0 \\ -18 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -9 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -7 \cdot 8 \\ -7 \cdot 8 \\ -7 \cdot 8 \\ -7 \cdot 8 \\ -7 \cdot 8 \\ -0 \cdot 5 \end{array}$	1.80	-21.99	$-4.8 \\ -30.4 \\ -21.99$	$\begin{array}{c} -1.0\\ -18.2\\ -29.4\\ -37.2\\ -21.8\\ -28.6\\ -37.2\\ -25.5\\ -27.0\\ -29.4\\ -28.5\\ -33.2\\ -33.2\\ -33.5\\ 0.0\end{array}$
$\begin{array}{c} -13.7\\ -3.0\\ 6.0\\ 0\\ -11.2\\ 5.4\\ -7.5\\ 1.6\\ 0\\ -16.0\\ -2.0\\ -14.0\\ -2.0\\ -12.0\\ -12.0\\ -12.0\\ -12.0\\ -12.0\\ -5.5\\ 1.2\\ 6.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -5.0\\ -1.0\\ 0\\ 13.7\\ -4.6\\ -4.3\\ -4.6\\ -4.3\\ -1.0\\ 2.5\end{array}$	5.22	-18.88 -20.77	-1.3 -24.5 -18.88	$\begin{array}{c} 1 \cdot 8 \\ -16 \cdot 8 \\ -26 \cdot 0 \\ -32 \cdot 6 \\ -17 \cdot 4 \\ -27 \cdot 0 \\ -32 \cdot 2 \\ -24 \cdot 7 \\ -21 \cdot 7 \\ -25 \cdot 2 \\ -26 \cdot 0 \\ -27 \cdot 0 \\ -27 \cdot 0 \\ -28 \cdot 5 \\ 1 \cdot 5 \end{array}$
$\begin{array}{c} -6\cdot 5\\ 3\cdot 0\\ 16\cdot 3\\ -7\cdot 5\\ 8\cdot 0\\ -3\cdot 6\\ 2\cdot 0\\ 15\cdot 0\\ 0\\ -10\cdot 0\\ -10\cdot 0\\ -10\cdot 0\\ -10\cdot 0\\ -10\cdot 0\\ -11\cdot 0\\$	9.83	-14.69	$\frac{2.0}{-18.2}$	$\begin{array}{c} 4 \cdot 2 \\ -16 \cdot 0 \\ -24 \cdot 0 \\ -27 \cdot 0 \\ -12 \cdot 4 \\ -21 \cdot 0 \\ -25 \cdot 4 \\ -20 \cdot 0 \\ -15 \cdot 0 \\ -21 \cdot 0 \\ -20 \cdot 8 \\ -21 \cdot 4 \\ 2 \cdot 0 \end{array}$
$\begin{array}{c} -8.0\\ 5.0\\ 17.8\\ -5.0\\ 9.63\\ -5.0\\ 9.63\\ -5.0\\ -9.8\\ -9.9\\ -9.8\\ -9.9\\ -9.8\\ -9.9\\ -9.8\\ -9.9\\ -1.0\\ 14.0\\ 14.0\\ 14.0\\ 18.0\\ 2.0\\ 14.4\\ 16.8\\ 3.0\\ 3.0\\ 0.5\\ -9.0\\ \end{array}$	12.99	-11'82		$\begin{array}{r} 8.0 \\ -16.0 \\ -22.2 \\ -22.8 \\ -11.2 \\ -15.8 \\ -21.5 \\ -15.8 \\ -12.5 \\ -20.0 \\ -16.5 \\ -16.0 \\ -16.5 \\ -4.0 \end{array}$
$\begin{array}{c} -5 \cdot 4 \\ 8 \cdot 0 \\ 19 \cdot 8 \\ -4 \cdot 0 \\ 12 \cdot 0 \\ 6 \cdot 5 \\ 11 \cdot 19 \\ -6 \cdot 5 \\ -8 \cdot 0 \\ -8 \cdot 0 \\ -8 \cdot 0 \\ -8 \cdot 5 \\ 13 \cdot 0 \\ -0 \cdot 5 \\ 13 \cdot 0 \\ -0 \cdot 5 \\ 13 \cdot 0 \\ 3 \cdot 5 \\ 13 \cdot 0 \\ 3 \cdot 5 \\ 18 \cdot 5 \\ 3 \cdot 4 \\ 4 \cdot 0 \\ 12 \cdot 5 \\ 18 \cdot 5 \\ 3 \cdot 4 \\ 4 \cdot 0 \\ 1 \cdot 5 \\ 7 \cdot 9 \end{array}$	15.34	-9'68	0.6 -12.5 -9.68	$\begin{array}{r} 7.5 \\ -16.0 \\ -20.8 \\ -20.0 \\ -9.8 \\ -14.8 \\ -20.6 \\ -12.5 \\ -9.8 \\ -18.3 \\ -15.2 \\ -18.3 \\ -15.2 \\ -12.0 \\ -12.5 \\ 6.3 \end{array}$
$\begin{array}{c} -3.5\\ 10.4\\ 14.2\\ -2.0\\ 11.8\\ -2.0\\ 11.8\\ 10.55\\ -5.5\\ -5.5\\ -5.5\\ -5.5\\ -5.6\\ -5.6\\ 11.8\\ 10.2\\ 4.8\\ 17.4\\ 18.5\\ 24.5\\ 5.5\\ 5.4\\ 3.0\\ 11.0\\ \end{array}$	17.22	-8.77		$\begin{array}{c} 10.0 \\ -15.5 \\ -18.5 \\ -18.5 \\ -29.0 \\ -12.5 \\ -18.0 \\ -12.5 \\ -18.0 \\ -18.0 \\ -18.0 \\ -18.0 \\ -18.0 \\ -9.6 \\ 9.0 \end{array}$
$\begin{array}{c} 0.5\\ 15.0\\ 18.0\\ -1.2\\ 2.3\\ 5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5.2\\ -5$	-17.29	-8.50	$     \begin{array}{r}       1.8 \\       -9.8 \\       -7.45     \end{array} $	$\begin{array}{c} 9.0 \\ -15.8 \\ -17.0 \\ -8.0 \\ -6.8 \\ -12.4 \\ -15.0 \\ -7.5 \\ -16.6 \\ -12.0 \\ -7.5 \\ -16.6 \\ -12.0 \\ -5.5 \\ 9.6 \end{array}$
$\begin{array}{c} 1 \cdot 0 \\ 12 \cdot 0 \\ 7 \cdot 8 \\ -0 \cdot 2 \\ 4 \cdot 5 \\ -8 \cdot 0 \\ 4 \cdot 5 \\ -8 \cdot 0 \\ 4 \cdot 0 \\ 4 \cdot 0 \\ -4 \cdot 5 \\ -8 \cdot 0 \\ 4 \cdot 8 \\ -5 \cdot 0 \\ 8 \cdot 0 \\ 11 \cdot 5 \\ 5 \cdot 0 \\ 11 \cdot 0 \\ 11 \cdot 5 \\ 5 \cdot 0 \\ 11 \cdot 0 \\ 11 \cdot 5 \\ 5 \cdot 0 \\ 11 \cdot 5 \\ 5 \cdot 0 \\ 12 \cdot 5 \\ 4 \cdot 8 \\ 5 \cdot 8 \\ 10 \cdot 2 \\ 4 \cdot 0 \\ 12 \cdot 5 \\ 4 \cdot 8 \\ 10 \cdot 2 \\ 4 \cdot 0 \\ 12 \cdot 5 \\ 4 \cdot 8 \\ 10 \cdot 2 \\ 4 \cdot 0 \\ 12 \cdot 5 \\ 4 \cdot 8 \\ 10 \cdot 2 \\ 4 \cdot 0 \\ 12 \cdot 5 \\ 4 \cdot 8 \\ 10 \cdot 2 \\ 4 \cdot 0 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 12 \cdot 5 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 10 \cdot 2 \\ 1$	17.84	-8.12	-0.5 -8.0 -7.41	$\begin{array}{c} -17 \cdot 0 \\ -16 \cdot 4 \\ -6 \cdot 5 \\ -14 \cdot 0 \\ -16 \cdot 5 \\ -12 \cdot 5 \\ -4 \cdot 2 \\ -17 \cdot 0 \\ -10 \cdot 0 \\ -10 \cdot 0 \\ -6 \cdot 5 \\ 10 \cdot 5 \end{array}$
$\begin{array}{c} 0.0\\ 8.8\\ 8.0\\ 1.0\\ 1.5\\ 6.2\\ 2.2\\ -6.0\\ 2.5\\ -5.0\\ -7.6\\ 2.5\\ -5.0\\ 1.3.0\\ 11.0\\ 2.2\\ -6.5\\ 5.8\\ 17.0\\ 6.0\\ 11.0\\ 2.2\\ 19.0\\ 11.5\\ 24.0\\ 6.0\\ 11.5\\ 24.0\\ 6.0\\ 11.2\\ \end{array}$	17.53	-8.46		$\begin{array}{c} 7 \cdot 2 \\ -15 \cdot 4 \\ -16 \cdot 9 \\ -14 \cdot 6 \\ -7 \cdot 0 \\ -13 \cdot 8 \\ -16 \cdot 0 \\ -6 \cdot 5 \\ -16 \cdot 6 \\ -15 \cdot 5 \\ -16 \cdot 5 \\ -16 \cdot 5 \\ -16 \cdot 5 \\ -16 \cdot 5 \\ -16 \cdot 5 \\ -16 \cdot 5 \\ -16 \cdot 5 \\ -11 \cdot 8 \end{array}$
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	16.61	-9.38	-2.0 -6.8 -8.53	$\begin{array}{c} 3.8 \\ -16.0 \\ -17.5 \\ -15.8 \\ -8.0 \\ -13.6 \\ -16.0 \\ -14.0 \\ -6.0 \\ -17.5 \\ -15.2 \\ -11.0 \\ -6.8 \\ 12.8 \end{array}$
$ \begin{array}{c} 13.0 \\ 17.2 \\ 3.5 \\ 6.0 \\ 11.5 \\ 5.5 \end{array} $	14.44			$\begin{array}{c} -19 \cdot 0 \\ -16 \cdot 8 \\ -11 \cdot 2 \\ -17 \cdot 0 \\ -16 \cdot 5 \\ -17 \cdot 0 \\ -7 \cdot 8 \\ -18 \cdot 0 \\ -17 \cdot 5 \\ -13 \cdot 8 \\ -8 \cdot 3 \\ 9 \cdot 0 \end{array}$
$\begin{array}{c} -5.0 \\ 7.0 \\ 7.0 \\ 7.0 \\ 1.1 \\ -3.0 \\ -3.0 \\ -1.0 \\ -3.0 \\ -1.0 \\ -3.0 \\ -1.0 \\ -3.0 \\ -1.0 \\ -3.0 \\ -3.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\ -5.0 \\$	10.87		-14.0	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
$\begin{array}{c} -10.0 \\ 5.5 \\ 5.5 \\ -1.9 \\ -12.5 \\ -2.0 \\ -2.0 \\ -4.5 \\ 3.5 \\ -15.6 \\ -15.6 \\ -15.6 \\ -15.6 \\ -15.6 \\ -15.6 \\ -15.6 \\ -15.6 \\ -2.0 \\ -2.0 \\ -2.0 \\ -8.0 \\ 10.0 \\ -8.0 \\ 10.0 \\ -8.0 \\ 10.0 \\ -8.0 \\ 10.0 \\ -8.0 \\ 10.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 \\ 0.0 $	7:36		-21.2	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
$\begin{array}{c} -15.5 \\ 5.0 \\ -3.0 \\ -16.0 \\ -6.0 \\ -6.5 \\ 3.2 \\ -26.0 \\ -6.2 \\ -26.0 \\ -6.2 \\ -26.0 \\ -6.2 \\ -26.0 \\ -6.2 \\ -26.0 \\ -6.2 \\ -11.0 \\ -3.0 \\ -9.0 \\ -9.0 \\ -9.0 \\ -9.0 \\ -11.0 \\ -9.0 \\ -11.0 \\ -9.0 \\ -1.0 \\ -9.0 \\ -3.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ 0.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ -2.0 \\ $	5.38	-20.61 -	-21.5	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
$\begin{array}{c} -19.5 \\ -19.5 \\ 4.0 \\ -5.0 \\ -8.0 \\ -8.0 \\ -8.0 \\ -8.0 \\ -9.0 \\ -9.0 \\ -22.5 \\ -12.0 \\ -12.0 \\ -22.5 \\ -12.0 \\ -22.5 \\ -22.5 \\ -12.0 \\ -15.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ -12.0 \\ $	3.43	-22.20		$\begin{array}{c c} -26\cdot0 & -\\ -24\cdot0 & -\\ -24\cdot0 & -\\ -32\cdot5 & -\\ -29\cdot0 & -\\ -34\cdot0 & -\\ -25\cdot5 & -\\ -30\cdot8 & -\\ -31\cdot0 & -\\ -25\cdot3 & -\\ -31\cdot0 & -\\ -25\cdot3 & -\\ 4\cdot5 & -\\ \end{array}$
$\begin{array}{c} -21^{\circ}0\\ 4^{\circ}0\\ -6^{\circ}2\\ -15^{\circ}0\\ -6^{\circ}5\\ 3^{\circ}0\\ -11^{\circ}0\\ -6^{\circ}5\\ 3^{\circ}0\\ -3^{\circ}0\\ -3^{\circ}0\\ -3^{\circ}0\\ -3^{\circ}5\\ -20^{\circ}0\\ -3^{\circ}5\\ -20^{\circ}5\\ -21^{\circ}5\\ -11^{\circ}2\\ -14^{\circ}0\\ -16^{\circ}5\\ -21^{\circ}5\\ -19^{\circ}0\\ -2^{\circ}5\\ -6^{\circ}5\\ -7^{\circ}0\\ 3^{\circ}0\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19\\ -7^{\circ}19$	8.08	-22.91	-30.0	
		-	-31.65	-28.0 -35.3
	-	-	-	

6.47

6.41

16.12

6.20

6.20

16.40

6.28

6.28

15.98

6.06

6.06

15.76

4.73

4.72

14.42

Suspended in the shade.

Fahrenheit's scale. Observations recorded without correction.

-0.22

-0.522

9.43

2.22

2.22

11.92

Day.

Mean Time at Station.

23

456789

 $\begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 9\\ 20\\ 22\\ 23\\ 4\\ 25\\ 27\\ 28\\ 23\\ 28\\ 23\\ 28\\ 31\\ 31\end{array}$ 

Means

Corrections

Oscillations

 $\hat{\mathbf{2}}$ 

Means

Corrections

Oscillations

40

1.

11111111111111111

-26.0 -35.2

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~30.60

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2.

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-26.5

-32.15

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-33-35

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3.

4,

377

Means.

-11.2ð

-4·18 -5·75

0.48 3.63 -2.73

-13.73-20.29-27.73-25.80 -22.72 -21.28

-13.28 -13.60  $-13 \ 60$ -2.442.82-18.61-22.85-23.44 -16.14 -24.20 -27.02

-20.66-15.52-22.71

-21.44-20.66-17.65

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-15.23

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-9.09 4.46 6.31 -7.16 4.61

-2.48 3.02 2.42

-13.08 -13.31 1.78

-8.84

-10.84 -1.07 7.32 7.12 -4.31

-12.18 0.68

0·31 14.94 10.68 9.12

16.80 2.91 -1.14

1.42

1.09

0.94

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1.25

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-5.19

-5.71

3.99

-3.09

-3.40

6.30

-7.19

-7.91

1.79

2.0

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6.50 -5.44 -17.79

### FORT CONFIDENCE-continued.

Mean Temperatures in the Shade for the Months at the Hours of Observation, and for the entire Periods,

11

Periods.				` A	die's Spi	irit Theri	nometer	in the S	hade.			
	1.	2.	8.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
23 days October -}	-	-	-	_		<u> </u>	18.56	18.90	20.03	 20•74	2°·52	
November -	-	-	-	-	-	-2.83	-3.82	-4-23	-3.33	-2.34	-1.07	0.11
December -	-		-	-	-	-40.22	-38.28	-37:47	-87.56	-37.20	-36.46	1. 1
January .	-	-		-		-	-21.12	-21.67	-21.15	-20.73	-20.31	-19.54
February -	- ·	-		-		-27.41	-28.38	-27.61	-25.55	-22.78	-20.79	-19.10
March -	-		-		-	-25.99	-24.19	-20.77	-16.16	-13.00	-10.65	-8.77
April		_	-	-	,	-9.20	-5.12	-2.03	1.68	3.23	4.71	5.71
Means of 7 months }	-	-		-			-19.93	-18.95	-11.72	-10.22	-9.01	-7.85
Means of 3 winter months	-	-	_		_		-30*27 -	-29.88	-29.02	-27.80	-26.70	-25.62

METEOROLOGICAL OBSERVATIONS.

### FORT CONFIDENCE-continued.

Mean Temperatures in the Shade for the Months at the Hours of Observation, and for the entire Periods.

		1	·		Spi	rit Ther	nometer	constru	cted by I	ldie.			
-	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midn ^t .	Means of Months.
	22*42	22.01	21°29	19.95	19·32	16.56	1 ⁶ ·80	17.93	17.82	<u> </u>		_	19.62
	0.41	-0.03	-1.06	-1.80	-2.83	-3.32	-3.92	-3.86	-4.28	_	-	_	-2-40
-	-35 78	-37.07	-37:45	-37.37	-37.81	-37.64	-37.78	-37.82	-37.72	_	-	-	-37:46
-	-19.61	-21 88	-20.84	-21.01	-21.86	-21.03	-21.04	-21.41	-21.14	-	-	-	-20.86
-	-18-14	-17-93	-19.03	-20.68	-22.79	-23.80	-25.59	-25.31	-25.92	-25.22	-	-	-23.29
	-8.30	-8.12	8-46	-9.38	-11.22	-15.12	18.63	-20.61	-22.26	-22.91	-	-	-15.29
	6.40	6.47	6.58	6.06	4.72	2.22	-0.522	-3:40	-5.71	-7.91	-	-	-0.85
	-7:46	-7.95	-8:40	-9.18	-10.40	-11.74	-12.92	-13.47	-14.62			-	
-	25.33	-26.14	-26*46	-27.23	-28.29	-28.42	-29.07	-29.12	-29:20		-		-27.91

Thermometer used stood at 36° in Observations in this table corrected for the error

freezing mercury. Zero point correct. of  $-4^{\circ}$  between the zero point and  $-40^{\circ}$  Fahrenheit.

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379

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### FORT CONFIDENCE.

Abstract of Hourly Observations in the month of October 1848.

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### FORT CONFIDENCE.

Abstract of Hourly Observations in the month of October 1848.

Day.		Spir	it Thern	iometer	by Adic,	Fahrenh	cit's scal	e. Kept	within t	the Obser	rvatory.	Stands	at 36°	degrees i	n freezing	g mercur	y. Sam	e Temper	ature wi	th Declir	nometer i	and susp	ended M	lagnets.	
Mean Time at Station.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Midn ^t .	Means.
$ \begin{array}{c} 1\\2\\3\\4\\5\\6\\7\\8\\9\\10\\11\\12\\13\\14\\15\\16\\17\\18\\19\\20\\21\\22\\23\\24\\25\\26\\27\\28\\29\\30\\31\\\end{array} $			° 	23·0 27·0 27·0	° 	° 	° 	° 	•           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·           ·	° 	° 	° 	<u>°</u> <u>–</u> <u>–</u> <u>–</u> <u>–</u> <u>–</u> <u>–</u> <u>–</u> <u>–</u> <u>–</u> <u>–</u>	° 	° 	° 	° 	<u>•</u> <u>•</u> <u>•</u> <u>•</u> <u>•</u> <u>•</u> <u>•</u> <u>•</u>	° 	° 	° 				• 
Means - Oscillations			28.00	26.00	23.20	25·11 1·34	24·12 0·35	23·77 0·00	23·80 0·03	·23·97 0·20	25.53	25.61	25.54	25.33	25.11	24.85	25.33	25·11 1·34	24.77	25.77	24.98	-			<u>24.90</u> —

All the Temperatures above zero.

All the Temperatures above zero.

#### FORT CONFIDENCE-continued.

1.1

3.

°

13.80

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-10.0

-

-10.00

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-14.0

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22.0

 $\frac{121.8}{14.6}$ 

_

-6.76

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-14.4

25.5

25°5

-10.8

25.6  $\frac{1}{27.3}$ 

 $21.2 \\ 14.5 \\ 14.2$ 

21.7

-16.67

-18.34

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-10.015.218.0

20·5 19·0 21·5

 $\begin{array}{c} 22 \cdot 0 \\ 22 \cdot 0 \\ 23 \cdot 0 \\ 23 \cdot 0 \\ 25 \cdot 0 \\ 25 \cdot 5 \\ 25 \cdot 5 \\ 24 \cdot 0 \\ 26 \cdot 5 \\ 26 \cdot 8 \\ 31 \cdot 0 \\ 26 \cdot 0 \\ 37 \cdot 2 \\ 33 \cdot 8 \\ 18 \cdot 6 \\ 12 \cdot 1 \\ 24 \cdot 0 \\ 22 \cdot 0 \\ 10 \\ 22 \cdot 0 \\ 10 \\ 33 \cdot 8 \\ 18 \cdot 6 \\ 12 \cdot 1 \\ 24 \cdot 0 \\ 22 \cdot 0 \\ 10 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 21 \cdot 0 \\ 15 \cdot 0 \\ 21 \cdot 0 \\ 15 \cdot 0 \\ 21 \cdot 0 \\ 15 \cdot 0 \\ 21 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\ 15 \cdot 0 \\$ 

-21.00

-23.10

1.08

-15.0

20.0

 $\begin{array}{r}
 19.0 \\
 22.0 \\
 22.0 \\
 22.0 \\
 \end{array}$ 

 $\begin{array}{c} 22 \\ -25 \\ 25 \\ 25 \\ 25 \\ 24 \\ 29 \\ 0 \end{array}$ 

---- $\begin{array}{c}
 31.0 \\
 37.0 \\
 34.0 \\
 34.0 \\
 \end{array}$ 

11.8

26.0 30.2 27.0 22.0

21.014.5 15.0

21.0

-22.12

-25:36

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-10.3

 $\begin{array}{c} 15 \cdot 0 \\ 29 \cdot 0 \\ 19 \cdot 0 \\ 20 \cdot 0 \\ 21 \cdot 5 \\ 22 \cdot 0 \\ 22 \cdot 0 \\ 22 \cdot 0 \\ 22 \cdot 0 \\ 22 \cdot 0 \\ 24 \cdot 6 \\ 25 \cdot 0 \\ 24 \cdot 6 \\ 25 \cdot 0 \\ 24 \cdot 6 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot 0 \\ 26 \cdot$ 

15·0 21·0

-22.04

-24.24

0.00

 $\begin{array}{c} -10^{\circ}8\\ 16^{\circ}0\\ 19^{\circ}0\\ 21^{\circ}5\\ 22^{\circ}0\\ 25^{\circ}0\\ 25^{\circ}0\\ 25^{\circ}0\\ 24^{\circ}8\\ 24^{\circ}6\\ 29^{\circ}2\\ 26^{\circ}0\\ 26^{\circ}5\\ 32^{\circ}0\\ 38^{\circ}0\\ 34^{\circ}0\\ 17^{\circ}8\\ 11^{\circ}1\end{array}$ 

 $\begin{array}{c}
 11 \\
 24 \cdot 3 \\
 27 \cdot 0 \\
 31 \cdot 0 \\
 25 \cdot 1
 \end{array}$ 

22.0 19.7 19.9

14·9 17·0 19·5

-22.03

-24.23

0.01

### Abstract of Hourly Observations in the months of November and December 1848.

a value	ins in the	monuo	01 11010						- 18 -											
Spin	it Thermo	meter by	Adie, ke	pt within	n the Ob	servatory	. Stand	ls at 36°	of the second	when n	iercury f	reezes.	Same Te	mperatu	re with t	he Decli	nometer	and susp	ended M	agnets.
4.	5.	6.	7.	8.	9.	10.	11.	Noon.	and the second second second second second second second second second second second second second second second	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
	$ \begin{array}{c}             -5.7 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             7.3 \\             -1.7 \\             -1.7 \\             7.3 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.7 \\             -1.1 \\             -1.1 \\             0 \\             -1.3 \\             0 \\             \\             \\           $	$\begin{array}{c} \overset{\circ}{19} \overset{\circ}{5} \\ \overset{\circ}{14} \overset{\circ}{5} \\ \overset{\circ}{9} \overset{\circ}{2} \\ \overset{-}{-2} \overset{\circ}{5} \\ \overset{\circ}{-4} \overset{\circ}{0} \\ \overset{\circ}{2} \overset{\circ}{3} \\ \overset{\circ}{9} \overset{\circ}{5} \\ \overset{\circ}{9} \overset{\circ}{0} \\ \overset{\circ}{-9} \overset{\circ}{0} \\ \overset{\circ}{-9} \overset{\circ}{0} \\ \overset{\circ}{-9} \overset{\circ}{0} \\ \overset{\circ}{-7} \overset{\circ}{5} \\ \overset{\circ}{-7} \overset{\circ}{5} \\ \overset{\circ}{-7} \overset{\circ}{5} \\ \overset{\circ}{-7} \overset{\circ}{5} \\ \overset{\circ}{-7} \overset{\circ}{5} \\ \overset{\circ}{-11} \\ \overset{\circ}{13} \overset{\circ}{5} \\ 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-	0.00	1.24	0.24	0.56	0.62	0.98	1.37	1.93		2.23	2.02	2.23	1.93	1.67	2.12	2.79	1.78	1.30		— "

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7.0\\ 2.0\\ 2.0\\ 0\\ 12\\ 6.0\\ 10.5\\ 13.0\\ -8.2\\ -1.0\\ 0\\ -2.0\\ -2.0\\ -2.0\\ -2.0\\ 10.0\\ 13.0\\ 15.0\\ 13.8\\ 16.5\\ 5\\ -5.0\\ -1.0\\ 1.0\\ 12.0\\ \end{array}$	$\begin{array}{c} 17.0 \\ -0.0 \\ 115 \\ 605 \\ 12.0 \\ -2.4 \\ -3.0 \\ 12.7 \\ 12.7 \\ 13.8 \\ 15.0 \\ 12.7 \\ 13.8 \\ 15.0 \\ -1.2 \\ 2.0 \\ 2.0 \\ 2.0 \end{array}$	$\begin{array}{c} 7.0 \\ - 0.0 \\ 1.2 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 3.0 \\ - 1.5 \\ 12.0 \\ 13.5 \\ 15.8 \\ 14.8 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 1.5 \\ - 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\mathbf{\dot{0}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{0}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{1}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{1}} \mathbf{\dot{2}} \mathbf{\dot{2}} \\ \mathbf{\dot{2}} \mathbf{\dot{1}} \\ - \mathbf{\dot{2}} \mathbf{\dot{1}} \\ \mathbf{\dot{2}} \mathbf{\dot{2}} \end{array}$	- <u>5.0</u> - <u>8.0</u> - <u>8.0</u> - <u>8</u> .0	-B:0		$\begin{array}{c} 7.52\\ 0.83\\ -0.95\\ -0.95\\ -0.81\\ 4.99\\ 10.22\\ 12.16\\ -2.91\\ -9.06\\ -3.02\\ 1.97\\ -0.42\\ -4.12\\ 3.69\\ 10.04\\ 9.97\\ 13.32\\ 14.04\\ 15.09\\ 12.85\\ 5.47\\ -0.33\\ -1.04\\ \end{array}$
	1.0 0.8 3.8	$     \begin{array}{c}       1'0 \\       -0'8 \\       -4'5     \end{array} $	$   \begin{array}{c c}     1.0 \\     -1.0 \\     -4.2   \end{array} $		$1^{15}$ -1^{5} -4^{5}	$     \begin{array}{r}       1.5 \\       -2.0 \\       -5.0     \end{array} $	$     \begin{array}{r}       1.5 \\       -2.0 \\       -5.1     \end{array} $	$     \begin{array}{r}       1.8 \\       -1.5 \\       -6.0     \end{array} $	-2.0 -6.0	$-2.8 \\ -6.0$	-2.6 -6.5	$2.0 \\ -3.0 \\ -7.0$	$\begin{array}{c} 2.0 \\ -3.0 \\ -7.0 \end{array}$	-		Ξ	$     \begin{array}{r}       1.49 \\       -1.21 \\       -5.02     \end{array} $
ľ	4.61	5.00	5.26		5.86	5.62	5.86	5.26	5.30	5.75	6.42	5.41	4.93	-1.33	-6.00		5.03
	0.98	1.37	1.93	1-160-26	2.23	2.05	2.23	1.93	1.67	2.12	2.79	1.78	1.30	-		-	-
	$\begin{array}{c} -11\cdot 1\\ 16\cdot 0\\ 19\cdot 2\\ 19\cdot 0\\ 22\cdot 4\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 2\\ 32\cdot 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19\cdot76\\ 21\cdot63\\ 19\cdot76\\ 22\cdot37\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 25\cdot23\\ 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	-21.99	-21.65	-21.75		-21.42	-21.38	-21.29	-21.24	-21.38	-21.42	-21.55	-21.26	-21.35	-8.00	-8.00	-7.75	-21.01
-	-24.19	-23.81	-23.92		-23.26	-23.52	-23.75	-23.69	-23.52	-23.56	-23.70	23.72	23.48				
	0.02	0.38	0.52		0.63	0.62	0.44	0.20	0.62	0.23	0.49	0.32	0.21			-	-
]	ow zero	marked	-; those	÷	above, w	ithout a	prefixed	sign.		-							

## Temperatures below zero marked -; those All the Observations

above, without a prefixed sign. below zero in December.

# METEOROLOGICAL OBSERVATIONS.

FORT CONFIDENCE - continued.

Abstract of Hourly Observations in the months of November and December 1848.

382

Day. Mean Time at Station.

1

 $\hat{2}$ 34

67

Means -

Oscillations

 $\frac{1}{2}$ 

456

789

 $\begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 21\\ 22\\ 23\\ 24\\ 25\\ 26\\ 27\\ 28\\ 29\\ 30\\ 1\end{array}$ 

Means

Corrections

Oscillations

1.

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-9.0

-9.00

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2.

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-9·9

-9.90

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383

Means.

 $19.38 \\ 14.61 \\ 7.52 \\ 0.83 \\ -0.95 \\ -0.81 \\ 4.99 \\ 10.22 \\ 12.16 \\ 2.101 \\ 10.22 \\ 12.16 \\ 10.22 \\ 12.16 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.22 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\ 10.21 \\$ 

Midn[‡].

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#### FORT CONFIDENCE—continued.

1

### Abstract of Hourly Observations in the months of January and February 1849.

#### Spirit Thermometer by Adie, kept within the Observatory, stands at 36° when Day. Mean Time at Station. 6. 7. 9. 11. ~ Noon 1. 2. 3. 8. 10. 4. 5. <u></u> |||||||||||||| ° -5.6 -7.0 -5.0 -9.0 -8.0 -7.0 -4.0 -7.5 -²·2 -8.0 $\begin{array}{c} -7.8\\ -4.5\\ -4.5\\ -6.8\\ -11.5\\ -22.5\\ -22.5\\ -16.0\\ -13.5\\ -22.5\\ -16.0\\ -13.5\\ -3.0\\ -9.0\\ -23.0\\ -9.0\\ -27.0\\ -13.8\\ -3.7\\ -3.6\\ -4.4\end{array}$ -4.1-3.0-6.0-80-4.2-3.0-6-4-11.0-22.0-23.5-4.0 -2.3 -7.8 -14.0 -24.1 -27.4 $\begin{array}{c} -4 \cdot 9 \\ -2 \cdot 5 \\ -7 \cdot 8 \\ -7 \cdot 8 \\ -27 \cdot 5 \\ -27 \cdot 5 \\ -27 \cdot 4 \\ -17 \cdot 5 \\ -27 \cdot 4 \\ -17 \cdot 5 \\ -22 \cdot 0 \\ -17 \cdot 5 \\ -22 \cdot 0 \\ -29 \cdot 5 \\ -27 \cdot 0 \\ -17 \cdot 5 \\ -25 \cdot 0 \\ -17 \cdot 5 \\ -25 \cdot 0 \\ -19 \cdot 0 \\ -16 \cdot 2 \\ -5 \cdot 6 \\ -5 \cdot 6 \\ -5 \cdot 6 \\ -7 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -17 \cdot 0 \\ -12 \cdot 5 \\ \end{array}$ -4.5 2 -3.0-6.8-11.0-23.0-27.0-23.0 $\begin{array}{c} -2^{\cdot}5 \\ -9^{\cdot}5 \\ -12^{\cdot}0 \\ -22^{\cdot}5 \\ -27^{\cdot}4 \\ -21^{\cdot}0 \\ -17^{\cdot}0 \\ -13^{\cdot}5 \\ -23^{\cdot}5 \\ -29^{\cdot}0 \\ -17^{\cdot}0 \\ -17^{\cdot}0 \\ -17^{\cdot}0 \\ -114^{\cdot}0 \\ -17^{\cdot}0 \\ -13^{\cdot}6 \\ -3^{\cdot}5 \\ 5^{\cdot}5 \end{array}$ $\begin{array}{c} -2^{\circ}5\\ -7^{\circ}98\\ -24^{\circ}05\\ -24^{\circ}05\\ -11^{\circ}90\\ -24^{\circ}05\\ -11^{\circ}00\\ -21^{\circ}80\\ -11^{\circ}00\\ -21^{\circ}8\\ -11^{\circ}0\\ -27^{\circ}5\\ -24^{\circ}0\\ -18^{\circ}8\\ -15^{\circ}0\\ -3^{\circ}6\\ -15^{\circ}0\\ -18^{\circ}8\\ -5^{\circ}0\\ -18^{\circ}8\\ -18^{\circ}8\\ -5^{\circ}0\\ -18^{\circ}8\\ -5^{\circ}0\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -18^{\circ}8\\ -$ - 3 6 89 $\begin{array}{r} -19.0 \\ -14.5 \\ -17.0 \\ -18.5 \\ -20.5 \\ -2.0 \\ -9.0 \\ -17.5 \\ -27.5 \\ -25.0 \\ -14.0 \end{array}$ -15·5 -3·8 $-23 \circ 0$ $-15 \cdot 5$ $-16 \cdot 0$ $-13 \cdot 0$ $-23 \cdot 0$ $-3 \cdot 5$ $\begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 19\\ 20\\ 22\\ 23\\ 24\\ 25\\ 62\\ 7\\ 28\\ 9\\ 30\\ 31\\ \end{array}$ -4.0 -9.0-15.2-26.8-26.4-15.0-25.8-26.6 $-14^{\circ}2$ $-25^{\circ}2$ $-27^{\circ}0$ -25.0-27.5-16.5-24.0 $\begin{array}{r} -26^{\circ}4 \\ -15^{\circ}0 \\ -17^{\circ}0 \\ -13^{\circ}4 \\ -6^{\circ}7 \\ 7^{\circ}0 \\ -1^{\circ}6 \\ -4^{\circ}0 \\ -6^{\circ}7 \\ -5^{\circ}5 \\ -16^{\circ}5 \end{array}$ $\begin{array}{c} -26.6 \\ -15.5 \\ -16.7 \\ -14.0 \\ -7.8 \\ 7.3 \\ -1.8 \\ -3.3 \\ -6.6 \\ -5.5 \\ -6.0 \\ -\end{array}$ -16.2 -16.0 -16.2-15.2-9.07.6-19.4-12.5-1.23.0-15.8-16.0-----9.6 7.8 8.0 8.0 8.0 -2.0-4.5-6.2-5.3-6.0-1.8-4.8-7.0-5.2-6.8-1.5-5.6-5.8-7.0-17.5 $-2.0 \\ -3.0 \\ -6.5$ -1.2 -2.0 -5.0 -----2.2-6.1 -6.9 -4.9 ____ ----5.8 -5.7 -6.0 ---____ -17.5-17.0-15.6-13.7-17.8 ----16.5 _ -17.5-15.0-13.6-17.0-15.2-13.6-17.0-15.6-12.5-17.0-16.0-12.5 $-17.6 \\ -15.0 \\ -15.2$ ---------14.2 -14.4 ------14.0 -12.76-12.54 1.20 -9.16 -10.40 -10.40 -11.23-12.40-12.43 -12.52-12.5215.2 Means -12.35 -13.64 -13.77 -14.04 -14.79 -13.67 -13.77 Corrections ____ -10.08 -11:44 -11.44 ----2.352.441.121.121.03 0.75 0.00 1.02 Oscillations -------------- $-19.2 \\ -22.2 \\ -18.5$ -17.7 -18.0 -18.6 -19.7 -20.0-20.0 $\begin{array}{c} -20^{\circ}0 \\ -22^{\circ}0 \\ -22^{\circ}0 \\ -17^{\circ}0 \\ -17^{\circ}0 \\ -17^{\circ}0 \\ -19^{\circ}0 \\ -19^{\circ}0 \\ -19^{\circ}0 \\ -20^{\circ}0 \\ -15^{\circ}0 \\ -23^{\circ}0 \\ -15^{\circ}2 \\ -17^{\circ}9 \\ -28^{\circ}0 \\ -29^{\circ}0 \\ -29^{\circ}0 \\ -29^{\circ}0 \\ -28^{\circ}0 \\ -28^$ -20.0 _____ ------22·0 -197-22.0-18.4-14.2-9.4-11.5-19.3-22.0-18.0-14.0-10.9-22.0 -18.8 -22.0 -17.8 -22.0-21.2 -____ 2 ___ -----19'2-16.0 -3 $\begin{array}{r} -18^{\circ} 5 \\ -14^{\circ} 0 \\ -9^{\circ} 5 \\ -11^{\circ} 3 \\ -19^{\circ} 1 \\ -10^{\circ} 4 \\ -8^{\circ} 3 \\ -20^{\circ} 5 \\ -21^{\circ} 6 \\ -19^{\circ} 5 \\ -11^{\circ} 6 \end{array}$ -14.0-9.0-12.0-19.5-14.0-8.5-11.2---- $-14.0 \\ -9.6$ -10.0-10.4-18.25 -<u>10</u>·1 -10.8-18.7-10.4-10.0-20.0-10.0-18.0 -10.3-8.5-14.8-20.8-21.5-19.7-10.0 -9.0 -8.8 -15.0 -10.4 -8.8-13.0-21.0-20.8-9.58.5-8.3-14.3-8.5-15.29 $\begin{array}{c} 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 21\\ 22\\ 23\\ 24\\ 25\\ 26\\ 27\\ \end{array}$ -21.0-21.8-20.5-19.8-21.7 -19.5 -12.0 7.39.8 -20.0-18.5 -8.5 10.0 13.8 -11.6 -7.0 -11.0 7.6 $13 \ 0 \\ 9 \ 4$ $13.0 \\ 1.5$ 13.0 13.8 14.0 $\begin{array}{r} 13.0 \\ 6.5 \\ -0.5 \\ -6.6 \\ -17.6 \\ -24.2 \\ -23.4 \\ -17.5 \\ -28.5 \\ -307.0 \end{array}$ 4.5 -1.0 -8.0 -18.0 6.0 2.0 -4.3 -0.5-5.8-17.2-1.0-7.0-17.6 $-\tilde{1}\cdot\tilde{2}$ $-8\cdot0$ $-18\cdot0$ -----5.7-17.0-23.7-23.7-----17.2 -24.3 -24.0 -23.3 -17.1 -28.0-18.0-25.6-23.0-22.8-17.4-28.2-30.0-26.5-23.2 -25.5 -23.5 -25.0-23.0-22.0 -22.5 -22.5-21.5 ---------23.4-17.1-28.5-23.3 -24.0 -16.2 -17.4-27.9-15.5 -15.0 -15.6-16.3-17'3 ____ ••••• -29.6 -30.0 -30.2 -29.8 ----____ ---------___ ____ -27.0 -27.0 -27.0 -27.0 -26.0 -26.0 -----____ --23.3 -23.2 -23.0 -22.2-21.8 -21.0 -19.8 28 -----14.65 -14:40 -17.72 -13.63 -14.82 -14.81 -19.02 -14.38 -14.94-14.90 Means -18.50 -18.20 -16.39 -16:30 -16.29 -16.11 -15.84 -----------15.82 -16'43Corrections ***** ---------0.61 0.00 0.04 0.13 0'14 0.350.25 Oscillations -------

METEOROLOGICAL OBSERVATIONS:

-11

### FORT CONFIDENCE - continued.

Abstract of Hourly Observations in the months of January and February 1849.

	mercur	rcury freezes. Same Temperature with Declinometer and suspended Magnets.											
	(13 <b>31.</b> 5)	2.	8.	4.	5.	6.	.7.	8.	9.	10.	11.	Midn [‡] .	Means.
	$\begin{array}{c} \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet$	$\begin{array}{c} & & & & & & \\ & & & & & & \\ & & & & & $	$\begin{array}{c} \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet$	$\begin{array}{c} & & & & & & \\ & & & & & & \\ & & & & & $	$\begin{array}{c} \cdot & \cdot & \cdot & \cdot \\ \cdot & - & 4^{+9} \\ - & 2^{+6} & \cdot & - \\ - & 2^{+6} & \cdot & - \\ - & 2^{+6} & \cdot & - \\ - & 2^{+6} & \cdot & - \\ - & 2^{+6} & \cdot & - \\ - & 2^{+6} & \cdot & - \\ - & 2^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - & 1^{+6} & - \\ - 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( N	1.00	1.23	1.73	2.08	2.31	2.44	2.22	2.35	2.20	2.11			<u> </u>

Temperatures below zero marked -;

those above, without a prefixed sign.

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### FORT CONFIDENCE-continued.

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### Abstract of Hourly Observations in the months of March and April 1849.

## ERVATIONS.

#### METEOROLOGICAL OBSERVATIONS.

#### FORT CONFIDENCE-continued.

### Abstract of Hourly Observations in the months of March and April 1849.

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n i Martine         L         a         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b         b <th< th=""><th>Day.</th><th></th><th></th><th>Spir</th><th>it Therm</th><th>ometer k</th><th>oy Adie, l</th><th>cept with</th><th>in the O</th><th>bservato</th><th>ry. Sta</th><th>nds at 36°</th><th>when</th><th>me</th><th>rour</th><th>y freezes</th><th>Same</th><th>Tempera</th><th>ture wit</th><th>h the De</th><th>clinomet</th><th>er and su</th><th>spended</th><th>Magnet</th><th>s.</th><th></th></th<>	Day.			Spir	it Therm	ometer k	oy Adie, l	cept with	in the O	bservato	ry. Sta	nds at 36°	when	me	rour	y freezes	Same	Tempera	ture wit	h the De	clinomet	er and su	spended	Magnet	s.	
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$ \begin{array}{c} \hline \text{Corrections} & _ & _ & _ & _ & _ & _ & _ & _ & _ & $		•] ·				·									5.48	-4.81	-4.16	-4.14	-4.28	-4.44	-4.78	-4.86	-5.60	-6.08	_	1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					-										3.93	5.60	7.25	7.27	7.13	6.92	6.63	6.22	5'81	5.33	_	1
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	Means -			_		6.22	1.84	1.67	1.94	8.38			_													ŀ
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Temperatures above zero without a prefixed sign.

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Means.

-8.26-2.670.18-0.463.505.06

-6.21

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 $\begin{array}{c} -4\cdot37\\ -1\cdot32\\ -6\cdot82\\ 3\cdot562\\ 9\cdot99\\ 9\cdot99\\ 7\cdot26\\ 3\cdot366\\ -2\cdot93\\ -2\cdot93\\ -2\cdot93\\ 7\cdot64\\ -2\cdot25\\ 3\cdot360\\ -2\cdot25\\ 3\cdot360\\ 10\cdot47\\ 7\cdot648\\ 2\cdot452\\ 9\cdot62\\ 12\cdot80\\ 11\cdot28\\ 9\cdot62\\ 12\cdot80\\ 11\cdot55\\ 9\cdot26\\ 6\cdot62\\ 17\cdot26\\ 6\cdot62\\ 7\cdot26\end{array}$ 

6.67

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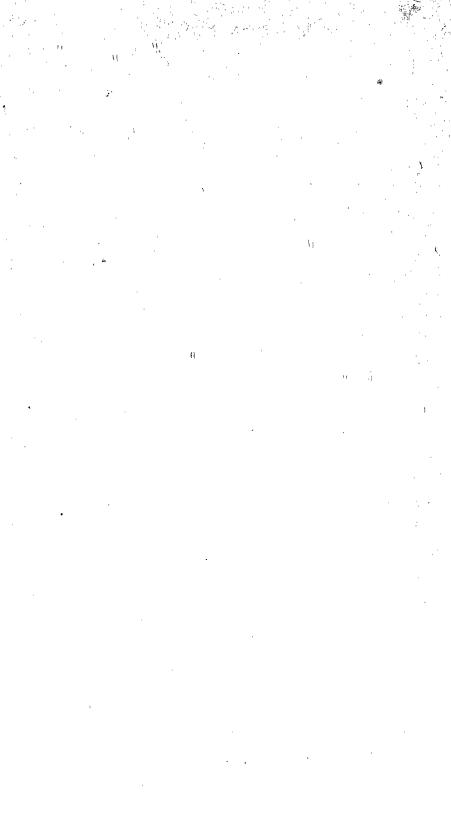
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### TABLE I.

Direction.	October.	November.	D~cember.	January.	February.	March.	April.	Seven Months,
	Hours.	Hours.	Hours.	Hours.	Hours.	Hours.	Hours.	Hours.
North. N. by E. N.N.E. N.E. by N. N.E. by E. E.N.E.	3 5 21 38 34 23	12 9 15 11 90 28 41	8 6 9 41 12 45	11 4 24 9 29 3 28	$ \begin{array}{r} 11\\ 2\\ 7\\ 1\\ 42\\ -14\\ 14 \end{array} $	10 1 8 7 42 6 16	2 5 7 3 21 4 14	57 35 72 61 303 87 181
E. by N. East. E. by S. E.S.E. S.E. by E.	16 29 15 36 9	28 57 28 84 17	75 114 48 18 2	20 62 23 39 5	7 102 7 13 5	21 97 45 30 16	6 86 8 78 8	173 547 174 298 62
S.E. S.E. by S. S.S.E. S. by E.		24 	12 3 4 1	$ \begin{array}{r} 13\\ -4\\ -1\\ 1 \end{array} $	13 	32 1 4 1	34 1 2 	155 12 14 3
South. S. by W. S.S.W. S.W. by S. S.W. by W. W. by W. W. S.W. W. by S.			2 3 1 4 15 1 8 	4 9 5 27 7 28 7	6 2 5 16 2 12 6	$ \begin{array}{c} 1\\ 5\\ \overline{}\\ \overline{}\\ 7\\ \overline{}\\ 10\\ 22\\ \end{array} $	$ \begin{array}{r}     1 \\     1 \\     \hline     6 \\     3 \\     14 \\     16 \\   \end{array} $	14 7 18 14 73 13 72 51
West. W. by N. W.N.W. N.W. by W. N.W. by N. N.W. by N. N.N.W. N. by W.	4 	$     \begin{array}{r}       13 \\       15 \\       3 \\       \\       3 \\       -2 \\       4     \end{array} $	4 8 3 2 1 2 3	35 26 24 3 33 4 5 7	54 16 39 2 34 3 1 1	61 17 6  3 1	$     \begin{array}{r}       125 \\       15 \\       -25 \\       2 \\       5 \\       3     \end{array} $	286 97 91 5 99 10 22 20
Calm -	27	15	49	58	75	63	7	294
Iours of Observation	} 308	504	510	557	502	534	515	3,430 3,136
Mean Di- rection {	N. 70° E. or E. by N. ‡ N.	S. 84 ¹ ° E. or E. ¹ / ₂ S.	N. 80° E. or E. by N.	S. 16° E. or S. by E. § E.	S. 13° E. or S. by E. ‡ E.	S. 45° E. or S.E.	S. 7° E. or S. 3 E.	S. 53° E. or S.E. ½ E.

Directions of the Winds at Fort Confidence within 30 feet of the Ground.

Of 3,430 hours of observation 294 were calm, and in 3,136 there was wind of various strength, from a storm down to an air just sufficient to move a light vane. For the mean strength of the winds, see the following Table (III.)

### TABLE II.

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Direction.	October.	November.	December	January.	February.	March.	April.	Seven Months.
North. N. by E. N.N.E. N.E. by N. N.E. by N. E. by N. East. E. by S. E.S.E. S.E. by E. S.E. by S. S.S.E.	1:00 1:20 2:34 3:68 2:09 2:04 3:56 3:90 3:07 3:72 8:22 4:48 2:14	$ \begin{array}{c} 1 \cdot 17 \\ 1 \cdot 78 \\ 2 \cdot 13 \\ 2 \cdot 36 \\ 2 \cdot 45 \\ 3 \cdot 57 \\ 1 \cdot 56 \\ 2 \cdot 11 \\ 2 \cdot 05 \\ 2 \cdot 64 \\ 3 \cdot 13 \\ 4 \cdot 24 \\ 2 \cdot 60 \\ 3 \cdot 00 \\ \end{array} $	0' 75 2' 17 0' 67 2' 89 1' 18 1' 37 1' 53 1' 41 1' 02 2' 13 1' 61 3' 50 2' 50 1' 67 1' 25	0'91 1'12 0'88 1'11 1'24 3'67 0'55 1'97 2'44 2'09 2'56 3'20 2'46 3'75	$ \begin{array}{c} 1'00\\1'00\\1'00\\1'01\\-\\1'54\\1'14\\1'14\\1'00\\2'85\\4'40\\1'30\\-\\0'50\end{array} $	1'80 2'00 1'88 2'29 1'98 1.'16 2'31 1'21 1'64 1'96 2'45 5'69 2'30 3'00 3'25	2'00 1'20 1'14 1'34 1'67 2'25 2'79 2'17 1'78 1'38 2'33 1'38 2'33 1'38 3'09 5'00 9'50	1' 23 1' 45 1' 27 1' 90 1' 89 2' 35 1' 77 1' 94 1' 89 2' 04 2' 66 4' 38 2' 65 3' 11 3' 50
S. by E. South. S. by W. S.S.W. S.W. by S. S.W. S.W. by W. W.S.W. W. by S.		1.00 	2'00 3'50 1'33 0'50 1'50 1'80 4'25 1'06	3.00 3.75 2.55 3.20 3.00 4.00 4.75 3.86	$ \begin{array}{c}\\ 0^{\circ}83\\ 1^{\circ}00\\ 2^{\circ}60\\ 3^{\circ}69\\ 1^{\circ}00\\ 2^{\circ}00\\ 2^{\circ}58\\ \end{array} $	3.00 3.00 2.60 0.86 1.40 1.78	5.00 1.00 	2.67 2.42 2.58 1.73 2.43 2.10 3.39 2.44 2.84
West. W. by N. N.W. by W. N.W. N.W. N.W. N.W. N. by N. N. by W.	1.50 3.67 1.00 2.00 1.00	$ \begin{array}{r} 3^{\circ}15\\ 2^{\circ}87\\ 2^{\circ}33\\\\ 0^{\circ}67\\\\ 1^{\circ}25\\ 2^{\circ}00\\ \end{array} $	1.37 1.38 1.33 1.00 0.50 0.50 1.67	$4^{\circ}62$ $4^{\circ}19$ $3^{\circ}50$ $6^{\circ}33$ $4^{\circ}85$ $6^{\circ}75$ $3^{\circ}10$ $1^{\circ}29$	2'26 3'68 4'68 8'50 7'44 8'67 1'00 1'00	2·44 2·76 1·67  2·00 3·00	3.09 1.80 3.38 	2'63 2'73 2'94 7'41 3'03 4'60 1'69 2'18
Mean Force	2.99	2'47	1.33	2.46	· 2·01	1.91	2.48	2.56
Calm Hours -	27	15	49	58	75	63	7	294

Table of the Mean Force of the Winds at Fort Confidence.

The force of the wind is denoted by figures, as recommended by Rear-Admiral Sir Francis Beaufort, K.C.B. Thus, 12 denotes a hurricane, 11 a storm, 10 a whole gale, and 1 a light breeze, just perceptible. It will be observed, by looking at Table, that though the N.E., East, and E.S.E. winds were most frequent, they were comparatively light, and that the N.W. winds were stronger.

### TABLE III.

Table of the Mean Extent of Cloudy Sky at Fort Confidence for each Month, and for Seven Months, with the Number of Hourly Observations.

Periods.	October.	November.	December.	January.	February.	Márch.	April.	Seven Months.
Proportions of cloudy sky -	8.42	6'25	2*34	4*87	<b>4</b> *65	<b>3*</b> 74	4*36	<b>4</b> •95
No. of ob- servations	} 241	492	510	557	502	534	¢ 515	3,351

Note.—A sky totally covered with clouds, whether rare or dense, or obscured by mist or snow, so that the blue sky is wholly hidden, is denoted by 10.00.

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