IX. *Contributions to Terrestrial Magnetism.—No. IV.*

By Lieut.-Colonel EDWARD SABINE, *R.A., F.R.S.*

Received May 5,—Read May 18, 1843.

§ 7. *Second Series of Magnetic Determinations, by Captain Sir* EDWARD BELCHER, *R.N.*

IN the present number of these Contributions, I resume the consideration of Captain Sir EDWARD BELCHER's magnetic observations, of which the first portion, viz. that of the stations on the north-west coast of America and adjacent islands, was discussed in No. II. The return to England of Her Majesty's ship Sulphur by the route of the Pacific Ocean, and her detention for some months in the China Seas, have enabled Sir EDWARD BELCHER to add magnetic determinations at thirty-two stations to those at the twenty-nine stations previously recorded.

In the notice of the earlier observations, a provisional coefficient was employed in the formula for the temperature corrections of the results with the intensity needles, as no experiments had then been made for the determination of their individual coefficients. As soon therefore as Sir EDWARD BELCHER had completed the observation of the times of vibration of those needles at Woolwich, as the concluding station of the series made with them, Lieut. RIDDELL, R.A. undertook the determination of their several coefficients, which was performed in the manner and with the results described in the subjoined memorandum.

"The observations were made in the instrument room attached to Lieut.-Colonel SABINE's office in the Royal Military Repository, Woolwich.

"The instruments rested on wooden stands detached from the floor.

"The deflections were observed with one of WEBER's transportable magnetometers; the variations of declination and horizontal force with the larger instruments.

"The needles were placed upon open Y supports, in the centre of a wooden trough about nine inches in length, six broad and six deep, and were fixed so that their magnetic axes should be in the line passing through the centre of the suspended magnet perpendicular to the magnetic meridian.

"The trough was filled alternately with warm and cold water, and the instruments were registered after a sufficient time had elapsed to allow the needles to take up the temperature of the water; care was taken not to raise the temperature of the water above 110° or 120°, to avoid the permanent loss of magnetism which might have been occasioned thereby.

"October 13th. Needle 5.

Times.	Temp.	Diffs.	Spare Magnetometer. 1. Sc. Div. = 1′·00.	Declination Magnetometer. 1. Sc. Div. = 0′·698.			Bifilar Magnetometer. $k = \cdot 00016 : q = \cdot 00016$ approx.			
				Readings.	Corrected Readings.	Diffs.	Readings.	Temp.	Corrected Readings.	Diffs.
h m	°	°	Sc. Div.	Sc. Div.	Sc. Div.	Sc. Div.	Sc. Div.	°	Sc. Div.	Sc. Div.
21 40	......	......	250·5	42·7	42·7					
22 3	54·0	......	249·8	228·8	229·3	186·6	180·9	54·3	180·9	
56	92·0	38·0	248·3	225·3	226·8	2·5	179·5	55·0	180·2	+0·7
23 26	56·2	35·8	246·1	226·7	229·8	3·0	179·0	55·3	180·0	−0·2
47	86·0	29·8	245·0	223·5	227·3	2·5	179·2	55·7	180·6	−0·6
24 00	56·5	29·5	243·0	224·3	229·5	2·2	179·7	56·0	181·4	+0·8
		4)133·1				10·2				+0·7
		33·3				2·55				+0·2

$$q = \frac{2\cdot55}{33\cdot3 \times 186\cdot6} + \frac{0\cdot2 \times \cdot00016}{33\cdot3} = 0\cdot000411.$$

October 22nd. Needle 5.

Times.	Temp.	Diffs.	Spare Magnetometer.	Decl. Readings.	Decl. Corrected Readings.	Decl. Diffs.	Bifilar Readings.	Bifilar Temp.	Bifilar Corrected Readings.	Bifilar Diffs.
22 21	......	......	238·8	1703·6	1703·6					
34	66·4	......	238·0	1586·2	1586·8	116·8	190·6	45·3	190·6	
56	90·7	44·3	237·3	87·9	89·0	2·2	190·5	46·0	191·2	−0·6
0 18	58·0	32·7	235·3	85·3	87·7	1·3	191·2	47·0	192·9	+1·7
38	75·1	17·1	234·8	85·6	88·4	0·7	192·1	47·7	194·5	−1·6
57	54·9	20·2	234·6	84·0	86·9	1·5	193·7	48·5	196·9	+2·4
		4)114·3				5·7				+1·9
		28·6				1·425				+0·5

$$q = \frac{1\cdot425}{28\cdot6 \times 116\cdot8} + \frac{0\cdot5 \times \cdot00016}{28\cdot6} = 0\cdot0004266 + 0\cdot000003 = 0\cdot00043.$$

"The 'readings' are the means, each, of three or four separate readings, at intervals of two or three minutes.

"Similar series were observed with eight other needles; the approximate results for each needle are as follows:—

Date.	No. of Needle.	Value of q.	Means.
October 14.	5	0·00041	0·00042
22.	5	0·00043	
14.	6	0·00056	0·00065
November 22.	6	0·00074	
22.	7	0·000090	0·00005
24.	7	0·000017	
26.	8	0·00014	0·00014
26.	9	0·00012	0·00012
26.	10	0·00009	0·00009
28.	11	0·00019	0·00019
28.	12	0·00014	0·00014
29.	13	0·00022	0·00022

These coefficients have accordingly been used in calculating the results in the present Number. A careful examination of the observations at the foreign stations had led me to infer that Nos. 5. and 6. would probably be found to have larger coefficients than the other needles, which has proved to be the case. The variation in the amount of the coefficients in the different needles, considerable as it is, is not unprecedented; it probably depends on the quality and temper of the steel, and may be particularly influenced by the portions of soft iron which a needle may contain. A species of steel has been recently employed for magnets in the Russian observatories, in which the coefficient for temperature has even a negative sign, *i. e.* the magnetic intensity of the bar *increases* with heat. In a letter which I have received from M. ADOLPHE ERMAN, he describes this particular kind of steel as consisting of alternate very thin layers of soft iron and of steel, so that when heated the soft iron layers would increase their magnetic intensity, and the steel layers diminish theirs; the amount and sign of the coefficient depending on the preponderance of the layers of soft iron or of steel, which is subject to much variation. It is called "Boulat," or "damascened steel," and is considered the pride of the Uralian forges. In a bar of this steel, kindly sent me by General TCHEFFKINE, at the request of M. KUPFFER, the usual effect is thus reversed. Experiments made with it at Woolwich by Lieutenant RIDDELL gave the results stated in the following memorandum:—

"The effect of temperature on the bar of Russian steel, sent by M. KUPFFER, was tried in the usual manner by means of the magnet of the declination magnetometer, the bar being placed with its axis in the line passing through the centre of the suspended magnet perpendicular to the magnetic meridian. The subjoined observations furnish satisfactory proof that the ordinary effect of temperature on bars of steel which are hardened throughout is reversed in this bar, but the value of the coefficient, or change of force for 1° of FAHR. deduced from them, must be taken only as a rough approximation, as in addition to the probable error of the observations themselves, the bar was placed with its centre at a distance of three feet, or only $1\frac{1}{2}$ times its length from the magnetometer, in order to produce a sufficient deflection, the magnetism being weak*."

* After the completion of this experiment with the bar in the state in which it was received from General TCHEFFKINE, a portion was cut off, softened, and made into 3-inch cylinders of the dimensions used with the portable magnetic apparatus. The effect of temperature on one of these cylinders, hardened afresh and remagnetised, was tried in a similar manner, and the value of its coefficient found to be about ·0003, the force decreasing with an increase of temperature, which is the ordinary effect.

Abstract.

November 21st, 1842.

Times.	Temperature.			Spare Declination Magnetometer. $a = 2'{\cdot}30$.			Declination Magnetometer. $a = 1'{\cdot}00$.				Bifilar Magnetometer. $k = 0{\cdot}00015$.					Bifilar Thermometer.	
	Observed.	Means.	Diffs.	Readings.	Diffs.	Corrections.	Readings.	Corrected Readings.	Means.	Diffs.	Readings.	Corrected Readings.	Means.	Diffs.	$\frac{\Delta X}{X}$.	Temp.	Diffs.
d h m	°			Sc. Div.	Sc. Div.	′	Sc. Div.	Sc. Div.	Sc. Div.	Sc. Div.	Sc. Div.	Sc. Div.	Sc. Div.	Sc. Div.			
20 23 40		Before deflection.			Bar away.		30·0	....	30·0								
21 0 32	50·3	......	......	2·4	......	....	1484·1	1484·1	......	......	194·5	194·5	......	......	......	51·3	
0 50	100·0	54·3	45·7	3·0	0·6	1·4	1492·9	1491·5	1484·7	6·8	195·1	194·9	193·5	1·4	·00021	51·5	0·2
1 10	58·3	105·3	47·0	3·4	1·0	2·3	1487·6	1485·3	1492·5	7·2	193·0	192·5	193·0	0·5	·00007	51·8	0·5
28	110·5	57·0	53·5	3·6	1·2	2·8	1496·2	1493·4	1483·9	9·5	192·3	191·2	192·3	1·1	·00016	52·4	1·1
45	55·7	......	......	3·0	0·6	1·4	1483·9	1482·5	......		193·5	192·1	......	......	......	52·7	1·4
			48·7							7·8							

$$\text{Approximately } q = \frac{7{\cdot}8}{48{\cdot}7 \times 1492{\cdot}5} = 0{\cdot}00011.$$

"The 'readings' in the several columns so entitled are the means each of three or more observations at intervals of $1\frac{1}{2}$ or 2 minutes. The 'corrections' are obtained by multiplying the differences of the readings of the spare declination magnetometer by the ratio of the angular value of the two declination scales. The corrections for changes of horizontal intensity are omitted as inappreciable.

"The bar was placed in a wooden trough filled alternately with warm and cold water, and its temperature was registered by a thermometer near its centre."

We have next to consider the more important question of the steadiness with which the needles may have maintained their magnetic condition during a voyage of so many months, and under such numerous and various trials. When there are many needles, all of generally steady magnetism, their intercomparison affords on the whole a not unsatisfactory mode of discovering the periods when any one amongst the number may have sustained an accidental loss, and of obtaining an approximate correction for it. I have already shown in No. II. of these Contributions*, the steadiness of Nos. 5. 7. 8. 9. 11. 12. and 13. of Sir EDWARD BELCHER's needles, from October 1838 to March 1839, by means of the observations made at Panama at both those dates. I have also noticed in the same paper that the intercomparison between March and November 1839, had shown that No. 8. was apparently more subject than the other needles to small occasional losses, and that I deemed it therefore less fit than the others for carrying on a chain of magnetic determinations. Subsequent experience with this needle has confirmed this early indication, as will be more fully shown in the sequel.

For the present investigation we shall therefore employ only Nos. 5. 7. 9. 11. 12. and 13.

A similar opportunity to the one above noticed (at Panama), of evidencing the *general* steadiness of these needles, was afforded by Sir EDWARD BELCHER's return to Singapore in December 1841, having previously visited that station in the October of the preceding year: the agreement in the respective times of vibration at those two periods is shown in the following Table:—

Periods.	Designation of the Needles.					
	5.	7.	9.	11.	12.	13.
	s	s	s	s	s	s
October 1840	466·9	532·8	433·2	469·1	397·0	390·5
December 1841	465·8	532·3	434·0	467·8	397·9	390·4

We are therefore warranted by the observations at Panama and Singapore, in regarding the usual condition of these needles to be that of steady magnetism, subject nevertheless, as all magnets appear to be, to occasional loss of force from accidental causes, the nature and operation of which are not perfectly understood.

The ratio of the squares of the times of vibration of two needles, or the difference of the logarithms of the squares, at stations at which they were both used, should be a constant quantity (within the limit of errors of observation), if both needles have continued steady; consequently a loss of magnetism occurring in either will be shown by an alteration in the ratio exceeding in amount the ordinary errors of observation; if the ratio diminishes, the loss has taken place in the needle, which for the purpose of comparison is regarded as unity; if it augments, the loss is in the needle with which it is compared. A simultaneous loss in both needles to an equal amount will not

* Philosophical Transactions, 1841, Part I., p. 13.

indeed be detected; but when the intercomparison is extended from two to several needles, the improbability of all being affected at the same time and to an equal amount becomes considerable. It is still however possible, because the intercomparison can show nothing beyond the *relative* condition of the needles.

In the present case the incompleteness in this respect of the evidence furnished by the intercomparison, is supplied by Nos. 7. and 9. having been vibrated at Woolwich in August 1839 and in October 1842: the change in their times of vibration at those dates, compared with the loss of magnetism deduced for each by the intercomparison with the other needles, shows whether any and what *unaccounted* loss has taken place in the interval in those two needles, and consequently in all those compared with them.

In what has been said above, it has been assumed that a change taking place is always occasioned by a *loss* of magnetism in one or other of the needles; it generally is so; but should the case occur, that one of the needles should gain instead of lose by any accidental disturbance of its magnetism, the intercomparison with others would equally point it out and mark its character.

An alteration in the ratio of the squares of the times of vibration may be occasioned at a particular station by an observation error of unusual magnitude, or by some unknown accidental cause of a temporary nature affecting *at the one station only* the time of vibration of the needle which is compared; an alteration to nearly the same amount will, in such case, equally pervade its comparisons with all the needles; but this case is readily distinguished from that of a permanent loss or gain of magnetism, requiring a correction to be sought out and applied,—by the ratio reverting to its original amount at the succeeding stations.

The process which has been followed in assigning the corrections for the losses thus discovered to have taken place may be best shown by an example. On the simple inspection of the observations, it was evident that Nos. 5. and 7. had each sustained a loss of magnetism between the Seychelles Islands and Mojambo Bay in the Island of Madagascar. The logarithms of the squares of the times of vibration of No. 5. at the three stations preceding the period of the loss, and at the three stations following the same, being severally subtracted from the corresponding logarithms of the squares of the times of vibration of Nos. 9. 11. 12. and 13. at the same stations, the differences are arranged in the subjoined Table. The differences for each needle are seen to be nearly a constant quantity (a) at Penang, Point de Galle, and Seychelles; to have undergone a change between Seychelles and Madagascar; and to have become again a nearly constant, though a different, quantity (b) at Madagascar, the Cape of Good Hope, and Ascension. The amount of the change between Seychelles and Madagascar ($b - a$) is shown by No. 9. to be 9·9856; by No. 11, 9·9859; by No. 12, 9·9856; and by No. 13, 9·9859. The mean, 9·9857, must be added to the logarithm of the square of the time of vibration of No. 5. at Madagascar and all the succeeding stations, to make them strictly comparable with the observations of that needle at the Seychelles and all preceding stations: or if the ratio of the intensity is sought between those stations and one visited subsequently to Madagascar,—(as for example Woolwich, where the observations with No. 5. were made in December 1842),—9·9857 must be subtracted from, or its arith. comp. 0·0143 added to, the squares of the times of vibration at the earlier stations.

Differences of the logarithms of the squares of the time of vibration of No. 5. with those of Nos. 9. 11. 12. and 13.

Stations.		No. 9.	No. 11.	No. 12.	No. 13.
Preceding the loss;	Penang	9·9401	0·0049	9·8674	9·8470
	Point de Galle	9·9406	0·0036	9·8678	9·8458
	Seychelles	9·9408	0·0041	9·8680	9·8481
	Mean (*a*)	9·9405	0·0042	9·8677	9·8476
Following the loss;	Madagascar	9·9265	9·9901	9·8530	9·8331
	Cape of Good Hope.	9·9261	9·9885	9·8530	9·8315
	Ascension	9·9256	9·9918	9·8538	9·8341
	Mean (*b*)	9·9261	9·9901	9·8533	9·8329
	(*b*) − (*a*) =	9·9856	9·9859	9·9856	9·9859

By a similar comparison, of which the particulars are also subjoined, No. 7. is shown to require a correction of 9·9885 to be added to the logarithms of the squares of the times of vibration at Madagascar and the subsequent stations, or of 0·0115 to be added to the logarithms at the stations antecedent to Madagascar, to render the series of observations with this needle before and after the loss thus ascertained comparable with each other.

Differences of the logarithms of the squares of the times of vibration of No. 7. with those of Nos. 9. 11. 12. and 13.

Stations.		No. 9.	No. 11.	No. 12.	No. 13.
Preceding the loss;	Penang	9·8232	9·8880	9·7505	9·7301
	Point de Galle	9·8217	9·8847	9·7489	9·7269
	Seychelles	9·8224	9·8857	9·7496	9·7297
	Mean (*a*)	9·8224	9·8861	9·7497	9·7289
Following the loss;	Madagascar........	9·8100	9·8736	9·7373	9·7166
	Cape of Good Hope.	9·8120	9·8744	9·7389	9·7174
	Ascension	9·8103	9·8765	9·7377	9·7188
	Mean (*b*)	9·8108	9·8748	9·7380	9·7176
	(*b*) − (*a*) =	9·9884	9·9887	9·9883	9·9887

The loss of magnetism thus manifested in Nos. 5. and 7. at the Seychelles is the most considerable change undergone by any of the needles between March 1839 and December 1842. The only change of nearly equal amount (being also a loss for which the correction is 0·0093) was sustained by No. 7. at Mazatlan in November 1839, and has been noticed and the circumstances connected with it stated in No. II. of these Contributions*. The corrections of Nos. 5. 7. 9. 11. 12. and 13, derived from the intercomparison, commencing with the observations at Panama in March 1839, and ending with those at Woolwich in December 1842, are as follows: they are all additive at the stations named and at all antecedent stations, and render the whole series with each needle comparable throughout with each other, and with the observations at Woolwich in December 1842.

No. 5. 0·0143 from Seychelles; 0·0027 (additional) from San Blas.

No. 7. 0·0115 from Seychelles; 0·0013 (additional) from Amboyna; and 0·0093 (additional) from Mazatlan.

No. 9. 0·0018 from Point de Galle; 0·0021 (additional) from Singapore, October 1840; 0·0038 (additional) from Tahiti.

No. 11. 0·0035 from Jobie Island.

No. 12. 0·0020 from the Cape of Good Hope; 0·0012 (additional) from Point de Galle; 0·0030 (additional) from Macao, September 1841.

No. 13. 0·0034 from Amboyna; 0·0017 (additional) from Tahiti.

We have next to examine how far the corrections thus derived correspond with the change in the times of vibration of Nos. 7. and 9, shown by direct observation at Woolwich at the two dates of August 1839 and December 1842.

	No. 7.	No. 9.
	s	s
In August 1839 the times of vibration observed were	767·0	627·6
The corrections assigned by intercomparison are equivalent to .	+ 19·8	+ 5·6
Observed times of vibration in August 1839, corrected . . .	786·8	633·2
Observed times of vibration in December 1842	789·1	635·7
Differences	2·3	2·5

The differences are in the same sense in both needles, and are such as would correspond to a small loss of magnetism still undetected by the intercomparison. It is possible that they may be partially or wholly due to this cause, without prejudice to the effectiveness of the method itself, because, in its present application, the intercomparison has not been pursued to the correction of *very* small differences; it has however been carried out to such extent, that even the very moderate differences indicated by the above figures would not have escaped detection had they occurred at any single station or period. They correspond respectively to ·006 and ·007 parts of the whole horizontal force; and were there no liability to observation errors,—and were the horizontal force at Woolwich at all times a constant quantity,—we might be justified in meeting them with a special correction. But they are exceeded in amount by the fluctuations of the force itself, which is subject both to periodical variations, dependent on the hour and season, and to other fluctuations of irregular occurrence,

* Philosophical Transactions, 1841, p. 15.

which sometimes for several days together raise the intensity above, or depress it below, its average value; and experience shows that either from these natural causes, or from observation errors, or from both combined, the results obtained at the same station on different days with needles of assured steadiness, do occasionally vary to as great and greater amounts than those under consideration; we should scarcely be justified, therefore, in applying any further correction.

Employing the corrections obtained by the intercomparison of the needles, and combining the times of vibration of each at Panama in March 1839 with those at Woolwich in December 1842, we obtain the ratio of the horizontal force at Panama to the force at Woolwich, regarded as unity, by the several needles as follows:—

No. 5.	2·078	Mean 2·081.
7.	2·078	
9.	2·087	
11.	2·082	
12.	2·077	
13.	2·084	

The partial results do not differ from each other more than those might be expected to do which should have been obtained by the repetition of observations with one and the same needle.

The general table of results in the sequel has been calculated by the aid of the corrections thus derived, and the intensity as given by each of the needles severally is entered in the Table.

The time of vibration of No. 11. at Woolwich, in October 1842, appears to have been affected by some accidental cause of error. Its discordance with the general series was perceived a few days after the observations were made, and error suspected, because the time of vibration would have corresponded to a considerable *increase* in the magnetism of the needle. The suspicion was confirmed by the repetition of the observations at Woolwich on the 27th and 28th December 1842, and at Falmouth on the 9th of February 1843, though no cause has been discovered either then or subsequently for the error in the first observation. Viewing the more than usual importance of accuracy in the observations at a base station, I have selected a different station for that purpose for this particular needle, and have chosen Singapore, both because the ratio of the horizontal force at that station to the force at Woolwich appears to have been extremely well determined by Sir EDWARD BELCHER's observations in 1840 and 1841, and because any error in that determination will be corrected with certainty before long by the absolute determinations at the magnetic observatory there. The horizontal force at Woolwich being unity, its value at Singapore is 2·135 by Sir EDWARD BELCHER's observations in 1840, and 2·140 by those in 1841. The mean is 2·1375. The time of vibration of No. 11. at Singapore was $468^{s}\cdot7$ in 1840, and $467^{s}\cdot3$ in 1841; mean $468^{s}\cdot0$ at 75° FAHR.

We have now to notice the two needles Nos. 6. and 8, which have not been included in the intercomparison which the others have undergone.

By means of the horizontal intensity derived for each station from the mean of Nos. 5. 7. 9. 11. 12. and 13, and the observed times of vibration of No. 8. at the several stations, the corresponding times of vibration which that needle would have had at the respective periods at Woolwich have been computed, and are as follows:—

	s		s
Mazatlan, November 1839 .	677·7	Singapore, October 1840 . .	681·6
San Blas, December 1839 . .	678·5	Singapore, December 1841 .	682·9
Martin's Island, January 1840	678·8	Penang, December 1841 . .	683·2
Bow Island, March 1840 . .	679·6	Point de Galle, January 1842.	683·0
Tahiti, May 1840.	678·8	Seychelles, February 1842 . .	683·0
Nukulau, June 1840 . . .	679·6	Madagascar, March 1842 . .	684·6
New Ireland, July 1840 . .	680·7	Cape of Good Hope, April 1842	684·3
Jobie Island, August 1840. .	680·2	Ascension, May 1842 . . .	685·1
Amboyna, September 1840 .	680·7	Woolwich, October, December	686·1
Macassar, September 1840 .	681·8		

The progressive increase in the times of vibration indicates that No. 8. was continually parting with small portions of its magnetism, a condition, which, when it occurs in one needle amongst many, renders that particular needle of less value in general deductions than those which have the character of general steadiness with only *occasional* loss. Corrections might be assigned for No. 8, derived either from its comparison with the other needles, or on a supposition of uniform loss in reference to time or to occasions of employment, but the latter could only be regarded as approximate, and the former would add no independent value to the general conclusions. The observations with No. 8. therefore are given in the Tables, but no deductions have been made from them.

The derangement in the magnetic state of No. 6, which took place in a journey to the summit of the volcano of Conchagua in December 1838, and its subsequent unsteadiness, have been already noticed in No. II. of these Contributions. The magnetism of this needle continued unsettled for the whole remainder of the voyage, affording an instructive example of the extent of injury which an exposure to unfavourable circumstances may produce in a long-tried and valuable needle; the one in question having been in use during the twenty-one previous months without undergoing apparently the slightest change in its magnetism. It unfortunately happened that No. 6. is one of two needles, No. 5. being the other, which Sir EDWARD BELCHER employed throughout his voyage at stations where time did not permit him to use more than two; and it is desirable therefore to draw from the observations with No. 6. at such stations, all the evidence they are capable of affording. For this purpose I have made the stations at which several needles were used base stations, for the deduction of the force with No. 6. at any intermediate place where Nos. 5. and

6. only were employed: the deductions by No. 6. being in all such cases dependent on the determinations by all the other needles at the base stations visited immediately before and after. When the force at the intermediate place has appeared by No. 6. to be nearly the same, whether derived from the base station preceding, or the one following it, the mean result has been considered to have an independent value, and has been employed accordingly. When otherwise, the observations have been entered in the table, but no deductions have been made from them.

The values of the horizontal force which are contained in the final column of the general table are expressed in absolute measure, referring to the units prescribed in the magnetic Instructions which have received the sanction of the Royal Society*. Experiments made by Lieutenants LEFROY and RIDDELL in the Royal Military Repository at Woolwich in May 1842, with magnets of four inches in length, gave 3·72 as the approximate value of the horizontal force at Woolwich at that period, agreeably to the following memorandum:—

"The number 3·72, given as the approximate value of the horizontal intensity at Woolwich, expressed in English units of feet, seconds, and grains, was determined from experiments of deflection and vibration made with one of WEBER's transportable magnetometers.

"The experiments of deflection were made after the method of M. GAUSS, with the axis of the deflecting magnet perpendicular to the magnetic meridian, the angles being measured on the scale fixed over the reading telescope. The deflecting and suspended magnets were of the same dimensions, about four inches in length and four-tenths in diameter.

"The values of $\frac{m}{X}$ were calculated from the several pairs of observations by the formula

$$\frac{m}{X} = \frac{r'^5 \tan u' - r^5 \tan u}{2\,(r'^2 - r^2)}.$$

"The partial results, distances, and angles of deflection are given in the accompanying abstracts.

"The moment of inertia of the vibrating magnet was determined by observing a

* "The number obtained for the force of the earth's magnetism expresses the ratio which that force bears to the *unit of force*, the unit of force being that which, acting on the unit of *mass*, through the unit of *time*, generates in it the unit of *velocity*. These units are entirely arbitrary; but for the sake of convenience in comparison, it is desirable that they should be the same in all the observations which shall be made according to this system. For the unit of mass, then, we may take a *grain*; for the unit of time a *second*; and, if a *foot* be taken as the unit of space, the unit of velocity will be that of one foot per second.

"As the magnetic force operates effectively only on the free or uncombined elements of the magnetic fluid, we are to understand by the earth's magnetic force, its action on the elementary unit of free magnetism; and we must take for that unit the quantity of free magnetism, which, acting on another equal quantity at the unit of distance, exerts an effect equal to the unit of force already defined."—*Royal Society, Report of the Committee of Physics, &c., approved by the President and Council,* 1840, pp. 21, 22.

second series of vibrations with two cylinders of equal weight and dimensions suspended across the end of the bar, in the manner described by M. WEBER. The times of vibration are uncorrected for the torsion of the suspension thread, or for the changes of horizontal intensity occurring during the intervals of the experiments.

"Abstract of Observations of the absolute Horizontal Intensity.

1842.	No. of Magnet.	Experiments of Deflection.									Times of vibration.			Values of		
		Distances in feet.				Angles of Deflection.				Log of $\frac{m}{X}$.	Without weights.	With weights.	Log of mX.	X.	m.	Temp. of Magn.
						° ′	° ′	° ′	° ′		s	s				°
May 26.	10	1·4746	....	1·8671	....	7 56·8	....	3 56·0	....	9·34969	6·218	11·630	0·49070	3·7196	0·832	62
28.	15	1·4832	....	1·8668	....	7 20·5	....	3 42·0	....	9·32349	6·433	....	0·46439	·7192	·783	63
28.	13	1·4831	....	1·8669	....	7 20·7	....	3 41·9	....	9·32296	6·442	....	0·46410	·7202	·783	62
30.	13	1·4831	1·5164	1·8669	1·9086	7 17·4	6 48·9	3 40·4	3 26·0	9·31982	6·481	12·078	0·45885	·7112	·775	67
30.	15	1·4165	1·4832	1·9085	1·9668	8 23·0	7 18·1	3 27·0	3 09·3	9·32244	6·433	12·000	0·46439	·7237	·782	68

From these experiments we may regard 3·72 as the approximate value of the horizontal force at Woolwich at the period referred to; and 3·72 + e as the corrected value at the same station, corresponding to the period which shall hereafter be taken as the epoch of the magnetic maps of the globe, which these and similar contributions will combine to form,—e being a small quantity depending partly on the epoch, and partly on the possibly increased precision of determinations hereafter to be made with improved apparatus. In the mean time 3·72 has been adopted, and will continue to be used, as the provisional value of the horizontal force at Woolwich; and the intensities at Sir EDWARD BELCHER's stations have been computed and are expressed accordingly.

The general table of the determinations of the horizontal force (Table I.) is divided into three portions. Part I. contains a condensed abstract of the observations with Nos. 5, 6, 7 and 8, antecedent to March 1839, at several of the ports of the west coast of America. The column entitled "corrected times," shows the mean times of vibration corrected for the chronometer's rate and for the arc of vibration, and reduced to a mean temperature of 75°; employing for that purpose the coefficients found experimentally for each needle. The corrections for the arc of vibration have been made by multiplying the time of vibration by $1 - \frac{a\,a'}{16}$, a and a' being the sines of the semiarcs at the commencement and conclusion of the observation. Previous to March 1839, the commencing semiarc was always 40°; subsequent to that period always 20°. The concluding arcs are specified in the Table. Panama is here employed as a base station; and the means of the corrected times in March 1837, October 1838, and March 1839, have been taken, for each needle respectively, as the approximate times throughout the interval; the values of the horizontal force are given in reference to the scale of absolute measure, the force at Panama being taken as = 7·743 (Part II. of Table I. of this memoir).

Part II. contains a condensed abstract of the observations with Nos. 5, 6, 7, 8, 9, 11, 12 and 13, between March 1839 and April 1840, more detailed particulars of which have been already given in Table V. of No. II. of these Contributions. Part III. comprises the whole remainder of the observations from May 1840 at Rarotonga Island to December 1842 at Woolwich. The manner in which the values of the horizontal force in the final column of Parts II. and III. have been computed, has been already explained.

Table II. contains the observations of the Inclination subsequent to March 1840, made with the same six-inch Inclinometer, by Robinson, employed at the earlier stations: this Table is a continuation of Table IX. in No. II. of these Contributions.

The Declinations inserted in the general table were observed with a nine-inch altitude and azimuth instrument by Cary, having a four-inch magnetic needle attached to it.

The general table, Table III., comprises in one view, the Declination, Inclination, horizontal and total Intensity, resulting from the whole of the observations, and is the best evidence, especially to those who are familiar with the practical details of such observations, of the amount of obligation which magnetical science owes to Sir Edward Belcher, and to the officers of the Royal Navy employed under his direction.

Table I.—Part I.

Abstract of Observations with the Intensity Needles between March 1837 and March 1839; in these observations the commencing semi-arc was 40°.

Station.	1837.	Needle.	No. of observations.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° Fahr.	Horizontal Intensity. Panama = 7·743.
				s	°	s	°	s	
Panama ..	March 10.	5	2	472·7	79	L. 1·1	14	467·8	
	10.	6	2	512·5	76	L. 1·1	14	507·4	
	12.	7	1	522·7	71	L. 1·1	4	531·3	
	12.	8	1	470·4	76	L. 1·1	7	468·1	
Fort Etches	August 28.	5	1	736·7	50	L. 8·6	5	737·9	3·13 } 3·15
	28.	6	1	792·4	50	L. 8·6	8	794·2	3·16
	1838.								
Acapulco ..	January 17.	6	1	508·1	88	L. 5·4	13	501·4	7·94 } 7·91
	17.	7	1	530·7	91	L. 5·4	3	529·2	7·87
Callao	June 20 & 21.	5	80	487·1	68	L. 2·0	14	483·1	7·31 } 7·37
	25.	6	1	525·0	79	L. 2·0	13	519·2	7·41
	27.	7	1	546·1	72	L. 2·0	5	544·3	7·44
	27.	8	1	483·8	70	L. 2·0	6·5	481·8	7·32
Puna Island, Guayaquil	Sept. 3.	5	90	476·1	78	L. 1·4	14	471·2	7·69 } 7·74
	17–23.	6	7	513·2	89	L. 1·4	13	505·9	7·80
Panama ..	October 28.	5	2	475·3	82	Not recorded.	14	470·0	
	28.	6	2	514·6	83	Not recorded.	13	508·3	
	28.	7	1	536·8	83	Not recorded.	4	535·1	
	28.	8	1	471·4	83	Not recorded.	6	469·1	
	1839.								
	March 16.	5	2	476·2	85	L. 2·1	14	470·7	
	16.	7	2	536·1	84	L. 2·1	3·5	534·5	
	16.	8	2	471·4	87	L. 2·1	5	469·4	

TABLE I.—Part II.

Abstract of Observations with the Intensity Needles between March 1839 and April 1840; in these observations the commencing semi-arc was 20°.

Station.	1839.	Needle.	No. of observations.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° FAHR.	Horizontal Intensity.	
				s	°	s	°	s		
Panama	March 16.	5	2	472·45	85	L. 2·1	7·5	470·2	7·731	7·743
	16.	6	3	522·80	87	L. 2·1	6·2	519·7		
	16.	7	3	534·53	85	L. 2·1	2·0	533·6	7·727	
	16.	8	3	469·30	87	L. 2·1	2·5	468·5		
	16.	9	3	436·85	83	L. 2·1	2·7	436·2	7·763	
	16.	11	1	473·26	87	L. 2·1	2·5	472·2	7·745	
	16.	12	1	403·22	87	L. 2·1	3·5	402·4	7·726	
	16.	13	1	393·24	88	L. 2·1	3·5	392·2	7·768	
Cocos Island	April 8.	5	2	466·68	82	L. 2·5	5·7	465·0	7·907	7·924
	8.	6	2	514·77	81	L. 2·5	7·0	512·3		
	8.	11	2	465·68	78	L. 2·5	3·0	465·0	7·988	
	8.	12	2	397·43	77	L. 2·5	3·0	396·9	7·939	
	8.	13	2	390·00	78	L. 2·5	3·7	389·3	7·864	
Oahu	June 4–9.	5	4	513·89	87	L. 1·3	5·7	511·4	6·536	6·506
	5–9.	6	4	575·77	86	L. 1·3	5·0	572·6		
	8.	11	2	515·65	83	L. 1·3	2·2	514·7	6·518	
	8.	12	2	439·60	87	L. 1·3	4·0	438·6	6·503	
	8.	13	2	430·55	87	L. 1·3	4·2	429·3	6·467	
Kodiack	July 7.	5	1	688·46	79	L. 2·0	1·5	687·5	3·617	3·635
	7.	6	1	765·08	80	L. 2·0	1·0	763·6	3·653	
Sitka	18.	5	1	730·30	61	L. 0·4	4·0	731·4	3·195	3·207
	18.	6	1	811·20	56	L. 0·4	5·0	814·6		
	18.	11	1	730·40	62	L. 0·4	1·5	730·9	3·231	
	18.	12	1	624·00	64	L. 0·4	1·5	624·1	3·211	
	18.	13	1	611·20	67	L. 0·4	1·5	611·4	3·189	
Woolwich	August 11–13.	7	3	767·35	64	L. 2·0	0·8	767·0	3·742	3·746
	11–13.	8	3	671·17	66	L. 2·0	0·8	670·9		
	11–13.	9	3	627·38	63	L. 2·0	1·0	627·6	3·750	
Fort Vancouver	13.	5	7	617·87	66	G. 8·5	3·5	618 2	4·474	4·475
	13.	6	5	691·60	66	G. 8·5	2·5	692·9		
	13.	11	1	620·67	56	G. 8·5	2·0	621·3	4·475	
	13.	12	2	528·84	74	G. 8·5	2·5	528·3	4·482	
	13.	13	2	517·05	74	G. 8·5	2·7	516·5	4·468	
Baker's Bay	September 13.	5	2	623·40	65	L. 1·9	3·5	623·9	4·392	4·394
	13.	6	2	698·17	69	L. 1·9	2·2	698·9	4·396	
Port Bodega	25.	5	1	560·44	63	L. 2·7	3·5	561·1	5·429	5·440
	25.	6	1	625·88	63	L. 2·7	3·0	627·6	5·452	
San Francisco	30.	5	2	556·98	73	L. 3·4	5·2	556·1	5·528	5·524
	30.	6	2	622·10	62	L. 3·4	5·2	623·4	5·524	
	30.	11	1	558·72	64	L. 3·4	2·0	558·9	5·529	
	30.	12	1	476·36	62	L. 3·4	3·0	476·3	5·515	
Monterey	October 5.	5	1	549·72	65	L. 2·9	4·5	549·9	5·652	5·666
	5.	6	1	613·76	64	L. 2·9	4·0	615·0	5·680	
Santa Barbara	10.	5	1	538·90	77	L. 2·9	5·0	537·7	5·912	5·925
	10.	6	1	602·28	73	L. 2·9	6·0	601·3	5·939	
San Pedro	12.	5	1	538·44	74	L. 2·7	3·0	538·0	5·907	5·913
	12.	6	1	602·56	73	L. 2·7	3·0	602·3	5·920	
San Diego	17.	5	1	528·02	70	L. 2·7	4·5	527·7	6·140	6·142
	17.	6	1	590·55	67	L. 2·7	4·0	591·2	6·145	
San Quentin	24.	5	1	515·30	77	L. 2·7	3·5	514·4	6·454	6·468
	24.	6	1	574·64	65	L. 2·7	4·0	575·6	6·482	
San Bartholomew.	29.	5	1	503·28	73	L. 2·7	5·0	502·6	6·769	6·780
	29.	6	1	562·72	73	L. 2·7	3·5	562·4	6·791	

TABLE. (Continued.)

Station.	1839.	Needle.	No. of observations.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° Fahr.	Horizontal Intensity.	
				s	°	s	°	s		
Magdalena Bay	November 1.	5	1	490·08	73	L. 2·7	5·5	489·3	7·141	7·160
	1.	6	1	547·36	73	L. 2·7	4·0	546·9	7·180	
Bay of San Lucas	21.	5	1	487·90	83	L. 2·7	6·0	486·0	7·238	7·259
	21.	6	1	545·92	84	L. 2·7	6·0	543·1	7·280	
Mazatlan......	28.	5	1	488·08	71	L. 1·9	6·5	487·3	7·200	7·214
	28.	6	1	546·16	71	L. 1·9	6·0	545·6		
	29.	7	1	552·84	73	L. 1·9	2·0	552·5	7·208	
	Nov. 30 and Dec. 2.	7	3	558·83	74	L. 1·9	2·0	558·4		
	Nov. 29 to Dec. 2.	8	4	487·22	74	L. 1·9	3·0	486·7		
		9	3	452·82	74	L. 1·9	3·5	452·2	7·222	
	November 28.	11	1	488·52	72	L. 1·9	2·0	488·3	7·245	
	28.	12	1	416·94	72	L. 1·9	3·0	416·6	7·208	
	28.	13	1	407·28	72	L. 1·9	3·5	406·9	7·200	
San Blas......	Dec. 6. and 19.	5	2	482·42	83	L. 1·9	4·2	480·8	7·394	7·421
	6. and 19.	6	3	539·09	81	L. 1·9	4·2	537·2		
	6. and 19.	7	3	551·30	80	L. 1·9	2·0	550·7	7·410	
	6. and 19.	8	2	481·14	82	L. 1·9	2·5	480·4		
	6. and 19.	9	2	446·04	81	L. 1·9	2·5	445·4	7·446	
	6. and 19.	11	2	482·92	83	L. 1·9	2·0	482·2	7·429	
	6. and 19.	12	2	410·77	82	L. 1·9	2·2	410·2	7·432	
	6. and 19.	13	2	401·66	82	L. 1·9	2·5	401·0	7·414	
Socorro Island	26.	5	2	477·92	84	L. 3·5	6·5	475·9	7·477	
	26.	6	3	553·78	85	L. 3·5	4·0	551·2		
Clarion Island	29.	5	2	481·70	85	L. 3·5	6·2	479·6	7·597	
	29.	6	2	550·47	84	L. 3·5	5·0	547·9		
	1840.									
Martin's Island	Jan. 23–29.	5	5	478·74	87	L. 3·6	6·0	476·5	7·578	7·594
	23–29.	6	6	543·03	86	L. 3·6	5·0	540·1		
	25–27.	7	2	544·78	87	L. 3·6	2·2	544·1	7·593	
	25–27.	8	2	475·88	85	L. 3·6	2·7	475·1		
	25–27.	8	2	475·88	85	L. 3·6	2·7	475·1		
	25–27.	9	2	441·17	88	L. 3·6	3·2	440·3	7·618	
	25–27.	11	2	477·94	89	L. 3·6	2·0	476·9	7·593	
	25–27.	12	2	406·58	87	L. 3·6	3·0	405·8	7·595	
	25–27.	13	2	397·54	88	L. 3·6	3·7	396·4	7·585	
Bow Island....	Feb. 6–29.	5	14	484·2	86	L. 5·3	7·0	482·1	7·402	7·425
	March 20–21.	5	14	484·30	83	G. 5·8	6·5			
	Feb. 6–29.	6	22	547·77	87	L. 5·3	5·5	545·1		
	March 20–21.	6	14	548·53	84	G. 5·8	6·5			
	22.	7	3	551·24	76	G. 5·8	3·0	550·6	7·415	
	22.	8	4	481·55	77	G. 5·8	3·0	480·9		
	22.	9	3	446·47	82	G. 5·8	4·0	445·6	7·440	
	22.	11	3	482·83	85	G. 5·8	2·5	481·9	7·440	
	22.	12	3	411·08	87	G. 5·8	3·0	410·2	7·432	
	22.	13	3	401·97	86	G. 5·8	3·4	400·8	7·419	
Tahiti, Point Venus	Ap. 4 to May 6.	5	11	482·47	84	L. 4·0	6·2	480·4	7·453	7·491
	April 11.	6	11	546·15	83	L. 4·0	5·5	543·6		
	May 6–7.	7	3	548·07	88	L. 3·7	2·3	547·3	7·505	
	6–7.	8	4	479·03	82	L. 3·7	2·7	478·3		
	6–7.	9	3	443·65	81	L. 3·7	3·2	443·0	7·525	
	6.	11	3	480·55	80	L. 3·7	2·6	479·9	7·501	
	6–8.	12	3	409·01	82	L. 3·7	2·7	408·4	7·498	
	6–8.	13	3	400·35	82	L. 3·7	3·2	399·6	7·465	
Tahiti, Papeete	April 17.	5	2	480·13	77	L. 5·2	6·0	479·1	7·498	
	17.	6	2	544·36	84	L. 5·2	5·0	541·8		

Table I.—Part III.

Observations with the Intensity Needles between May 1840 and December 1842; in these observations the commencing semi-arc was 20°.

Stations.	1840.	Needle.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° Fahr.	Horizontal Intensity.	
			s	°	s	°	s		
	May 15.	5	486·34	77	L. 5·8	7·0	484·9	7·315	
Rarotonga Island,	15.	5	486·46	80	L. 5·8	6·5			
Harvey Group.	15.	6	555·48	85	L. 5·8	5·5	552·6		
	15.	6	555·40	85	L. 5·8	5·0			
	22.	5	474·16	77	L. 5·6	6·5			
	22.	5	473·68	77	L. 5·6	7·5	472·4	7·706	
Vavao Island,	22.	5	473·92	78	L. 5·6	7·0			
Hapae Group.	22.	6	530·88	78	L. 5·6	6·5			
	22.	6	529·96	77	L. 5·6	6·5	528·7		
	22.	6	530·24	76	L. 5·6	7·0			
	30.	5	474·00	80	L. 5·6	6·5			
	30.	5	473·76	80	L. 5·6	6·5	472·2	7·715	
	30.	5	474·08	85	L. 5·6	6·5			
	30.	6	532·74	85	L. 5·6	6·0			
	30.	6	533·14	83	L. 5·6	5·5	530·4		
	30.	6	532·24	82	L. 5·6	6·0			
	30.	6	532·60	79	L. 5·6	7·0			
	31.	7	540·46	80	L. 5·6	2·5			
	31.	7	540·00	80	L. 5·6	2·5	540·0	7·676	
	June 1.	7	541·46	79	L. 5·6	3·0			
	1.	8	472·68	79	L. 5·6	3·5			
Nukulau Island,	1.	8	472·70	79	L. 5·6	3·5	472·0		
Feejee Group.	1.	8	472·88	80	L. 5·6	3·5			7·708
	1.	9	440·12	85	L. 5·6	3·5			
	1.	9	439·52	86	L. 5·6	3·5	438·8	7·738	
	1.	9	439·34	86	L. 5·6	3·5			
	May 30.	11	474·60	81	L. 5·6	3·0			
	31.	11	474·32	86	L. 5·6	2·5	473·7	7·697	
	31.	11	474·72	85	L. 5·6	3·0			
	31.	12	403·10	85	L. 5·6	3·0			
	31.	12	403·68	86	L. 5·6	3·5	402·7	7·715	
	31.	12	403·32	85	L. 5·6	3·0			
	31.	13	394·52	82	L. 5·6	4·0			
	31.	13	395·14	82	L. 5·6	3·5	394·1	7·706	
	31.	13	394·96	82	L. 5·6	3·5			
Banga Island,	June 15.	5	474·32	89	L. 6·0	5·5	472·0	7·721	7·718
Feejee Group.	15.	6	533·36	91	L. 6·0	4·0	529·9	7·715	
	22.	5	470·62	75	L. 6·2	6·5			
	22.	5	470·44	72	L. 6·2	6·5	469·7	7·797	
Tanna Island,	22.	5	470·76	72	L. 6·2	7·0			7·790
Port Resolution,	22.	6	527·80	72	L. 6·2	6·0			
New Hebrides.	22.	6	527·40	70	L. 6·2	5·5	527·5	7·784	
	22.	6	528·26	70	L. 6·2	6·0			
	July 7.	5	464·16	77	L. 6·3	7·5			
	7.	5	463·72	77	L. 6·3	8·0	462·6	8·039	
	15.	5	463·92	78	L. 6·3	7·0			
	7.	6	520·73	79	L. 6·3	7·0			
	7.	6	520·40	79	L. 6·3	7·0	518·9		
	15.	6	521·44	78	L. 6·3	6·5			
Cocos Island,	7.	7	529·20	80	L. 6·3	3·5			
Port Carteret,	7.	7	529·44	81	L. 6·3	3·5	528·4	8·049	
New Ireland.	15.	7	528·98	77	L. 6·3	3·5			8·039

TABLE. (Continued.)

Station.	1840.	Needle.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° Fahr.	Horizontal Intensity.	
			s	°	s	°	s		
Cocos Island, Port Carteret, New Ireland.	July 7.	8	463·64	83	L. 6·3	3·5			8·039
	7.	8	463·68	84	L. 6·3	4·0	463·0		
	7.	8	463·68	80	L. 6·3	4·0			
	15.	8	464·26	77	L. 6·3	4·0			
	7.	9	430·84	83	L. 6·3	5·5			
	7.	9	430·88	85	L. 6·3	5·0	430·0	8·060	
	7.	9	431·16	82	L. 6·3	4·5			
	15.	9	430·88	77	L. 6·3	5·0			
	7.	11	464·54	85	L. 6·3	3·5			
	7.	11	464·76	85	L. 6·3	3·5	463·7	8·033	
	7.	11	464·84	81	L. 6·3	3·0			
	7.	12	395·42	84	L. 6·3	4·0			
	7.	12	395·96	84	L. 6·3	4·0	394·8	8·024	
	7.	12	395·54	81	L. 6·3	5·0			
	7.	13	386·60	84	L. 6·3	4·0			
	7.	13	387·16	83	L. 6·3	4·0	386·1	8·028	
	7.	13	387·16	82	L. 6·3	4·5			
Britannia Island, New Guinea.	27.	5	470·12	77	L. 6·2	8·0			
	27.	5	469·64	77	L. 6·2	7·5	468·5	7·835	
	27.	5	470·43	78	L. 6·2	7·5			7·832
	27.	6	527·54	78	L. 6·2	6·5			
	27.	6	527·84	78	L. 6·2	7·0	525·9	7·828	
	27.	6	527·76	78	L. 6·2	6·5			
Booby Rock, Jobie Island, New Guinea.	August 8.	5	463·80	83	L. 6·2	6·5			
	8.	5	465·62	83	L. 6·2	8·0			
	8.	5	464·24	82	L. 6·2	7·0	402·2	8·053	
	8.	5	463·16	83	L. 6·2	7·0			
	8.	5	463·88	84	L. 6·2	7·0			
	8.	6	520·86	82	L. 6·2	6·5			
	8.	6	521·28	85	L. 6·2	6·5	518·5		
	8.	6	521·16	83	L. 6·2	6·0			
	8.	7	529·24	84	L. 6·2	3·0	528·6	8·045	
	8.	7	529·40	82	L. 6·2	3·0			
	8.	8	463·08	82	L. 6·2	3·5			
	8.	8	462·92	82	L. 6·2	3·5	462·2		
	8.	8	463·08	82	L. 6·2	3·5			8·056
	8.	9	429·64	80	L. 6·2	5·5			
	8.	9	430·12	80	L. 6·2	5·0	429·0	8·093	
	8.	9	430·36	82	L. 6·2	5·5			
	8.	11	463·24	82	L. 6·2	3·0			
	8.	11	463·04	82	L. 6·2	3·0	462·2	8·067	
	8.	11	462·96	82	L. 6·2	3·5			
	8.	12	395·14	82	L. 6·2	4·0			
	8.	12	395·05	81	L. 6·2	4·0	394·4	8·041	
	8.	12	395·10	81	L. 6·2	4·0			
	8.	13	386·96	81	L. 6·2	4·5			
	8.	13	386·44	81	L. 6·2	4·0	385·9	8·036	
	8.	13	386·84	81	L. 6·2	4·5			
Shell Rock, Jobie Island.	14.	5	463·88	86	L. 5·8	5·5	461·4	8·079	
	14.	5	463·62	92	L. 5·8	6·0			8·066
	14.	6	522·32	91	L. 5·8	5·5	518·8	8·054	
	14.	6	522·38	89	L. 5·8	6·0			
Amsterdam Island, New Guinea.	24.	5	464·68	86	L. 5·8	7·0			
	24.	5	464·36	86	L. 5·8	7·0	462·7	8·036	
	24.	5	465·44	87	L. 5·8	6·5			
	24.	5	464·84	82	L. 5·8	7·5			8·012
	24.	6	522·72	81	L. 5·8	6·5			
	24.	6	522·60	87	L. 5·8	6·5	521·0	7·988	
	24.	6	523·12	88	L. 5·8	6·0			

Table. (Continued.)

Station.	1840.	Needle.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° Fahr.	Horizontal Intensity.	
			s	°	s	°	s		
Fort Defence, Bouro Island.	August 31.	5	463·28	89	L. 6·4	6·0	461·2	8·088	
	Sept. 1.	5	463·36	85	L. 6·4	6·5			8·093
	August 31.	6	521·52	89	L. 6·4	5·0	517·4	8·097	
	Sept. 1.	6	520·08	89	L. 6·4	6·0			
Fort Victoria, Amboyna Island.	4.	5	460·65	76	L. 6·1	8·0			
	4.	5	461·08	80	L. 6·1	8·0	459·1	8·161	
	4.	5	460·28	77	L. 6·1	7·5			
	4.	6	518·04	76	L. 6·1	6·5			
	4.	6	517·96	78	L. 6·1	7·0	516·2		
	4.	6	517·78	79	L. 6·1	6·0			
	5.	7	525·30	84	L. 6·1	3·0			
	5.	7	525·80	84	L. 6·1	2·5	525·0	8·157	
	5.	7	526·00	86	L. 6·1	2·0			
	5.	8	461·40	86	L. 6·1	2·5			
	5.	8	460·80	87	L. 6·1	2·5	460·1		8·144
	5.	8	460·32	87	L. 6·1	2·5			
	5.	9	427·60	84	L. 6·1	3·0			
	5.	9	428·04	77	L. 6·1	3·0	427·2	8·163	
	5.	9	427·93	77	L. 6·1	4·5			
	5.	11	463·32	80	L. 6·1	3·0			
	5.	11	463·42	85	L. 6·1	2·5	462·6	8·136	
	5.	11	463·36	85	L. 6·1	2·5			
	5.	12	392·72	84	L. 6·1	3·0	392·1	8·134	
	4.	13	385·48	81	L. 6·1	4·0			
	4.	13	384·56	82	L. 6·1	4·0	384·0	8·116	
	5.	13	384·50	84	L. 6·1	4·0			
Fort Rotterdam, Macassar Island.	26.	5	465·00	73	L. 6·2	8·0			
	27.	5	464·34	78	L. 6·2	7·0	463·1	8·021	
	27.	5	464·44	78	L. 6·2	7·0			
	30.	5	464·80	87	L. 6·2	6·0			
	26.	6	522·20	74	L. 6·2	7·0			
	27.	6	523·28	79	L. 6·2	6·5	521·2		
	27.	6	523·04	79	L. 6·2	6·5			
	27.	7	530·50	83	L. 6·2	2·5	530·1	8·023	
	27.	7	531·00	83	L. 6·2	2·0			
	28.	8	464·96	72	L. 6·2	3·0	464·1		8·029
	28.	8	464·20	72	L. 6·2	3·5			
	28.	9	431·21	90	L. 6·2	3·5	430·1	8·054	
	28.	9	430·76	90	L. 6·2	3·0			
	29.	11	466·92	91	L. 6·2	2·0	465·6	8·032	
	29.	11	466·46	91	L. 6·2	2·5			
	29.	12	395·86	90	L. 6·2	3·0	395·1	8·014	
	29.	12	395·84	90	L. 6·2	2·5			
	29.	13	388·32	89	L. 6·2	3·5	387·6	8·031	
	29.	13	388·76	87	L. 6·2	3·0			
Solombo Island.	October 4.	5	466·72	91	L. 6·2	6·5			
	4.	5	466·92	92	L. 6·2	6·5	464·1	7·988	
	4.	5	466·86	94	L. 6·2	6·5			
	4.	6	525·92	92	L. 6·2	5·0			8·003
	4.	6	525·48	92	L. 6·2	5·5	521·8	8·019	
	4.	6	526·00	94	L. 6·2	5·5			
Rendezvous Island, Pulo Kumpal (S.W. Pt of Borneo).	7.	5	466·16	85	L. 6·6	8·0			
	7.	5	466·07	84	L. 6·6	7·5	462·4	8·047	
	7.	5	466·17	82	L. 6·6	7·0			
	7.	6	524·56	85	L. 6·6	7·0			8·038
	7.	6	524·45	85	L. 6·6	7·0	521·5	8·029	
	7.	6	524·47	84	L. 6·6	7·0			

Table. (Continued.)

Station.	1840.	Needle.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° Fahr.	Horizontal Intensity.	
			s	°	s	°	s		
	October 18.	5	466·61	79	L. 6·8	7·0	465·6	7·935	
	18.	5	467·06	70	L. 6·8	7·5			
	18.	6	524·88	70	L. 6·8	7·5	524·7		
	18.	7	532·60	75	L. 6·8	3·0	532·3	7·957	
	18.	7	533·02	75	L. 6·8	2·5			
	18.	8	467·30	79	L. 6·8	3·5			
	18.	8	467·56	79	L. 6·8	3·5	466·8		
	18.	8	467·54	80	L. 6·8	3·5			
	18.	9	433·80	82	L. 6·8	3·5			
Singapore	18.	9	433·46	84	L. 6·8	3·5	432·7	7·958	7·940
	18.	9	432·97	83	L. 6·8	3·5			
	18.	11	468·97	77	L. 6·8	3·0	468·7	7·926	
	18.	11	469·48	78	L. 6·8	2·5			
	18.	12	397·28	79	L. 6·8	3·0			
	18.	12	396·88	80	L. 6·8	3·0	396·6	7·953	
	18.	12	397·28	82	L. 6·8	3·0			
	18.	13	391·36	83	L. 6·8	3·0			
	18.	13	390·98	84	L. 6·8	3·5	390·0	7·910	
	18.	13	390·28	85	L. 6·8	3·5			
	Dec. 1.	5	469·64	82	G. 11·5	7·0			
	1.	5	469·52	82	G. 11·5	7·0			
	1.	5	469·54	80	G. 11·5	7·0	468·2	7·848	
Manila	1.	5	469·44	80	G. 11·5	7·0			
	1.	5	470·92	80	G. 11·5	5·0			7·869
	2.	5	470·40	83	G. 11·5	5·0			
	1.	6	530·72	82	G. 11·5	6·5	528·1	7·891	
	2.	6	530·70	84	G. 11·5	5·5			
	30.	5	476·04	70	L. 5·9	6·0			
	30.	5	476·32	72	L. 5·9	6·0	475·6	7·606	
Island of Sampan-chow, Boca Tigris	31.	5	475·94	69	L. 5·9	6·0			7·608
	30.	6	538·60	73	L. 5·9	4·0			
	30.	6	538·14	76	L. 5·9	5·0	537·8	7·611	
	31.	6	537·81	68	L. 5·9	5·5			
	1841.								
	Feb. 12.	5	475·82	70	L. 5·7	6·0			
	12.	5	475·80	71	L. 5·7	6·0	475·2	7·616	
Island of Hong Kong.	12.	5	476·36	74	L. 5·7	6·0			7·574
	12.	6	541·60	72	L. 5·7	5·0			
	12.	6	541·68	73	L. 5·7	5·5	540·5	7·532	
	12.	6	540·46	73	L. 5·7	6·5			
	20.	5	476·04	64	L. 6·4	6·5			
	20.	5	476·13	74	L. 6·4	5·5	475·6	7·606	
Sampanchow Island.	20.	5	476·44	76	L. 6·4	6·0			7·613
	20.	6	537·40	67	L. 6·4	5·0			
	20.	6	538·12	76	L. 6·4	5·0	537·4	7·621	
	20.	6	538·64	76	L. 6·4	5·5			
	April 9.	5	478·04	84	L. 6·4	6·5			
	9.	5	477·90	83	L. 6·4	6·5	475·7	7·600	
	9.	5	477·48	83	L. 6·4	7·5			
	9.	6	542·38	89	L. 6·4	5·5			
	9.	6	542·70	92	L. 6·4	6·0	538·9		
	9.	6	542·32	86	L. 6·4	5·5			
	9.	7	544·60	85	L. 6·4	2·5			
	9.	7	544·42	86	L. 6·4	3·0	543·5	7·632	
	9.	7	544·03	88	L. 6·4	2·5			
	9.	8	478·16	87	L. 6·4	3·0			
	9.	8	477·92	84	L. 6·4	3·5	477·3		
Macao	9	8	478·44	85	L. 6·4	3·0		......	7·596

TABLE. (Continued.)

Station.	1841.	Needle.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° FAHR.	Horizontal Intensity.	
			s	°	s	°	s		
Macao..........	April 9.	9	442·94	85	L. 6·4	2·5			7·596
	9.	9	442·96	85	L. 6·4	2·5	442·3	7·653	
	9.	9	442·92	82	L. 6·4	3·0			
	9.	11	480·40	83	L. 6·4	3·5			
	9.	11	480·20	83	L. 6·4	3·0	479·5	7·538	
	9.	11	480·36	73	L. 6·4	3·0			
	9.	12	405·88	73	L. 6·4	3·5			
	9.	12	405·36	73	L. 6·4	3·0	405·5	7·606	
	9.	12	406·44	73	L. 6·4	3·5			
	9.	13	400·48	73	L. 6·4	4·0			
	9.	13	400·16	74	L. 6·4	3·5	399·7	7·548	
	9.	13	400·04	74	L. 6·4	3·5			
	12.	5	476·84	73	G. 18·2	6·5			
	12.	5	475·84	71	G. 18·2	7·5	475·2	7·618	
	12.	5	476·10	71	G. 18·2	7·5			
	12.	6	539·20	72	G. 18·2	6·5			
	12.	6	539·13	72	G. 18·2	6·0	538·2		
	12.	6	538·86	73	G. 18·2	6·0			
	19.	7	544·28	79	L. 6·4	2·0			
	20.	7	544·38	81	L. 6·4	3·0	543·8	7·625	
	20.	7	544·40	81	L. 6·4	2·0			
	20.	8	478·68	81	L. 6·4	3·0			
	20.	8	478·06	83	L. 6·4	3·0	477·6		
	20.	8	478·08	83	L. 6·4	2·0			
	21.	9	443·72	80	L. 6·4	3·5			7·595
	21.	9	443·56	83	L. 6·4	4·0	443·0	7·630	
	21.	9	443·88	83	L. 6·4	3·5			
	13.	11	479·58	68	G 18·2	2·0			
	13.	11	478·82	69	G. 18·2	2·0	479·0	7·553	
	13.	11	479·28	70	G. 18·2	2·0			
	13.	12	405·40	70	G. 18·2	2·5			
	13.	12	405·36	71	G. 18·2	2·5	405·3	7·615	
	13.	12	406·26	71	G. 18·2	3·0			
	19.	13	400·80	79	L. 6·4	3·5			
	19.	13	400·68	79	L. 6·4	3·0	400·0	7·540	
	19.	13	400·42	80	L. 6·4	4·0			
Island of Sampan-chow.	May 8.	5	476·74	65	L. 5·4	7·5			
	8.	5	476·60	65	L. 5·4	7·5	476·4	7·581	7·593
	8.	6	539·26	66	L. 5·4	6·5	539·1	7·606	
	8.	6	538·88	66	L. 5·4	7·0			
	August 19.	5	477·56	88	L. 8·1	7·0			
	19.	5	477·48	85	L. 8·1	7·5	474·9	7·630	
	19.	5	476·86	89	L. 8·1	7·5			
	19.	6	543·0	89	L. 8·1	6·5			
	19.	6	543·38	89	L. 8·1	6·5	538·8		
	19.	6	543·28	89	L. 8·1	7·0			
	Sept. 24.	5	477·02	83	L. 8·1	7·0	474·7	7·634	
	24.	5	476·52	85	L. 8·1	7·0			
	24.	6	545·62	85	L. 8·1	6·5			
	24.	6	545·60	85	L. 8·1	6·5	542·6		
	24.	6	544·24	78	L. 8·1	6·5			
	24.	7	543·36	78	L. 8·1	2·5	542·8	7·651	
	24.	7	543·38	78	L. 8·1	2·5			
	25.	8	477·66	83	L. 8·1	3·5	476·6		
	25.	8	477·16	83	L. 8·1	3·5			
	25.	9	443·40	84	L. 8·1	3·5	442·5	7·644	
Macao	25.	9	443·20	85	L. 8·1	3·5			7·634*

TABLE. (Continued.)

Station.	1841.	Needle.	Time of vibration.	Thermo-meter.	Chronometer rate.	Final semi-arc.	Corrected time 75° FAHR.	Horizontal Intensity.	
			s	°	s	°	s		
Macao..........	Sept. 25.	11	476·84	85	L. 8·1	3·0	475·5	7·665	7·634*
	25.	11	476·20	85	L. 8·1	3·5			
	25.	12	405·96	85	L. 8·1	3·0	405·2	7·616	
	25.	12	405·88	85	L. 8·1	3·0			
	25.	13	399·52	84	L. 8·1	4·0	398·4	7·597	
	25.	13	399·26	84	L. 8·1	4·0			
	Nov. 16.	5	475·90	66	G. 20·2	8·0			
	16.	5	476·14	67	G. 20·2	8·0	475·3	7·616	
	16.	5	475·92	67	G. 20·2	7·5			
	16.	6	537·20	67	G. 20·2	7·0	536·8		
	16.	6	536·74	67	G. 20·2	7·0			
	19.	7	547·58	62	G. 19·0	2·5			
	19.	7	547·96	62	G. 19·0	2·5			
	19.	7	548·12	63	G. 19·0	2·5	547·0	7·537	
	20.	7	545·40	70	L. 6·7	2·5			
	19.	8	479·32	63	G. 19·0	3·0			
	19.	8	479·52	64	G. 19·0	3·0	478·6		
	20.	8	477·92	70	L. 6·7	3·0			
	19.	9	445·05	64	G. 19·0	3·5			7·585
	19.	9	444·92	64	G. 19·0	3·5	444·1	7·575	
	20.	9	443·64	70	L. 6·7	3·0			
	19.	11	476·92	64	G. 19·0	3·5			
	19.	11	477·28	64	G. 19·0	3·0	476·5	7·634	
	20.	11	476·02	70	L. 6·7	2·0			
	19.	12	407·36	64	G. 19·0	3·5			
	19.	12	407·40	64	G. 19·0	3·0	406·9	7·611	
	20.	12	406·80	70	L. 6·7	2·5			
	19.	13	400·80	64	G. 19·0	4·0			
	19.	13	400·76	64	G. 19·0	5·0	400·0	7·536	
	20.	13	399·40	70	L. 6·7	3·0			
	Dec. 8.	5	465·52	84	L. 8·2	6·5			
	8.	5	466·00	83	L. 8·2	7·0			
	9.	5	467·65	86	L. 8·2	7·0			
	9.	5	467·62	86	L. 8·2	6·0			
	11.	5	467·92	86	L. 8·2	5·5	465·1	7·951	
	11.	5	467·48	87	L. 8·2	6·0			
	14.	5	467·32	86	L. 8·2	6·5			
Singapore	14.	5	467·80	85	L. 8·2	6·5			7·961

* The 24th and 25th of September were days of great and general magnetic disturbance. If we collect in one view the determinations of the horizontal force at Macao, we find them as follows:—

1841. April 9 .... six needles — 7·596
April 12–19 .... six needles — 7·595
September 24 and 25 six needles — 7·634
November 16–20 .... six needles — 7·585.

The comparison of these results leaves little reason to doubt that the discrepancy on the 24th and 25th of September was occasioned by an irregularity in the horizontal force itself; and we may infer that the derangement, which was felt at all stations at which magnetic observations were made on that day, was characterized at Macao by an increase of the horizontal force at the hours when Sir EDWARD BELCHER's observations were made. These hours appear to have been, late in the afternoon of the 24th, and from 11 A.M. to 3 P.M. on the 25th.

TABLE. (Continued.)

Station.	1841.	Needle.	Time of vibration.	Thermo-meter.	Chronometer rate.	Final semi-arc.	Corrected time, 75° FAHR.	Horizontal Intensity.	
			s	°	s	°	s		
Singapore	Dec. 8.	6	527·94	83	L. 8·2	6·5			7·961
	8.	6	527·10	84	L. 8·2	6·5			
	9.	6	528·72	88	L. 8·2	7·0			
	9.	6	529·08	88	L 8·2	6·0			
	11.	6	532·45	89	L. 8·2	4·5			
	11.	6	533·03	90	L. 8·2	7·0	527·3		
	11.	6	533·12	88	L. 8·2	5·0			
	11.	6	533·22	88	L. 8·2	3·0			
	14.	6	529·34	85	L. 8·2	5·0			
	14.	6	529·72	85	L. 8·2	6·0			
	9.	7	531·72	88	L. 8·2	2·0			
	9.	7	533·03	87	L. 8·2	2·0	531·9	7·970	
	9.	7	533·08	88	L. 8·2	2·0			
	9.	8	466·82	87	L. 8·2	2·5			
	9.	8	467·44	86	L. 8·2	3·5	466·4		
	9.	8	467·48	85	L. 8·2	3·5			
	9.	9	434·08	84	L. 8·2	3·5	433·4	7·971	
	9.	9	434·20	83	L. 8·2	3·5			
	10.	11	468·08	81	L. 8·2	2·5			
	10.	11	468·14	82	L. 8·2	2·5	467·3	7·973	
	10.	11	467·90	82	L. 8·2	2·5			
	10.	12	398·36	87	L. 8·2	3·0			
	10.	12	398·22	88	L. 8·2	2·5	397·5	7·973	
	10.	12	398·04	88	L. 8·2	2·5			
	10.	13	390·84	88	L. 8·2	3·0			
	10.	13	390·82	88	L. 8·2	3·0	390·0	7·931	
	10.	13	391·20	88	L. 8·2	3·0			
	20.	5	467·44	82	L. 8·2	7·5			
	20.	5	467·30	82	L. 8·2	7·5	465·5	7·939	
	20.	5	467·58	82	L. 8·2	7·5			
Malacca........	20.	6	529·76	81	L. 8·2	7·0			7·939
	20.	6	529·92	80	L. 8·2	7·0	527·7	7·939	
	20.	6	529·88	80	L. 8·2	6·5			
	30.	5	466·24	81	L. 8·0	8·0			
	30.	5	466·12	81	L. 8·0	8·0	464·4	7·977	
	30.	5	466·52	82	I. 8·0	7·5			
	30.	6	528·76	83	L. 8·0	6·0			
	30.	6	528·92	85	L. 8·0	6·0	526·0		
	30.	6	529·04	87	L. 8·0	6·5			
	31.	7	532·05	89	L. 8·0	2·5	531·3	7·988	
	31.	7	532·08	90	L. 8·0	2·0			
	31.	8	467·04	90	L. 8·0	3·0	466·3		
Penang	31.	8	467·52	89	L. 8·0	3·0			7·982
	31.	9	433·16	89	L. 8·0	3·0	432·5	8·003	
	31.	9	433·58	89	L. 8·0	3·5			
	30.	11	468·24	90	L. 8·0	2·5	467·0	7·985	
	30.	11	467·84	90	L. 8·0	2·0			
	31.	12	398·32	89	L. 8·0	3·0			
	31.	12	397·60	89	L. 8·0	3·0	397·2	7·985	
	31.	12	398·14	89	L. 8·0	3·0			
	31.	13	390·24	89	L. 8·0	3·0			
	31.	13	390·54	90	L. 8·0	2·5	389·4	7·955	
	31.	13	390·32	90	L. 8·0	3·0			
	1842.								
Island of Malora,	Jan. 10.	5	470·04	89	L. 8·0	5·0			
N.W. coast of	10.	5	469·28	85	L. 8·0	6·5	467·7	7·866	
Sumatra.	13.	5	470·00	83	L. 8·0	7·5			7·863

TABLE. (Continued.)

Station.	1842.	Needle.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° FAHR.	Horizontal Intensity.	
			s	°	s	°	s		
Island of Malora,	January 13.	6	532·56	86	L. 8·0	5·5	529·7	7·871	7·863
N.W. coast of	13.	6	532·76	85	L. 8·0	6·0			
Sumatra.	13.	6	532·82	83	L. 8·0	6·5			
	13.	6	531·68	81	L. 8·0	6·0			
	13.	11	469·96	81	L. 8·0	2·0	469·2	7·873	
	14.	11	469·60	80	L. 8·0	2·0			
	14.	12	400·20	82	L. 8·0	2·0	400·2	7·869	
	14.	12	401·20	85	L. 8·0	3·0			
	14.	13	393·25	87	L. 8·0	3·0	392·4	7·834	
	14.	13	393·32	86	L. 8·0	3·5			
	11.	5	470·72	83	L. 8·0	7·0			
	11.	5	470·44	83	L. 8·0	7·0	468·5	7·837	
Acheen Island,	11.	5	470·32	84	L. 8·0	7·5			
North coast of	12.	6	532·98	76	L. 8·0	6·0			7·828
Sumatra.	12.	6	532·96	76	L. 8·0	6·0			
	12.	6	533·00	76	L. 8·0	6·5	531·5	7·819	
	12.	6	532·88	79	L. 8·0	6·5			
	24.	5	472·80	79	L. 8·0	7·5			
	24.	5	472·60	80	L. 8·0	7·5	471·1	7·753	
	24.	5	472·94	81	L. 8·0	7·5			
	24.	6	536·04	83	L. 8·0	7·0			
	24.	6	535·92	84	L. 8·0	6·5	533·1		
	24.	6	536·00	83	L. 8·0	7·0			
	24.	6	535·44	82	L. 8·0	7·0			
	24.	7	540·96	82	L. 8·0	2·5			
	24.	7	540·56	82	L. 8·0	2·0	540·2	7·727	
	24.	7	540·80	82	L. 8·0	2·0			
	24.	8	473·52	82	L. 8·0	3·0	473·0		
Point de Galle,	24.	8	473·96	82	L. 8·0	3·5			
Ceylon.	25.	9	439·80	79	L. 7·8	4·0			7·756
	25.	9	439·60	83	L. 7·8	3·5	439·0	7·768	
	25.	9	439·91	83	L. 7·8	3·5			
	25.	11	474·20	90	L. 7·8	2·0			
	25.	11	474·12	91	L. 7·8	2·0	473·0	7·783	
	25.	11	473·90	91	L. 7·8	2·0			
	25.	12	404·04	93	L. 7·8	2·5			
	25.	12	403·98	93	L. 7·8	2·5	403·1	7·753	
	25.	12	403·92	90	L. 7·8	3·0			
	25.	13	395·52	88	L. 7·8	3·5	394·4	7·753	
	25.	13	395·30	88	L. 7·8	3·0			
	Feb. 21.	5	511·04	79	L. 7·3	7·0			
	21.	5	511·00	80	L. 7·3	7·0	509·1	6·636	
	21.	5	511·16	80	L. 7·3	7·0			
	21.	6	579·44	83	L. 7·3	6·0			
	21.	6	579·36	83	L. 7·3	6·0	576·8		
	21.	6	579·60	83	L. 7·3	6·0			
	21.	7	584·12	84	L. 7·3	1·5			
	21.	7	584·12	84	L. 7·3	2·0	583·4	6·623	
	21.	7	583·98	83	L. 7·3	2·0			
	21.	8	512·44	84	L. 7·3	2·0			
	21.	8	512·12	84	L. 7·3	2·5	511·5		
	21.	8	512·20	84	L. 7·3	3·0			
	22.	9	476·08	80	L. 7·3	3·0			
	22.	9	476·32	81	L. 7·3	3·0	475·6	6·647	
	22.	9	476·24	81	L. 7·3	3·0			
	21.	11	511·88	83	L. 7·3	2·0			
St. Anne's Island,	21.	11	512·26	83	L. 7·3	2·0	511·5	6·655	
Seychelles.	21.	11	512·64	82	L. 7·3	2·0			6·632

TABLE. (Continued.)

Station.	1842.	Needle.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° FAHR.	Horizontal Intensity.	
			s	°	s	°	s		
St. Anne's Island, Seychelles.	Feb. 21.	12	436·72	82	L. 7·3	2·0			6·632
	21.	12	437·00	83	L. 7·3	3·0	436·3	6·633	
	21.	12	437·04	82	L. 7·3	3·0			
	21.	13	428·40	83	L. 7·3	3·0			
	21.	13	428·36	82	L. 7·3	3·0	427·5	6·601	
	21.	13	428·12	83	L. 7·3	3·5			
Sandy Point, Majambo Bay, Madagascar.	March 14.	5	571·52	87	L. 8·4	5·5			
	14.	5	571·28	89	L. 8·4	5·0	568·6	5·500	
	14.	5	571·66	90	L. 8·4	5·0			
	15.	5	570·60	90	G. 8·4	4·5			
	14.	6	641·16	82	L. 8·4	4·0			
	14.	6	640·39	82	L. 8·4	5·0	637·9		
	14.	6	643·29	93	L. 8·4	4·5			
	15.	6	640·96	91	G. 8·4	4·5			
	14.	7	650·36	92	L. 8·4	1·0			
	14.	7	650·56	90	L. 8·4	1·0	650·1	5·480	
	14.	7	651·64	91	L. 8·4	1·0			
	14.	8	564·12	91	L. 8·4	2·0			
	14.	8	564·40	90	L. 8·4	2·0	563·3		5·496
	14.	8	564·28	90	L. 8·4	1·5			
	14.	9	522·88	85	L. 8·4	2·5	522·4	5·509	
	14.	9	523·32	84	L. 8·4	2·8			
	15.	11	562·92	84	L. 8·4	1·6			
	15.	11	563·34	88	L. 8·4	1·5	562·1	5·511	
	15.	11	562·80	89	L. 8·4	1·0			
	15.	12	479·84	89	L. 8·4	2·0			
	15.	12	479·96	92	L. 8·4	1·0	479·4	5·496	
	15.	12	480·40	89	L. 8·4	1·5			
	15.	13	470·60	95	L. 8·4	1·5			
	15.	13	470·56	98	L. 8·4	2·0	469·1	5·480	
	15.	13	470·20	93	L. 8·4	2·0			
Magnetic Observatory, Cape of Good Hope.	April 18.	5	627·20	88	G. 11·6	5·5			
	18.	5	627·36	88	G. 11·6	5·5	624·3	4·561	
	18.	5	627·26	84	G. 11·6	5·5			
	18.	6	704·08	82	G. 11·6	5·0			
	18.	6	703·66	81	G. 11·6	5·0	700·9		
	19.	6	702·68	76	G. 11·6	5·5			
	19.	7	712·90	85	G. 11·6	1·5			
	19.	7	712·78	84	G. 11·6	1·5	712·0	4·569	
	19.	7	713·20	83	G. 11·6	2·0			
	19.	8	618·78	84	G. 11·6	2·0			
	19.	8	617·50	79	G. 11·6	2·0	617·4		4·569
	20.	8	618·42	76	G. 11·6	2·5			
	20.	9	573·80	74	G. 11·6	2·0			
	20.	9	574·00	65	G. 11·6	2·5	573·4	4·572	
	20.	9	573·64	67	G. 11·6	3·0			
	19.	11	616·94	84	G. 11·6	1·5	616·3	4·587	
	19.	11	617·36	85	G. 11·6	2·0			
	19.	12	526·60	87	G. 11·6	2·5	525·9	4·566	
	19.	12	527·12	86	G. 11·6	2·0			
	19.	13	515·80	86	G. 11·6	2·5	514·3	4·561	
	19.	13	514·98	86	G. 11·6	2·0			
Simon's Bay	22.	5	624·20	71	G. 11·6	4·5	623·6	4·571	
	22.	5	623·88	67	G. 11·6	5·0			4·571
	22.	6	700·76	72	G. 11·6	4·0	699·4	4·571	
	22.	6	699·14	72	G. 11·6	5·0			

TABLE. (Continued.)

Station.	1842.	Needle.	Time of vibration.	Thermo-meter.	Chronometer rate.	Final semi-arc.	Corrected time, 75° FAHR.	Horizontal Intensity.	
			s	°	s	°	s		
Sisters' Walk (Station of Captain Ross), Saint Helena.	May 9.	5	553·50	76	G. 11·4	6·0	552·2	5·831	
	9.	5	554·16	78	G. 11·4	7·0			5·827
	9.	6	621·32	79	G. 11·4	5·0	619·6	5·824	
	9.	6	622·16	79	G. 11·4	5·5			
Sandy Beach, Ascension.	17.	5	527·48	87	G. 10·4	5·5			
	17.	5	527·60	90	G. 10·4	5·5	524·8	6·456	
	17.	5	527·68	92	G. 10·4	5·5			
	17.	6	592·44	95	G. 10·4	5·0			
	17.	6	591·32	90	G. 10·4	5·5	587·2		
	17.	6	591·08	91	G. 10·4	5·0			
	17.	7	599·44	88	G. 10·4	1·5			
	17.	7	600·50	89	G. 10·4	1·0	599·3	6·480	
	17.	7	600·04	76	G. 10·4	2·0			
	17.	8	520·80	77	G. 10·4	2·5			
	17.	8	520·56	77	G. 10·4	3·0	520·0		
	17.	8	520·76	77	G. 10·4	3·0			6·457
	17.	9	482·28	78	G. 10·4	3·0			
	17.	9	482·56	78	G. 10·4	3·0	481·7	6·480	
	17.	9	482·36	78	G. 10·4	3·5			
	18.	11	521·04	84	G. 10·4	2·0			
	18.	11	520·64	85	G. 10·4	2·0	519·8	6·444	
	18.	11	520·68	87	G. 10·4	1·5			
	18.	12	444·20	89	G. 10·4	2·5			
	18.	12	443·72	92	G. 10·4	2·5	443·0	6·463	
	18.	12	444·12	95	G. 10·4	2·0			
	18.	13	435·04	96	G. 10·4	2·5			
	18.	13	435·04	96	G. 10·4	2·5	433·5	6·417	
	18.	13	434·78	96	G. 10·4	2·5			
Royal Military Repository, Woolwich.	October 12.	5	689·48	57	G. 0·3	3·0			
	12.	5	688·77	56	G. 0·3	3·0			
	12.	5	688·60	57	G. 0·3	3·5			
	Dec. 27.	5	689·88	59	G. 5·6	4·5	691·3		
	27.	5	688·84	59	G. 5·6	5·0			
	27.	5	690·20	60	G. 5·6	5·0			
	28.	5	688·52	28	G. 5·6	3·5			
	October 12.	6	774·36	58	G. 0·3	2·5			
	12.	6	773·48	55	G. 0·3	2·5			
	12.	6	773·94	55	G. 0·3	3·0			
	Dec. 27.	6	775·40	60	G. 5·6	3·0	778·1		
	27.	6	775·84	61	G. 5·6	3·5			
	27.	6	775·68	61	G. 5·6	4·0			
	28.	6	768·00	30	G. 5·6	3·0			
	October 13.	7	789·68	61	G. 0·3	1·0			
	13.	7	790·12	61	G. 0·3	0·5			
	13.	7	790·00	61	G. 0·3	1·0	789·1		
	Dec. 28.	7	786·98	59	G. 5·6	1·0			
	28.	7	787·52	60	G. 5·6	1·0			
	Oct. 13.	8	684·32	61	G. 0·3	0·5			
	13.	8	684·60	60	G. 0·3	0·5			
	13.	8	684·02	61	G. 0·3	0·5			
	Dec. 28.	8	684·50	32	G. 5·6	1·0	686·1		
	28.	8	687·24	59	G. 5·6	1·0			
	28.	8	687·78	59	G. 5·6	1·5			
	Oct. 13.	9	634·28	59	G. 0·3	1·0			
	13.	9	634·12	58	G. 0·3	1·0			
	13.	9	634·24	58	G. 0·3	1·0			
	Dec. 28.	9	634·08	33	G. 5·6	1·0	635·7		
	28.	9	637·28	55	G. 5·6	1·5			
	28.	9	637·02	58	G. 5·6	2·0			3·720

Table. (Continued.)

Station.	1842.	Needle.	Time of vibration.	Thermometer.	Chronometer rate.	Final semi-arc.	Corrected time, 75° Fahr.	Horizontal Intensity.
			s	°	s	°	s	
Royal Military Repository, Woolwich.	Oct. 12.	11	674·20	53	G. 0·3	1·0	674·9	3·720
	13.	11	673·52	58	G. 0·3	0·5		
	13.	11	673·50	57	G. 0·3	0·5		
	Dec. 27.	11	686·64	59	G. 5·6	1·5	686·4	
	27.	11	686·00	59	G. 5·6	1·5		
	28.	11	682·08	28	G. 5·6	0·5		
	Oct. 13.	12	583·32	58	G. 0·3	0·5	584·0	
	13.	12	584·04	59	G. 0·3	0·5		
	13.	12	583·68	61	G. 0·3	0·5		
	Dec. 27.	12	582·36	59	G. 5·6	1·5		
	27.	12	582·84	60	G. 5·6	2·0		
	28.	12	584·14	28	G. 5·6	1·0		
	Oct. 13.	13	568·80	61	G. 0·3	0·5	569·4	
	13.	13	569·00	61	G. 0·3	0·5		
	13.	13	569·52	61	G. 0·3	1·0		
	Dec. 28.	13	566·32	41	G. 5·6	2·5		
	28.	13	566·98	42	G. 5·6	2·0		
	28.	13	568·20	30	G. 5·6	1·0		
	1843.							
Falmouth	Feb.	11	682·74	39	G. 3·3	1·5	684·8	
		11	682·54	39	G. 3·3	1·5		

Table II.

Observations of the Inclination.

Station.	Date.	Poles. Direct.	Poles. Reversed.	Inclination.		Remarks.
	1840.	° ′	° ′	° ′	° ′	
Rarotonga Island	May 14.	−35 30·0	−36 47·0		−36 08·5	
Vavao Island	22.	−34 30·5	−35 46·9	−35 08·7	−35 06·9	
	22.	−34 27·5	−35 42·7	−35 05·1		
Nukulau Island	30.	−35 27·8	−36 49·0	−36 08·8	−36 09·2	
	30.	−35 31·7	−36 46·1	−36 08·9		
	30.	−35 30·9	−36 47·8	−36 09·8		
Banga Island	June 15.	−35 51·5	−37 08·2		−36 29·9	
Tanna Island	22.	−39 22·9	−40 23·3		−39 53·1	
Port Carteret, New Ireland	July 7.	−20 13·5	−21 19·5	−20 46·5	−20 49·2	
	7.	−20 08·5	−21 35·4	−20 51·9		
Britannia Island.	27.	−21 26·5	−22 37·1		−22 01·8	
Jobie Island	August 8.	−17 30·0	−17 32·0	−17 31·0	−17 28·4	
	8.	−17 25·5	−17 35·7	−17 30·6		
	14.	−17 19·8	−17 36·7	−17 28·2		
	14.	−17 06·5	−17 40·9	−17 23·7		
Shell Rock, Jobie Island ..	14.	−18 04·0	−18 27·7		−18 15·8	
Amsterdam Island........	24.	−14 51·7	−15 26·6		−15 09·1	
Bouro Island	31.	−20 07·1	−20 39·8	−20 23·4	−20 23·4	
	Sept. 1.	−18 36·4	−21 58·8	−20 17·6		
	1.	−20 03·0	−20 55·1	−20 29·1		
Amboyna Island	1.	−20 32·6	−21 22·1	−20 57·4	−21 09·8	
	1.	−20 45·7	−22 29·1	−21 37·4		
	1.	−19 24·4	−22 39·4	−21 01·9		
	1.	−19 09·1	−22 56·5	−21 02·6		

TABLE. (Continued.)

Station.	Date.	Poles. Direct.	Poles. Reversed.	Inclination.	Inclination.	Remarks.
	1840.	° ′	° ′	° ′	° ′	
Macassar Island	Sept. 26.	−23 18·4	−23 36·9	−23 27·6	−23 42·2	
	26.	−23 45·4	−23 54·7	−23 50·0		
	26.	−23 36·9	−24 03·2	−23 50·0		
	26.	−23 29·4	−23 51·9	−23 41·2		
Solombo Island	Oct. 4.	−21 21·8	−27 08·7	−24 15·2	−24 16·1	
	4.	−21 25·2	−27 08·7	−24 17·0		
Pulo Kumpal, Borneo	7.	−16 21·9	−23 00·6	−19 41·2	−19 48·8	
	7.	−16 11·9	−22 58·2	−19 35·0		
	7.	−17 17·5	−22 40·7	−19 59·1		
	7.	−17 21·0	−22 39·0	−20 00·0		
Singapore*	18.	− 8 47·5	−15 49·3		−12 18·4	
Manila	Dec. 1.	23 11·6	9 43·3		16 27·5	
Sampanchow Island	30.	34 07·1	26 20·6	30 13·9	30 25·8	
	30.	35 36·0	25 39·4	30 37·7		
	1841.					
Hong Kong Island	Feb. 12.	34 50·4	25 15·0		30 02·7	
Macao	April 9.	34 44·0	25 17·6		30 00·8	
Singapore	Dec. 7.	−11 42·8	−12 40·6	−12 11·7	−12 01·4	
	7.	−11 44·1	−12 10·5	−11 57·3		
	7.	−11 38·0	−12 17·2	−11 57·6		
	8.	−11 01·1	−12 43·5	−11 52·3		
	8.	− 9 22·2	−14 54·0	−12 08·1		
Malacca	20.	− 7 49·5	−14 14·2		−11 01·9	
Penang	30.	− 1 25·7	− 7 39·7	− 4 32·7	− 4 40·4	
	30.	− 1 25·5	− 8 10·9	− 4 48·2		
	1842.					
Malora Island	Jan. 10.	− 2 07·2	− 8 47·6	− 5 27·4	− 5 29·3	
	10.	− 2 15·4	− 8 47·0	− 5 31·2		
Acheen Island	11.	− 2 48·3	− 9 08·7		− 5 58·5	
Point de Galle	24.	− 4 45·7	−11 30·7	− 8 08·2	− 8 07·0	
	24.	− 4 40·5	−11 33·0	− 8 06·7		
Seychelles	Feb. 21.	−29 17·6	−34 41·6	−31 59·6	−32 02·9	
	21.	−29 13·5	−34 56·6	−32 05·0		
	21.	−29 08·1	−35 00·4	−32 04·2		
Majambo Bay	March 10.	−44 52·3	−51 15·7	−48 04·0	−48 18·9	
	10.	−45 43·5	−51 42·0	−48 42·7		
	10.	−45 27·0	−50 52·9	−48 09·9		
Cape of Good Hope	April 18.	−50 40·8	−56 41·0	−53 41·0	−53 20·0	
	18.	−50 50·2	−55 07·9	−52 59·1		
Simon's Bay	22.	−50 43·1	−55 19·9	−53 01·5	−53 04·0	
	22.	−50 46·0	−55 27·0	−53 06·5		
St. Helena	May 9.	−11 55·7	−22 06·4		−17 01·0	

* "At Singapore, in October 1840, a cat got into the room where the dip instrument was placed and threw it down, breaking the axle of the needle and the levelling screws of the dip circle. A new axle was fitted by a watchmaker, with which the observations were made at Manila and in the Canton River; and on my return to Singapore, in December 1841, I had the satisfaction to find that the results obtained with the needle were in accordance with those of the magnetic observatory at this island."—*Extract from Sir Edward Belcher's Memoranda.*

Table III.

General Table of Captain Sir Edward Belcher's Magnetic Determinations. The longitudes in this Table are east of Greenwich; the declinations west when positive, east when negative; the values of the horizontal intensity are expressed in the scale of absolute measure, in which the horizontal intensity at Woolwich is 3·72; and the total intensities in the usual arbitrary scale, in which the total intensity at Woolwich (as in London) is 1·372.

Station.	Date.	Latitude.	Longitude.	Declination.	Inclination.	Intensity.		Remarks.
						Horizontal.	Total.	
		° ′	° ′	° ′	° ′			
Port Etches	1837.	+60 21	213 19	−31 38	+76 02·9	3·15	1·728	
Kodiack	1839.	+57 20	207 09	−26 43	+72 42·9	3·635	1·617	
Sitka	1837.	+57 03	224 34	−27 42	+75 51·5			
Sitka	1839.	+57 03	224 38	−29 32	+75 49·1	3·207	1·730	
Baker's Bay	1839.	+46 17	235 58	−19 11	+69 26·9	4·394	1·654	
Fort Vancouver	1839.	+45 37	237 24	−19 22	+69 22·2	4·475	1·682	
Port Bodega	1839.	+38 18	236 58	−15 20	+62 53·4	5·440	1·577	
San Francisco	1837.	+37 48	237 37	−15 20	+61 53·8			
San Francisco	1839.	+37 48	237 37	−15 20	+62 05·8	5·524	1·560	
Monterey	1839.	+36 36	238 07	−14 13	+61 03·6	5·666	1·547	
Sta Barbara	1839.	+34 24	240 19	−13 28	+58 54·1	5·925	1·516	
San Pedro	1839.	+33 43	241 45	−13 08	+58 21·4	5·913	1·490	
San Diego	1839.	+32 41	242 47	−12 21	+57 06·1	6·142	1·495	
San Quentin	1839.	+30 22	244 02	−12 06	+54 29·9	6·468	1·472	
San Bartholomew	1839.	+27 40	245 07	−10 46	+51 41·0	6·780	1·445	
Magdalena Bay	1839.	+24 38	247 53	− 9 15	+46 34·0	7·160	1·376	
Mazatlan	1839.	+23 11	253 36	− 9 24	+46 38·5	7·214	1·388	
San Lucas Bay	1839.	+22 52	250 07	− 8 38	+45 39·3	7·259	1·372	
San Blas	1837.	+21 32	254 44	− 8 34	+45 24·3	....	......	Palm Island Beach.
San Blas	1839.	+21 32	254 44	− 9 00	+44 32·5	7·421	1·376	
Oahu Island	1837.	+21 17	202 00	−10 39	+41 35·1			
Oahu Island	1839.	+21 17	202 00	....	+41 16·8	6·506	1·144	
Socorro Island	1839.	+18 43	249 06	− 6 56	+40 43·7	7·477	1·325	
Clarion Island	1839.	+18 21	245 19	− 8 05	+37 03·0	7·597	1·238	
Acapulco	1838.	+16 50	260 05	− 8 13	+37 57·4	7·91	1·326	
Realejo	1838.	+12 28	272 52	− 7 53	+34 36·9			
Panama	1837.	+ 8 57	280 31	− 7 02	+31 51·9	7·743	1·205	
Magnetic Island	1837.	+ 8 04	278 15	− 7 37	+31 11·9			
Sampanchow Island	1841.	+22 43	113 40	− 0 22	+30 25·8	7·605	1·166	
Hong Kong	1841.	+22 16	114 08	− 0 37	+30 02·7	7·574	1·156	
Macao	1841.	+22 11	113 30	− 0 35	+30 00·8	7·592	1·159	
Cocos Island	1838.	+ 5 34	272 58	− 8 24	+23 33·2			
Cocos Island	1839.	+ 5 34	272 58	....	+22 55·7	7·924	1·137	
Manila	1840.	+14 36	120 58	− 0 18	+16 27·5	7·869	1·084	
Puna Island	1838.	− 2 47	280 05	− 8 56	+ 9 0·8	7·74	1·036	
Ascension	1842.	− 7 56	345 36	+19 16	....	6·457	0·853	
Penang	1841.	+ 5 25	100 19	− 1 30	− 4 40·4	7·982	1·058	
Malora Island	1842.	+ 5 41	95 24	− 2 22	− 5 29·3	7·863	1·041	
Acheen Island	1842.	+ 5 36	95 20	− 2 22	− 5 58·5	7·828	1·040	
Callao	1838.	−12 04	282 52	−10 44	− 6 14·3	7·37	0·980	
Pt de Galle	1842.	+ 6 02	80 15	− 0 41	− 8 07·0	7·756	1·035	
Malacca	1841.	+ 2 10	102 15	− 1 36	−11 01·9	7·939	1·069	
Singapore	1841.	+ 1 17	103 51	− 1 39	−12 01·4	7·950	1·074	
Martins Island	1840.	− 8 56	220 20	− 6 16	−14 06·0	7·594	1·024	
Amsterdam Island	1840.	− 0 20	132 08	− 1 24	−15 09·1	8·012	1·097	
St. Helena	1842.	−15 55	354 17	+22 11	−17 01·0	5·827	0·805	

TABLE. (Continued.)

Station.	Date.	Latitude.	Longitude.	Declination.	Inclination.	Intensity. Horizontal.	Intensity. Total.	Remarks.
		° ′	° ′	° ′	° ′			
Jobie Island	1840.	− 1 50	136 41	− 4 09	−17 28·4	8·056	1·116	
Shell Rock........	1840.	− 1 57	136 21	− 3 00	−18 15·8	8·066	1·123	
Pulo Kumpal......	1840.	− 2 44	110 07	− 0 39	−19 48·8	8·038	1·128	
Bouro Island	1840.	− 3 23	127 06	− 1 06	−20 23·4	8·093	1·141	
New Ireland	1840.	− 4 41	152 44	− 7 13	−20 49·2	8·039	1·136	
Amboyna Island ..	1840.	− 3 42	128 10	− 1 14	−21 09·8	8·144	1·154	
Britannia Island ..	1840.	− 3 19	143 29	− 4 55	−22 01·8	7·832	1·116	
Macassar Island....	1840.	− 5 08	119 23	− 0 29	−23 42·2	8·029	1·159	
Solombo Island....	1840.	− 5 35	114 23	− 1 24	−24 16·1	8·003	1·160	
Bow Island........	1840.	−18 05	219 07	− 6 34	−30 16·0	7·425	1·123	
Tahiti	1840.	−17 29	210 30	− 6 30	−30 17·7	7·491	1·146	
Seychelles	1842.	− 4 36	55 31	+ 2 01	−32 02·9	6·632	1·034	
Vavao Island......	1840.	−18 39	186 00	− 9 34	−35 06·9	7·706	1·245	
Rarotonga Island ..	1840.	−21 12	200 14	− 8 34	−36 08·5	7·315	1·197	
Nukulau Island	1840.	−18 10	178 31	−10 25	−36 09·2	7·708	1·262	
Banga Island......	1840.	−18 20	178 10	−10 21	−36 29·9	7·718	1·269	
Tanna Island......	1840.	−19 32	169 29	−11 37	−39 53·1	7·790	1·342	
Majambo Bay	1842.	−15 14	47 00	+12 10	−48 18·9	5·496	1·092	
Simon's Bay	1842.	−34 12	18 26	+29 08	−53 04·3	4·571	1·005	
Cape of Good Hope	1842.	−33 56	18 29	+29 13	−53 20	4·569	1·011	

Memorandum of the particular spot of observation at Sir EDWARD BELCHER'S Magnetic Stations.

Port Etches. On the slate beach abreast of the anchorage.

Kodiack. On the slate beach, in sight of Cape Greville.

Sitka. In 1837, in the Governor's house on the hill. In 1839, in the summer-house of the Governor's private dwelling.

Baker's Bay. At the landing-place.

Fort Vancouver. One set in a room in the fort, no iron being visible: one set in the garden of the fort.

Port Bodega. On a fine slaty beach, near the stream.

San Francisco. At Yerba Buena.

Monterey. At the back of the house at the landing-place, being the spot where Mr. DAVID DOUGLAS made his observations.

Santa Barbara. On the sand at the landing-place.

San Pedro. On a small island.

San Diego. On the tongue on the eastern side; a sandy flat.

San Quentin. On the sandy beach.

San Bartholomew. On observation bluff.

Magdalena Bay. At the observatory station.

Mazatlan. In a house belonging to Messrs. HAYN, KEYSER, and Co.

Cape San Lucas. In the sandy bay: the surrounding rocks of large-grained granite.

San Blas. In 1837, on Palm Island; objectionable, the rocks being volcanic. In

1839, on the beach at the arsenal, in a line between the Custom-house and the outer rocky point: the sand is about twenty feet deep.

Oahu. In 1837, in a room used as an office by Mr. J. Coffin Jones. In 1838, in a house belonging to Mrs. Holmes; both well-known places.

Socorro Island. On the cliff.

Clarion Island. On the sandy bank above the beach.

Acapulco. Near Fort San Carlos, outside the gate.

Realejo. On the N.W. high cliff of Cardon Island; rocks basaltic.

Panama. Near the ruins of the convent of San Francisco.

Magnetic Island. A small islet.

Sampanchow Island. Near Chuenpee, on a beach composed of coarse quartz sand.

Hong Kong. Near the harbour, on granite rocks.

Macao. In the garden of the house belonging to Messrs. Leslie and Dent.

Cocos Island. At the landing-place. The observations in 1838 were made under unfavourable circumstances.

Manila. Two positions; one at the house of Mr. Strachan, which did not afford very satisfactory results: the second on the mole head; an entire failure, owing probably to iron clamps used to bind the masonry.

Puna Island. On various points of the island.

Ascension Island. On the N.W. sandy beach.

Penang. In the garden of the Admiralty-house.

Malora Island. Called Bouro Island by the natives: it is volcanic.

Acheen Island. On the sandy point about 100 yards north of the flag-staff.

Callao. On the Plaza de los Muertos.

Point de Galle. On Utrecht bastion, behind the magazine.

Malacca. Near the small saluting battery.

Singapore. In 1840, under a covered landing in front of the Recorder's house, being the position of the French expedition, the Astrolabe and Zélée. In 1841, at the Magnetic Observatory.

Martin's Island. In the sandy bay S.E. of Pilot's Hill.

Amsterdam Island. A coral islet; on the sand, at the landing-place.

Saint Helena. Position of the Erebus and Terror at Sisters' Walk.

Jobie Island. On a limestone islet, one mile from the main island.

Shell Rock. Volcanic rock; on a sandy tongue projecting from it.

Pulo Kumpal. At the landing-place on Rendezvous Island, clay-slate.

Bouro Island. Beach in front of the battery.

Port Carteret. The sandy landing-place on Cocoa-nut Island.

Amboyna. On the S.W. outer curtain; position changed three times.

Britannia Island. On coral sand at the landing-place, Victoria Bay.

Macassar Island. Position pointed out as that of the French expedition, the Astrolabe and Zélée.

Solombo Island. At the landing-place.

Bow Island. At five positions on the island.

Tahiti. The observations at Papeete were made in the yard of the house belonging to the queen's aunt. The partial results were exceedingly discordant. The house is on the beach. Those at Point Venus were made at the spot usually selected, viz. just clear of the extreme trees; spot marked by a stone sunk for the purpose. The United States' expedition observed about 100 yards more towards the trees near the canoe sheds.

Seychelles. Island of St. Mary, on a bluff head on the western side facing the town. Rocks granite.

Vavao Island. In the king's garden.

Rarotonga Island. At the landing-place, a coarse gravel flat composed of basaltic pebbles.

Nukulau Island. On the Coral Island.

Banga Island. On a coral islet at the extremity of the eastern reef.

Tanna Island. In front of the Missionary-house, at the west landing-place.

Majambo Bay. Sandy bay three miles south of Captain Owen's "north point."

Simon's Bay. Position of the Erebus and Terror.

Cape of Good Hope. Magnetic Observatory.