An Account of the Trigonometrical Operations in crossing the Peninsula of India, and connecting Fort St. George with Mangalore.

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Communicated by the Honorable William Petrie, Esq. *Governor of* Fort St. George.

GENERAL ACCOUNT.

IN the year 1801 I had the honor of communicating to the Asiatic Society my intention of extending a geographical survey across the peninsula of *India*, with a view to ascertain certain positions on the *Coromandel* and *Malabar* coasts, and to fix the latitudes and longitudes of all the principal places, in the interior country, within the extent of the operations for connecting the two seas. My labours commenced in the *Carnatic*, in 1803, in measuring a small arc on the meridian and on its perpendicular, an account of which has been published in the 8th Vol. of the Asiatic Researches. The triangles, from which those arcs were deduced, constitute a part of the general survey under my superintendance, now extended from sea to sea, taking in upwards of two degrees of latitude. A series of principal triangles has also been carried down in a meridional direction, from which has been deduced an arc of three degrees and upwards in amplitude, giving the length of the degree, on the meridian, in lat. 11° 59′ 55″, equal 60494 fathoms, and that from a great number of observations of different fixed stars. As I expect that the detailed par-

ticulars of that arc will appear before the public in another place, it will be sufficient barely to mention it here, as being the scale from which the latitudes of places are computed.*

A full account of this survey being intended for a separate publication at some future period, when more materials will be collected, I have chosen for the subject of the present paper, that part of it which I think will be the most interesting; viz. the triangular operations in connecting the two seas, and the method by which the difference of longitude has been determined in my progress from east to west: and that it may be better adapted to the general reader, who, perhaps, may have neither time nor inclination to enter into minute detail, I shall previously state, in a concise form, the manner in which these extensive operations have been carried over the great mountains, forming the eastern and western

* It may not be amiss to mention here, that some little irregularity had occurred at some of the stations of observation, occasioned no doubt by the plumb-line's being drawn out of its vertical position; but it is impossible to say at which of the stations this has happened, as at the three where the zenith distances were deemed the most unexceptionable, there is nothing, to appearance, which can be considered competent to produce the effect in question. One of these three is in the ceded districts, in latitude 14° and upwards. Another one is on the table land, near *Bangalore*, in lat. 13°, and the most southerly one is in the *Coimbetoor* country, in lat. 11°. The arc, comprised between the stations in 11° and 13°, gives the measure of the degree 60530 fathoms; and that, comprehended between 11° and 14°, gives only 60461 fathoms; so that there evidently has existed some cause, for deflecting the plumb-line, at one or both of these northern stations. I have, for the present, taken the mean result of the two cases, reducing them to the same latitude, 11° 59′ 55″, which is 60494 fathoms. This measure, used with all the recent measurements made in *England*, *France*, and at the polar circle, will give the mean ellipticity of the earth $\frac{1}{321}$ nearly, and therefore the polar, to the equatorial diameter, will be in the ratio of 1 to 1.003125 nearly.

ghauts, and through the whole extent from *Fort St. George* to *Mangalore*, being a distance of three hundred and sixty two miles and upwards, on the parallel of the mean latitude between these two places.

In the triangles of 1803, a great distance was determined between *Carangooly* and *Carnatighur*, at which stations pole-star observations were made for determining the difference of longitude of those two places, and it was then thought probable that others might be found in succession, nearly west from *Carnatighur*, so as to afford great distances for connecting the meridian lines; but it was afterwards discovered that *Kylasghur* was preferable, and it was accordingly chosen for continuing those distances to the westward, *that* between *Carangooly* and *Carnatighur*, as already determined in 1803, remaining the first.

Kylasghur was laid down from the side *Carnatighur* and *Hanandamulla*, being given in the 39th triangle, and the side *Hanandamulla* and *Poonauk* of the 21st triangle, was the base for finding the distance of *Poonauk* from *Pilloor* hill. From this last, and from the side *Kylasghur* and *Hanandamulla*, each as a base, the side *Kylasghur* and *Pilloor* hill has been obtained as a mean of the two results. From this, as a base, the series has been carried on to *Yerracondah* and *Kylasghur*, depending on the measured line near *St. Thomas's Mount;* the particulars of which have already been given in the 8th Vol. of the Researches.

The base near *Bangalore* (an account of which is given in Art. 2) is then had recourse to, for bringing out the same distance, and it will appear, in the arrangement of the triangles depending on that base,

that all the errors are intended to be combined in the distance between *Rymandroog* and *Yerracondah*. From that the triangles are carried eastward, and the side *Yerracondah* and *Kylasghur* again brought out, differing from the former two feet, which will show, by proportioning the said side to the length of the new base, that had the triangles been carried on, and that base computed therefrom, it would have differed from the measurement $3\frac{7}{10}$ inches. The distance, therefore, between *Kylasghur* and *Yerracondah*, is the second great distance for connecting the meridian lines.

The third of these distances is that between *Yerracondah* and *Savendroog*, which is had from the base *Savendroog* and *Nundydroog* to the northward, and *Savendroog Deorabetta* to the southward, differing 11 feet, the mean of which is made use of.

The same two sides are used as bases to proceed to the westward: the stations to the northward are *Devaroydroog*, *Bomanelly*, and *Mullapunnabetta;* those to the southward are *Bundhullydroog*, *Mysoor* hill, and *Mullapunnabetta;* and, from the mean of these, (the difference being 5 feet) the fourth great distance is had between *Savendroog* and *Mullapunnabetta.*

Finding the three stations, comprehending the two last distances, fall very favourably with respect to each other, the positions of their meridians have been fixed, with more than ordinary care, in moving to the westward. But, as this will be more particularly treated of in giving an account of the perpendicular arcs deduced therefrom, I shall proceed to state the manner in which the triangles have been continued across the great mountains that form the western ghauts.

After the observations were completed at *Mullapunnabetta* in Nov. 1804, the western monsoon being then over, and the favourable season on the *Malabar* coast approaching, it became necessary that some previous knowledge of the country should be had, as I found that my intended direction would take me across the *Bullum* district, which is a part of the ghauts forming a curve convex to the eastward, and, in consequence, is at too great a distance to discover any object on the sea coast; for I had all along entertained a hope of finding two or three stations, on the tops of these high mountains, from which to intersect the flag staves at *Cannanore*, *Tellicherry*, and *Mangalore*. For the purpose of selecting stations I had detached Lieut. KATER, one of my assistants, who after encountering many difficulties, succeeded in the choice of two, one on the top of *Balroyndroog*, in the *Bednore* province, and the other on *Koondhully*, a mountain in the *Koorg*. The distance between them has been derived from the base, *Mullapunnabetta* and *Daesauneegooda;* as is also the fifth great distance connecting the meridians of *Mullapunnabetta* and *Balroyndroog*. These stations, however, being too remote from the sea, I decided on descending the ghauts, and on the distance between them as a base, a series of triangles was carried through to *Mangalore*, and thence down the coast to *Mount Delli* and *Cannanore*.

It will no doubt be noticed, that the great extent from *Bangalore* to the sea coast required that another base should have been measured to verify the truth of the triangular operations, and it was my intention that it should have been done, but circumstances and various avocations prevented it, till the season became so far advanced that every other object would have been lost. I had to fix the meridian at *Balroyndroog*,

and to observe zenith distances, at *Paughur*, the intended northern extremity of my meridian arc; and, by the time I arrived at the latter place, it was the end of April, and very shortly after that the monsoon set in. I had, however, laid the foundation for a southern series of triangles, to be carried through the *Koorg* to *Mount Delli*, which was rendered practicable by the assistance afforded me by the *Koorg* Rajah, to whose liberal aid I am indebted for the successful means I had in carrying the triangles over these stupendous mountains. Several beacons had been erected on commanding situations pointed out by me, previous to my descending the ghauts, some of which were distinctly seen from every part of the coast, and one of them *(Taddiandamole)* being visited as a station, the season following, I was enabled thereby to intersect the flag staves at *Cannanore* and *Tellicherry*, and also a signal flag on my former station on *Mount Delli*. This branch of triangles was carried on in the beginning of 1806, and commenced from *Mullapunnabetta* and *Mysoor* hill, and thence to *Bettatipoor*, *Soobramanee* hill, *Taddiandamole*, *Kunduddakamully*, *Mount Delli*, and *Baekul*. From the distance between *Taddiandamole* and *Mount Delli*, *Cannanore*, and *Tellicherry*, have been laid down; and upon the distance between *Baekul* and *Kunduddakamully*, a branch of triangles has been carried up for finding the distance from *Bullamully* to *Kunnoor* hill, which was also determined by the northern series, and there is a difference of $3\frac{7}{10}$ feet. I have been more particular in giving an account of this southern series, because the object was to do away any doubt that might exist, as to the accuracy of the northern one, from the want of a base on the *Malabar* coast; and I think, so far as regards nautical purposes, no error, of any importance, can exist. It will, however, be necessary that a base

line be measured near *Mangolore*, from which all these distances, near the sea, should be derived anew, when a more minute survey of the coast is made.

As the situation of the places on the *Malabar* coast, and their relative positions, with respect to the observatory at *Madras*, and other places on the coast of *Coromandel*, constitute a most important part of this survey, I have left nothing undone, in that respect, to give full and entire satisfaction. But the great accuracy required, in these low latitudes, in ascertaining the length of a degree of longitude, has called forth more than ordinary attention; and I have reason to hope, from the many favourable and concurring circumstances, that my endeavours have been rewarded with success. The three stations best situated for determining the length of an arc, perpendicular to the meridian, are *Yerracondah*, *Savendroog*, and *Mullapunnabetta;* their respective distances from each other being nearly 67 *miles;* and lying in a direction very nearly east and west, the spheriodical corrections for the angles are trifling. All the other great stations have therefore been used for connecting the meridian lines, their latitudes and longitudes being computed spherically by using the oblique arcs, as obtained on the elliptical hypothesis, the perpendicular degrees having been found equal to 60748 fathoms, and the meridional degree 60498 fathoms, in latitude 12° 55′ 10″, which is the latitude of *Savendroog*, as had by referring to the latitude of *Dodagoontah*, the great station of observation, (Art. 8) for fixing the point of departure.

The scale of 60748 fathoms, for the length of the degree perpendicular to the meridian, in lat. 12° 55′ 10″, is considerably different from what was formerly obtained from the observations made at *Carangooly*

and *Carnatighur*, and reduced to the same latitude; but this is not to be wondered at, considering under what great disadvantages they were made, and the extreme accuracy required in making them: and it may be further remarked, that *Carnatighur* is by no means an eligible station, on account of the great mass of mountains on the west, and the low sandy plain to the east, which comes to the foot of the mountain. Such an inequality of matter must doubtless produce a great lateral attraction, and sensibly affect the instrument. The station on *Balroyndroog*, on the top of the western ghauts, has been laid aside on a similar account.

The relative positions of *Savendroog*, *Mullapunnabetta*, and *Yerracondah*, having been fixed with great accuracy, the connection with the observatory at *Madras* is effected, by working back to *Carangooly*, by means of the oblique arcs, (Art. 15) and then using the northing and easting, and computing spherically, by converting the easting into an arc at right angles to the meridian of *Carangooly*, and passing through the observatory; and also using the co-latitude of the point of intersection of the said arc and meridian. From this computation, the latitude of the stone pedestal in the centre of the observatory is had equal 13° 48′ 7″. The position of the flag-staff at *Mangalore*, is deduced from the meridian of *Balroyndroog*, by using the southing and westing, in a similar manner as at *Carangooly*, with respect to the observatory. It is thence found to be in lat. 12° 51′ 38″ N. and 34′ 50″ W. from the meridian of *Balroyndroog*. By summing up the respective differences of longitude, we shall have 5° 25′ 23″ for the longitude of *Mangalore* west from the observatory; to which add 2′ 22″, the easting of the church steeple in

Fort St. George, we get 5° 27′ 45″ for the difference of longitude between the steeple in *Fort St. George* and the flag-staff at *Mangalore*.

The meridians of *Carangooly* and *Balroyndroog* are also used for fixing the latitudes and longitudes of other places on the two coasts, as will be seen in the detailed account (Art. 15); so that by having the positions of a few places accurately laid, the general form of the peninsula may be determined, and a foundation laid for carrying on more minute surveys, both along the coasts, and in the interior. I have given here the mode of computing the positions of the most remarkable places on the coasts, and of the great stations connecting the meridian lines. But from these different meridians, the latitudes and longitudes of other places are fixed by using the eastings and westings, and the northing and southing from the great stations, and computing spherically; so that the whole together amount to near six hundred. I have subjoined to this paper an alphabetical list, which includes the most remarkable places within the extent of the survey; and I have also added a table, giving the perpendicular height of all the great stations above the level of the sea, and the ultimate comparisons of the height of a station on the beach, near *Mangalore*, as had by computing from *this* coast, and by measuring from the low water mark on the *other*, where there appears an error only of $8\frac{6}{10}$ feet. This table also contains the terrestrial refractions.

It will be unnecessary to say more here, there being sufficient, by referring to the plan of the triangles, to convey a general idea, and the adjoining detail will furnish all the materials for a more critical ex-

amination of the subject. The work is now grown to a magnitude far exceeding what was first proposed, and will, I hope, be adopted, as a foundation for a more finished superstructure, in times to come. The task has been an interesting one, and by no means arduous. Freed from restriction of every kind, and permitted to act under the most liberal conditions, I have been enabled to obviate every difficulty; which otherwise must have embarrassed my exertions, and defeated the ultimate objects of my labours.

SECTION. I.

Series of triangles taken up at *Hanandamulla* and *Pilloor Hill*, and carried to the base near *Bangalore*.

I. ANGLES.

At Hanandamulla.

Between	*And*				
Kylasghur	Pilloor Hill	98°	13′	34″.6	
				31 .6	33″.6
				34 .5	

At Pilloor Hill.

Kylasghur	Hanandamulla	42	59	9.25	
				5.8	8
				8.95	
	Patticondah	50	13	25.7	
				26.95	26.32
	Bodeemulla	50	36	20.75	
				21.4	21.07

At Kylasghur.

Referring flag, ...	Patticondah, ...	53	2	34	
				33.62	33.81
	Yerracondah	89	17	57.16	
				56.	57.61
				59 66	

At Kylasghur, continued.

Between	*And*				
Referring flag, ...	Bodeemulla	2°	15′	44″	
				44.25	
				44	42″.9
				42.25	
				40	
	Pilloor Hill	33	9	56.5	
				54	
				53.25	54.15
				53.12	
				53.75	
				54.25	
	Patticondah	53	2	33.81	
	Yerracondah	89	17	57.61	
Patticondah	Yerracondah	36	15	23.80	
Referring flag	Patticondah	53	2	33.81	
	Bodeemulla	2	15	42.9	
Patticondah	Bodeemulla	50	46	50.91	
Referring flag	Bodeemulla	2	15	42.9	
	Pilloor Hill	33	9	54.15	
Bodeemulla	Pilloor Hill	35	25	37.05	
Referring flag	Pilloor Hill	33	9	54.15	
	Patticondah	53	2	33.81	
Pilloor Hill	Patticondah	86	12	27.96	
Referring Lamp..	Pole-star's W. elongation,	3	28	57	
				52.4	
				55.25	
				53.5	

At Bodeemulla.

Kylasghur	Patticondah, ...	85	23	41.5	40.3
				39.1	
	Pilloor Hill	93	58	8.3	
				5.15	
				7.15	6.45
				7.4	
				4.25	

At Patticondah.

Rymandroog	Yerracondah	56	22	19.75	20.37
				21.	

At Patticondah, continued.

Between	*And*					
Yerracondah	Kylasghur,	101°	21′	48″.45	48″.77
				49 .1	
Kylasghur	Bodeemulla	43	49	34 .8	36.2
				37 .15	
				34 .95	
				37 .8	
				36 .3	

At Yerracondah.

Referring flag	Rymandroog	35	51	24 .85	26.57
				28 .6	
				24 .85	
				28 .55	
				26 .	
	Tirtapully Hill	73	22	43 .25	45.9
				42 .75	
				46 .25	
				46 .5	
				47 .25	
				46 .5	
				46 .	
				46 .75	
				47 .25	
				46 .5	
Rymandroog	Patticondah	78	25	51 .85	51.06
				50 .20	
				52 .95	
				49 .85	
				50 .45	
Referring flag	Kylasghur	84	57	10 .	12.48
				14 .35	
				12 .45	
				10 .5	
				13 .18	
				14 .5	
				12 .	
				12 .25	
				14 .5	
				10 .75	
	Patticondah	42	34	24 .5	23.51
				22 .	
				23 .4	
				24 .4	
				23 .25	
Savendroog	Nundydroog	37	46	58 .22	58.82
				58 .47	
				60 .10	
				58 .47	

At Yerracondah, continued.

Between	*And*				
Rymandroog	Deorabetta	82°	19′	13″.5	
				15 .5	15″.21
				16 .62	
Referring flag	Savendroog	94	16	15 .	
				13 .	
				16 .5	
				16 .5	
				14 .5	14.97
				14 .75	
				14 .5	
				15 .75	
				15 .5	
				13 .75	
	Ankissgherry	143	13	21 .	
				23 .5	
				18 .5	21.35
				20.	
				23 .75	
	Rymandroog	35	51	26 .57	
	Tirtapully Hill	73	22	45 .90	
Rymandroog	Tirtapully Hill	37	31	19 .33	
Referring flag	Patticondah	42	34	23 .51	
	Kylasghur	84	57	12 .48	
Patticondah	Kylasghur	42	22	48 .97	
Referring flag	Tirtapully	73	22	45 .90	
	Ankissgherry	143	13	21 .35	
Tirtapully	Ankissgherry	69	50	35 .45	
Rymandroog	Deorabetta	82	19	15 .21	
	Tirtapully Hill	37	31	19 .33	
Deorabetta	Tirtapully Hill	44	47	55 .88	
Referring flag	Rymandroog	35	51	26 .57	
	Savendroog	24	16	14 .97	
Rymandroog	Savendroog	58	24	48 .4	
	Deorabetta	82	19	15 .21	
Savendroog	Deorabetta	23	54	26 .81	
Referring flag	Pole-star's W. elongation,	9	3	6.5	
				3 .85	
				2 .	
				3 .5	

At Yerracondah, continued.

Between	*And*				
Referring flag	Pole-star's W. elongation	9°	3′	5″.5	
				3.75	
				4.	
				5.	
				4.25	

At Rymandroog.

Between	*And*				
Yerracondah	Patticondah	45°	11′	52″.15	51″.7
				51.25	
	Tirtapully Hill	49	22	56.85	
				53.25	54.58
				55.25	
				52.95	
	Nundydroog	121	27	28.5	
				33.9	
				28.6	30.05
				28.3	
				30.95	
Yerracondah	Tirtapully Hill	49	22	54.58	
	Nundydroog	121	27	30.05	
Tirtapully Hill	Nundydroog	72	4	35.47	

At Tirtapully Hill.

Nundydroog	Rymandroog	51	31	46.65	
				44.25	
				44.5	44.03
				42.75	
				42.	
Rymandroog	Yerracondah	93	5	56.	
				50.75	
				50.	51.3
				49.75	
				50.	
Deorabetta	Yerracondah	97	51	18.75	
				18.37	18.04
				17.	
Yerracondah	Ankissgherry	38	16	9.9	
				8.6	9.25
Nundydroog	Bonnairgottah	95	53	43.	
				49.17	46.24
Muntapum Station	Bonnairgottah	31	25	15.03	
				17.27	16.15
Muntapum Centre	Bonnairgottah	31	25	7.97	
				9.95	8.96

At Tirtapully Hill, continued.

Between	*And*				
Savendroog	Allasoor Hill	36°	33′	33″.02	30″.37
				27.75	
Deorabetta	Savendroog	46	42	26.25	24.5
				22.75	
Deorabetta	Yerracondah	97	51	18.04	
Ankissgherry	Yerracondah	38	16	9.25	
Ankissgherry	Deorabetta	59	35	8.79	

At Nundydroog.

Rymandroog	Tirtapully Hill	56	23	42.75	44.
				43.75	
				42.75	
				46.75	
Savendroog	Tirtapully Hill	71	26	37.25	38.55
				38.	
				40.75	
				38.5	
				38.25	
Savendroog	Yerracondah	89	55	29.25	29.02
				28.5	
				28.	
				30.34	
Savendroog	Devaroydroog	49	53	51.42	53.48
				52.92	
				54.17	
				55.42	

At Bonnairgottah.

S. end of the Base ..	Muntapum Station .	38	46	30.02	31.15
				32.28	
Muntapum Station ..	Tirtapully Hill	51	7	53.25	54.62
				53.6	
				57.	
Tirtapully Hill	Muntapum Centre .	51	5	56.65	56.91
				56.55	
				59.55	
				54.9	
Muntapum Centre ..	Savendroog	70	52	25.06	23.91
				22.77	
Savendroog	Allasoor Hill	75	50	27.25	27.92
				28.5	
				28.	

At Bonnairgottah, continued.

Between	*And*					
Dodagoontah Station	Savendroog	83°	20	14″.75	
				17 .5	16″.17
				16 .25	
Savendroog	Tirtapully Hill	121	58	22 .76	
				21 .59	22.17

At the Muntapum Centre.

Bonnairgottah	Tirtapully Hill,	97	28	55 .75	
				54 .85	55.27
				55 .	
				55 .5	
	Savendroog	69	50	45 .25	46.5
				47 .75	
Tirtapully Hill	Savendroog	167	19	40 .52	41.77
				43 .02	

At the Muntapum Station.

N. end of the Base,	S. end of the Base	56	56	40 .62	
				41 .4	41.42
				42 .25	
S. end of the Base,	Bonnairgottah	35	3	56 .05	
				54 .75	
				54 .25	56.05
				57 .75	
				57 .5	
Bonnairgottah	Tirtapully Hill	97	26	51 .53	53.39
				55 .25	

At the S. End of the Base.

N. end of the Base	Muntapum Station	33	43	60 .4	
				58 .15	60.06
				61 .27	
				60 .43	
	Dodagoontah Station	17	38	47 .85	
				45 .6	47.51
				48 .72	
				47 .38	
Muntapum Station	Bonnairgottah	106	9	36 .25	
				39 .76	37.72
				36 .5	
				38 .38	

At the N. End of the Base.

Between	*And*					
S. end of the Base	Muntapum Station	89°	19′	21″.5		
				19 .75		
				20 .25		20″.75
				21 .5		
	Dodagoontah Station	67	41	24 .5		
				20 .75		
				20 .75		22.55
				21 .25		
				25 .5		

At Deorabetta.

Savendroog	Tirtapully Hill	79	40	54	
				52	
				53	52.9
				52 .75	
				52 .75	
Bonnairgottah	Ankissgherry	98	54	18	
				21 .5	20
				20 .5	
Savendroog	Bonnairgottah	32	56	38 .25	
				36 .25	37.17
				37	
Savendroog	Bonnairgottah	32	56	37 .17	
	Tirtapully Hill	79	40	52 .9	
Bonnairgottah	Tirtapully Hill	46	44	15 .73	
	Ankissgherry	98	54	20	
Tirtapully Hill	Ankissgherry	52	10	04 .27	

II. MEASUREMENT of the Base Line near *Bangalore.*

This base was executed by Lieut. WARREN, of H. M. 33d Regt. then one of my assistants; and was intended as a datum for extending the triangles to the *Malabar* coast: and also as a base of verification to the triangular measurement brought from the base near *Madras;* and it appeared that, by continuing the computations the whole distance, and making this base one of the sides of the last triangle, the computation exceeded the measurement only $3\frac{7}{10}$ inches.

No further account need therefore be given of the manner of performing this very important and delicate part of the work, than that in addition to the apparatus used in the former measurement near St. *Thomas's Mount*, there was a transit telescope, in all respects similar to that mentioned in the account of the trigonometrical survey of *England* for fixing objects in the *alignement*, and taking the elevations and depressions at the same time. The manner of using it was as follows:

When the instrument was placed at a sufficient distance behind the commencement of an hypothenuse, so as to see distinctly the mark placed on the head of the drawing post, and the elevation or depression of the hypothenuse finally determined, the instrument being covered from the sun by a small cloth pandal, remained in that position, till four or sometimes five chains were measured. Previous to removing it, a small hooped picket was placed, by signal from the person at the transit, at a proper distance behind the termination of the last chain. In fixing the spot for this little picket, a common rod, with a sharp point was used, and the telescope of the transit depressed to the place on the ground intended to be marked. After the spot was fixed on, and the picket driven down, the instrument was removed, and placed in the alignement, with the plummet hanging over the centre of the little picket, and then a new hypothenuse was laid out, or the former one continued.

When the hypothenuse was terminated, a register picket was driven into the ground opposite to the arrow of the chain, and in such a manner, that when the brass head was fixed thereon, the slide might

be parallel to the chain, and very near it. A piece of wood was contrived to be placed upon the brass head, and fixed by a screw, which pressed against the end of the slider, so that when that slider was moved by its own screw, the wood, thus attached, moved with it, in the direction of the alignement, as nearly as the eye could judge. On the top of this wood was placed a T, having also a motion in the same direction with the brass slider, to expedite the operation; and on the top of this T, a brass ruler, in length about six inches, was placed, having a sliding motion at right angles to the other; and in the middle of the projecting end, was a mark from which the plummet was suspended, and by the two motions, at right angles to each other, the plumb line was easily brought to coincide with the arrow terminating the hypotheneuse. A like operation was gone through with the commencement of the next hypothenuse, and the arrow brought to coincide with the same plumb line. Here the distance of each arrow above or below the brass rule was noticed as in the former measurement.

If, after the removal of the transit, the same hypothenuse was continued, the register picket, at the end of the chain, was left standing; and when the instrument was brought into the alignement with the plummet over the mark, nothing was required but to place the telescope at the former elevation or depression, and move the cross vane which is applied to the heads of the pickets and stands, till the appropriate mark coincided with the horizontal wire in the focus of the eye glass.

EXPERIMENTS, *made for comparing the* CHAINS, *previous to the* MEASUREMENT.

Month.	Thermometers.					Mean of 5 Thermometers.	Comparisons.	
1804.	1	2	3	4	5			
								Divisions.
May 28. A. M.	73	73	72	72	73	72.6	The old chain exceeded the new one by	17.5
	73	74	73	72	74	73.2	.....	16.00
	74	74	74	73	74	73.8	.....	15.75
	74	74	74	73	73	73.6	.....	16.00
	74	74.5	74	73	73	73.6	.....	15.5
	74	75	74	74	74	74.2	.....	14.75
	75	76	75	74	75	75 0	.....	14.75
	75	77	76	75	75	75.6	.....	15.00
	77	79	78	76	76	77.2	.....	14.00
					Mean	74.3	..... Mean	15.47

EXPERIMENTS, *made for comparing the* CHAINS, *after the conclusion of the* MEASUREMENT.

Month.	Thermometers.					Mean of 5 Thermometers.	Comparisons.	
1804.	1	2	3	4	5			
								Divisions.
July 12. A. M.	78	78.5	79	78	80	78.7	The old chain exceeded the new one by	18.25
	80	80	79	80	80	79.8	.....	18.00
	81	80	80	77	80	79.6	.....	17.5
	80	79	80	80	78	79.4	.....	18.00
	81	80	80	80	79	80	.....	18.00
	81	81	79.5	81	80.5	80.6	.....	18.25
	81.5	81 5	80	81	82	81.2	.....	18.00
	82	81	80	81.5	81.5	81.2	.....	17.5
	82	81	79.5	82	82	81.3	.....	17.25
	82	81	80	82	81	81.2	.....	18.25
					Mean	80.3	..... Mean	17 9

Table, containing the Particulars of the Measurement.

No. of the Hypothenuse.	Length of each in feet.	Angles of E^n & D^n	Deductions from each Hy. pothenuse.	Perpendicular. Ascents.	Perpendicular. Descents.	Commencement from the last. Above inches	Commencement from the last. Below inches	Mean of 5 Thermometers.	REMARKS.
			feet	feet	feet				
1	600	0° 16′ 01″	.00648		2.7954	26. 6		94.8	
2	600	0 2 17	.00012	0.3985		3. 6		86.5	
3	400	0 22 56	.00892		2.6684		5. 9	84.9	
4	300	0 53 31.5	.03636		4.6707		7. 5	82.1	
5	400	1 13 15	.09080		8.5224		3. 5	83.4	
6	300	0 16 43.5	.00354		1.4595		5. 8	96.6	
7	900	0 13 16.5	.00675		3.4754		6. 9	81.9	
8	800	0 39 15	.05208		9.1387	6. 9		81.8	
9	300	1 15 15	.07188		6.5663		4. 7	80.2	
10	300	0 47 28.5	.02682		4.1428		3. 4	88.5	
11	800	0 57 15	.11096		13.3220		6. 9	82	
12	300	1 3 42	.05151		5.5585		6. 4	86.7	
13	200	0 48 30	.01990		2.8215		8. 9	74	
14	600	0 12 31.5	.00402	2.1860			19. 5	83.4	
15	600	0 29 1.15	.02132		5.0658		6. 9	88.1	
16	700	1 2 30	.11564		12.7257		15. 0	82.7	
17	600	1 26 34.5	.19026		15.1086	6. 4		99.8	
18	700	1 25 49.5	.21812		17.4740		5. 2	95.8	
19	200	0 45 35	.01758		2.6518	1. 1		79.7	
20	500	0 26 10	.01450		3.8057		25. 2	84.4	
21	200	0 24 52.5	.00522	1.4471		4. 7		90.9	
22	200	1 10 41	.04228		4.1119	3. 4		79.1	
23	300	Level	.....	.....	.....	3. 5	....	77.2	
24	600	0 10 40.5	.00288		1.8631	46		82.9	
25	1100	0 58 21	.15840	18.6697		15		80.5	
26	400	0 57 57	.05680	6.7425			6. 9	87.8	
27	500	0 46 20	.04540	6.7387		22. 1		79.2	
28	700	0 16 1.5	.00756	3.2630		2. 9		79.7	
29	500	0 22 1.5	.01027		3.2033		5	80.7	
30	400	1 24 00	.11940		9.7729		10	80.2	
31	500	1 42 43.5	.22320		14.9385		4	77.1	
32	200	Level	.....	.....	.....	4. 9	....	77.1	
33	500	0 5 41	.00070		0.8266	43. 6		83.6	
34	800	0 25 33	.02208	5.9457		7. 5		85.2	
35	1000	0 12 1.5	.00610	3.4979			10. 4	75.6	
36	700	0 37 39	.04200	7.6662		8.75		86.1	
37	900	0 52 16	.10404	13.6828		9		81.1	
38	500	0 53 49.5	.06130	7.8282		16. 1		78.2	
39	1200	0 40 44	.08424	14.2183			8.25	81.4	
40	800	Level	.....	....	.....	4. 9		74.3	
41	200	0 52 17	.02312	3.0416		1		87.1	
42	300	1 14 41	.07080	6.5168			3. 3	80	
43	500	2 5 1.5	.33065	18.1801		16		83.3	
44	300	1 20 55.5	.08313	7.0614			9. 9	89.1	
45	200	0 48 42	.02008	2.8331		7. 5		93.6	

Commenced the 26th May, 1804.

Table, containing the Particulars of the Measurement, continued.

No. of the Hy. pothenuse.	Length of each in feet.	Angles of E^n & D^n	Deductions from each Hy. pothenuse.	Perpendicular. Ascents.	Perpendicular. Descents.	Commencement from the last. Above inches	Commencement from the last. below inches	Mean of 5 Thermometers.	REMARKS.
			feet	feet	feet				
46	300	0° 9′ 27″	.00114		0.8247		6.75	71.6	
47	200	1 10 46.5	.04239		4.1172		8.5	81	
48	500	2 00 15	.30587		17.4860		8.8	88.6	
49	400	0 42 30	.03056		4.9450	15. 2		89.9	
50	300	0 11 47	.00177		1.0283	11. 9		82.1	
51	200	0 16 30	.00230	.9599		13. 9		80.8	
52	300	2 8 27	.20940	11.2067		11. 7		89.1	
53	500	1 13 31.5	.11437	10.6929			10. 4	90.8	
54	400	0 51 43.5	.05428	6.0182			5.	74	
55	200	0 32 31.5	.00896		1.8922		17	88.9	
56	400	1 38 9	.16300		11.4178		8. 3	94.2	
57	300	2 33 58.5	.30087		13.4323	0. 3		91.2	
58	200	0 54 24	.02504		3.1647	5. 5		82.2	
59	200	0 32 3	.00868	1.8645		23. 8		71.8	
60	600	1 58 15	.35490	20.6344		12. 8		84.7	
61	600	1 51 25.5	.31514	19.4439			8. 6	93.2	
62	700	1 26 27	.22134	17.6012			4. 5	91.9	
63	500	0 38 16.5	.03100	5.5667			14	89.8	
64	800	0 6 14	.00128		1.4505		9. 2	79.6	
65	400	0 27 27	.01276		3.1939	7. 5		87.8	
66	500	1 13 4.5	.11300		10.6275		6. 2	73	
67	400	1 42 4.5	.17630		11.8752		12	86.7	
68	500	2 26 30	.45395		21.3011	8. 6		79.5	
69	200	0 14 3	.00167		0.8174	13		71.7	
70	200	0 36 16.5	.01113	2.1103		3. 8		79.1	
71	300	2 16 36	.21381	11.9174		25		94.9	
72	200	1 47 22	.09752	6.2453			2. 3	84.3	
73	400	1 11 43.5	.18208	8.3450		21. 2		72.4	
74	900	0 41 11	.06453	10.7815		4. 9		87.6	
75	300	0 35 13	.01573		3.0732		11	76.8	
76	200	1 1 43	.03222		3.5903	0. 5		70.8	
77	300	0 6 24	.00053	0.5585		2.75		77.6	
78	200	2 23 45	.17483	8.3606			7. 5	87	
79	400	1 3 28.5	.06820	7.3852		26. 5		87.8	
80	800	0 32 13	.03512		7.4971		22. 1	80.2	
81	700	0 22 59	.01568	4.6799		14.37		70.7	
82	600	0 47 22	.05697	8.2668		11		74.6	
83	400	0 59 35	.06008	6.9325		11.55		83	
84	400	1 3 20	.06788	7.3687		7. 1		79	
85	300	0 10 00	.00126	0.8727			3. 6	76.7	
		Descent from the termination of the base to the ground				 34			
39800			6.63475	307.7304	278.4189	514.32	389.2	83.1	

North above the South extremity of the base = 39.74 feet.

Completed 11th July.

	Feet.
At the commencement the old chain exceeded the new one 15.47 divisions of the micrometer = 0.00619 feet. Therefore 398 × 100.00619 feet will be the measure in terms of the new chain - -	39802.4636
At the conclusion the old chain exceeded the new one 17.9 divisions, and had therefore increased 2.43 divisions = 0.00097 feet. Hence $398 \times \frac{0.00097}{2} = 0.1930$ feet, is the correction for the wear, which add - - - - - - - -	+ 0.1930
The sum of the deductions from col. 4th is 6.63475 feet, which being increased in the ratio of 100 to 100.00619 will be 6.6351 feet, which subtract - - -	— 6.6351
Hence the apparent horizontal distance will be - - - - - - - -	39796.0215
The correction for the expansion and reduced to the standard temperature of 62° will be $\frac{(83°.1-50) \times 0.0074-(62°-50°) \times 0.01237}{12} \times 39796.$ 0215 feet, which add - - - -	+ 3.1996
Hence the corrected measure of the base for the temperature of 62° will be - -	39799.2211
To which add the correction for reducing all the hypothenuses to the level of the south end of the base - - -	+ 0.0893
	39799.3104
Which being reduced to the level of the sea, will be - - - - -	39793.7

III. TRIANGLES.

Hanandamulla from Pilloor Hill 110381.9

TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess	Error.	Angles for Calculation.	Distance in feet.
Hanandamulla	98° 13′ 33″.6	—1′.8			98° 13′ 31″.5	
Pilloor Hill.....	42 59 08	—0.7			42 59 7	
Kylasghur	38 47 22.4	—0.6			38 47 21.5	
	180 00 04		3″.1	+0′.9	180 00 00	

Kylasghur from { Hanandamulla 120135
Pilloor Hill 174387.3

Hanandamulla from Kylasgh r 120128

Hanandamulla	98 13 33.6	—0.8			98 13 31.5	
Kylasghur	38 47 22.4	—0.6			38 47 21.5	
Pilloor Hill.....	42 59 8	—0.7			42 59 7	
	180 00 04		3.1	+0.9	180 00 00	

Pilloor Hill from { Hanandamulla 110375.6
Kylasghur 174377.3

Kylasghur from Pilloor Hill 174382.3

Kylasghur	86 12 27.96	—3.7			86 12 24.25	
Pilloor Hill.....	50 13 26.32	—2.14			50 13 24.25	
Patticondah	. . .				43 34 11.5	
					180 00 00	

Patticondah from { Kylasghur 194447.4
Pilloor Hill 252452.9

TRIANGLES—CONTINUED.

Kylasghur from Pilloor Hill 174382.3

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
48	Kylasghur	35 25′ 37″.05	—0″.8			35 25′ 35″.5	
	Pilloor Hill.....	50 36 21.07	—0.7			50 36 20.5	
	Bodeemulla.....	93 58 6.45	—1.7			93 58 4	
		180 00 4.57		3.2	+1.37	180 00 00	
	Bodeemulla from	Kylasghur					135085.8
		Pilloor Hill					101325.0

Kylasghur from Bodeemulla 135085.8

49	Kylasghur	50 46 50.91	—1.3			50 46 48.75	
	Bodeemulla.....	85 23 40.3	—2.2			85 23 37.25	
	Patticondah	43 49 36.2	—1.3			43 49 34	
		180 00 7.41		4.8	+2.61	180 00 00	
	Patticondah from	Kylasghur					194447.6
		Bodeemulla					151131.8

Kylasghur from Patticondah 194447.5

50	Kylasghur	36 15 24.6	—1.5			36 15 25	
	Patticondah	101 21 48.77	—4.8			101 21 45.75	
	Yerracondah	42 22 48.97	—1.4			42 22 49.25	
		180 00 2.34		7.7	—5.36	180 00 00	
	Yerracondah from	Kylasghur					282822.5
		Patticondah					170607.3

RIANGLES, *taken up at the* BASE, *and continued back to* PERRACONDAH *and* KYLASGHUR.

N. end of the Base from the S. end of the Base 39793.7

o.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	N. end of the Base	89° 19′ 20″.75	—0″.12			89° 19′ 20″	
	S. end of the Base	33 44 0 .06	—0 .06			33 43 59 .3	
	Muntapum Station	56 56 41 .42	—0 .06			56 56 40 .7	
1		180 00 02 .23		0″.24	+1″.99	180 00 00	
	Muntapum Station from { N. end of the Base						26365.95
		S. end of the Base					47475.03

S. end of the base from Muntapum Station 47475.03

	S. end of the Base	106 9 37 .72	—0 .33			106 9 35 .9	
	Muntapum Station	35 3 56 .05	—0 .08			35 3 54 .5	
	Bonnairgottah	38 46 31 .15	—0 .07			38 46 29 .6	
2		180 00 04 .92		0 .47	+4 .45	180 00 00	
	Bonnairgottah from { S. end of the Base						43551.7
		Muntapum Station					72811.7

Muntapum Station from Bonnairgottah 72811.7

	Muntapum Station	97 26 53 .39	—1 .07			97 26 53 .9	
	Bonnairgottah	51 7 54 .62	—0 .37			51 7 54 .2	
	Tirtapully Hill	31 25 16 .15	—0 .41			31 25 11 .9	
53		180 00 4 .16		1 .85	+2 .31	180 00 00	
	Tirtapully Hill from { Muntapum Station						108746.8
		Bonnairgottah					138492.9

TRIANGLES—CONTINUED.

Bonnairgottah from Tirtapully Hill 138492.9

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
54	Bonnairgottah	51° 5′ 56″.91	—0″.4			51° 5′ 56″.5	
	Tirtapully Hill	31 25 8 .96	—0 .4			31 25 9	
	Muntapum Centre	97 28 55 .27	—1 .1			97 28 54 .5	
		180 00 01 .14		1″.9	—0″.76	180 00 00	
	Muntapum Centre from	Bonnairgottah					72815.6
		Tirtapully Hill					108705.1

Muntapum Centre from Bonnairgottah 72815.6

55	Muntapum Centre	69 50 46 .5	—0 .6			69 50 46	
	Bonnairgottah	70 52 23 .91	—0 .6			70 52 23 .5	
	Savendroog Station	39 16 50 .88	—0 .5			39 16 50 .5	
		180 00 01 .29		1 .7	—0 .41	180 00 00	
	Savendroog from	Munpatum Centre					108661.6
		Bonnairgottah					107968.7

With the sides *Muntapum* centre from *Tirtapully* hill 108705.1 feet, and *Muntapum* centre from *Savendroog* = 108661.6 feet, and the included angle at *Muntapum* = 167° 19′ 29″.3 the side *Savendroog* from *Tirtapully* hill is found = 216038.9 feet.

Again with the sides *Bonnairgottah* from *Tirtapully* hill 138492.9 feet, and *Bonnairgottah* from *Savendroog* = 107968.7 feet, and the included angle at *Bonnairgottah* = 121° 58′ 19″ the side *Savendroog* from *Tirtapully* hill is found = 216038.8 feet differing from the above $\frac{1}{10}$ of a foot, and of which the mean is 216038.85 feet.

TRIANGLES—CONTINUED.

Savendroog from Tirtapully Hill 216038.85.

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	Savendroog	53° 36′ 47″.5	—1″.9			53° 36′ 45″.5	
	Tirtapully Hill	46 42 24 .5	—1 .9			46 42 22 .5	
	Deorabetta	79 40 52 .9	—2 .8			79 40 52	
56		180 00 04 .9		6″.6	—1″.7	180 00 00	
	Deorabetta from	Savendroog					159828.8
		Tirtapully Hill					176775.8
	Savendroog	37 44 43.15	—1.9			37 44 41.25	
	Tirtapully Hill	70 48 41.9	—2.4			70 48 42.5	
	Nundydroog	71 26 38.55	—2.4			71 26 36.25	
57		180 00 03.6		6.7	—3.1	180 00 00	
	Nundydroog from	Savendroog					215226.3
		Tirtapully Hill					139499.8
	Tirtapully Hill from Nundydroog 139499.8.						
	Tirtapully Hill	51 31 44.03	—1.0			51 31 43	
	Nundydroog	56 [illegible] 44	—1.0			56 23 42.5	
	Rymandroog	72 4 35.47	—1.2			72 4 34.5	
58		180 00 3.5		3.15	+.35	180 00 00	
	Rymandroog from	Tirtapully Hill					122112.3
		Nundydroog					114788.1

TRIANGLES—CONTINUED.

Tirtapully Hill from Rymandroog 122112.3.

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	Tirtapully Hill	93° 5′ 51″3	−2″.13			93° 5′ 49″	
	Rymandroog	49 22 54.58	−1 .04			49 22 53	
	Yerracondah	37 31 19.33	−1 .03			37 31 18	
59		180 00 5 21		4″.2	+1″.01	180 00 00	
	Yerracondah from { Tirtapully Hill						152185.5
	Yerracondah from { Rymandroog						200199.8

Tirtapully Hill from Deorabetta 176775.8.

	Tirtapully Hill	97 51 18.04	−3.65			97 51 14.4	
	Deorabetta	. . .				37 20 51.1	
	Yerracondah.....	44 47 55.83	−1.28			44 47 54.5	
60						180 00 00	
	Yerracondah from { Tirtapully Hill						152197.5
	Yerracondah from { Deorabetta						241529.3
	Tirtapully Hill	59 35 8.79	−1.76			59 35 7	
	Deorabetta	52 10 4.27	−1.67			52 10 2.6	
	Ankissgherry	. . .				68 14 50.4	
61						180 00 00	
	Ankissgherry from { Tirtapully Hill						150322.7
	Ankissgherry from { Deorabetta						164136.3

TRIANGLES—CONTINUED.

Tirtapully Hill from Ankissgherry 150322.7.

TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
Tirtapully Hill	38° 16′ 9″.25	−0″.9			38° 16′ 8″.25	
Ankissgherry	. . .				71 53 17.5	
Yerracondah	69 50 35 .4	−1 .2			69 50 34.25	
					180 00 00	
Yerracondah from { Tirtapully Hill						152196.3
Yerracondah from { Ankissgherry						99177.5

Tirtapully Hill from Yerracondah 152196 9.

Tirtapully Hill	93 5 51.3	−2.13			93 5 49	
Yerracondah.....	37 31 19.39	−1 03			37 31 18	
Rymandroog	49 22 54.58	−1.04			49 22 53	
	180 00 05.26		4.2	+1.06	180 00 00	
Rymandroog from { Tirtapully Hill						122121.2
Rymandroog from { Yerracondah						200214.3

he side from *Tirtapully* hill to *Yerracondah* is the mean distance nd in the triangles *Tirtapully* hill, *Deorabetta*, and *Yerracondah* *Tirtapully* hill, *Ankissgherry* and *Yerracondah*.

Yerracondah from Rymandroog 200214.3.

Yerracondah	78 25 51.06	−3 .3			78 25 47.75	
Rymandroog	45 11 51 7	−2 .4			45 11 52	
Patticondah	56 22 20.37	−2 .4			56 22 20.25	
	180 00 3.13		7.9	−4.77	180 00 00	
Patticondah from { Yerracondah						170605.9
Patticondah from { Rymandroog						235558.9

TRIANGLES—CONTINUED.

Yerracondah from Patticondah 170605.9.

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance feet.
65	Yerracondah	42° 22′ 48″.97	—1″.4			42° 22′ 49″.25	
	Patticondah	101 21 48 .77	—4 .8			101 21 45 .75	
	Kylasghur	36 15 24 .6	—1 .5			36 15 25	
		180 00 2 .34		7″.7	—5″.36	180 00 00	
	Kylasghur from { Yerracondah						282820.5
		Patticondah					194445.9

SECTION II.

Series of triangles direct from the Base near *Bangalore*, to *Mangalore* on the *Malabar* coast.

IV. ANGLES.

At Dodagoontah Station.

Between	*And*				
Bonnairgottah	Savendroog	61°	34′	54″	
				50	
				49	51″.20
				55	
				50	
Referring Lamp.....	Savendroog	104	4	29.68	
	Pole-star's W. elongation ...	1	31	53	
				56.25	
				51 25	
				48.5	
				46.25	
				47.5	
				45.5	
				45.5	
				43.5	
				44.5	

At Savendroog.

Between	*And*					
Deorabetta	Bundhully Hill	...44°	41	41″.25		
				40 .5		
				40 .75		
				41 .5		40″.93
				40 .25		
				41 .75		
				40 .5		
Devaroydroog	Nundydroog	50	14	6 .75		
				7 .		
				5 .25		6.37
				3 .5		
				7 .25		
				8 .5		
Cheetkul Hill	Devaroydroog	 6	56	11 .33		
				10 .83		
				16 .58		13.43
				16 .33		
				12 .08		
Devaroydroog	Bomanelly Hill	51	25	1 .75		
				2		2.12
				2 .5		
				2. 25		
Bomanelly Hill	Mullapunnabetta	...28	47	59 .91		
				61 .16		62.35
				63 .66		
				64 .66		
Bundhully Hill	Mysoor Hill	47	6	33 .6		
				34 .1		33.68
				33 .35		
Mysoor Hill	Mullapunnabetta	...46	23	6 .34		
				5 .84		6.26
				6 .59		
Referring Lamp	Mullapunnabetta	...90	39	58 .37		
				59 .25		
				60 .75		
				61. 25		
				62 .5		
				61 .5		
				61		61.16
				62 .25		
				62 .75		
				59 .25		
				60 .5		
				62		
				63 .75		

At Savendroog, continued.

Between	*And*				
Referring Lamp.....	Yerracondah.....	92°	4′	51″.25	
				49 .5	
				47 .75	
				49 .5	
				49 .5	49′.45
				48 .55	
				48 .5	
				50 .62	
				50 .5	
				48 .87	
Pole-star's greatest W. elongation		2	28	56 .75	
				57 .25	
				54	
				53 .5	
				57 .75	
				56	
				58 .75	
				58 .75	
				58 .25	
				61 .12	

At Devaroydroog.

Cheetkul Hill.....	Rungaswamy Hill	82	48	17 .25	17.62
				18	
Bomanelly	Savendroog.....	89	33	42	44.8
				47 .6	
Savendroog	Nundydroog	79	52	7 .75	
				8 .75	
				8	8.45
				8 .25	
				9 .5	
Rungaswamy	Bomanelly Hill ...	44	59	30 .35	
Cheetkul Hill.....	Rungaswamy	82	48	17 .62	
Bomanelly Hill	Cheetkul Hill.....	127	47	47 .97	
Savendroog	Cheetkul Hill.....	38	14	4 .75	
Bomanelly Hill	Savendroog	89	33	43 .22	
Bomanelly Hill	Savendroog	89	33	44 .8	
Bomanelly Hill	Savendroog	89	33	44 .01	

At Bomanelly Hill.

Hytalloo Flag	Mullapunnabetta	175	40	1 88	
				0 .87	1
				0 .75	

At Bomanelly Hill, continued.

Between	*And*					
Hytalloo Flag.....	Savendroog.....	76°	9′	19″.75		
				19 .75		19″.94
				19		
				21 .5		
Referring Flag	Mullapunnabetta	86	15	22 .75		
				26 .5		24.34
				24		
				24 .12		
	Daesauneegooda	131	4	38 .12		
				39 .75		38.78
				37 .25		
				40		
Hytalloo Flag.....	Mullapunnabetta	175	40	1		
	Savendroog	70	9	19 .94		
Mullapunnabetta	Savendroog	105	30	41 .06		
Referring Flag.....	Mullapunnabetta	86	15	24 .34		
	Daesauneegooda	131	4	38 .78		
Daesauneegooda	Mullapunnabetta	44	49	14 .44		
Daesauneegooda	Mullapunnabetta	44	49	15 .87		
				12 .5		14.90
				14 .88		
				16. 37		
Ditto	Do. by Referring Lamp.....					14 .44
				Mean...		14.67

At Mullapunnabetta.

Referring Flag	Bomanelly Hill	143	22	60.5		
				59 .5		
				60 .75		
				63		60.25
				58		
				61		
				59		

At Mullapunnabetta, continued.

Between	*And*				
Referring Flag	Savendroog	97° 41′	34″.25		
			36 .38		
			36 .62		
			34		
			35 .4		
			35 .25		
			32 .5		
			32 .5		
			33		34″.36
			34 .5		
			35 .25		
			33		
			36 .5		
			33 .8		
			33		
			33 .87		
	Mysoor Hill	37 59	12		
			10 .75		
			12 .75		
			12 .25		
			14		
			10 .5		12.58
			12		
			12 .25		
			14		
			13 .25		
			14 .5		
			12 .75		
	Daesauneegooda	150 36	32		
			32 .75		
			25 .25		33.6
			35 .5		
			32 .5		
	Koondoor Hill	71 37	24 .25		
			24 .75		22.94
			22 .75		
			20		
Referring Flag	Koondhully Hill...	55 38	43		
			44 .75		
			43		
			43 .75		44.68
			45 .25		
			46 .25		
			46 .75		
Koondhully Hill	Hannabetta	45 31	61 .5		
			61		
			61 .75		60.65
			60 .5		
			58 .5		

At Mullapunnabetta, continued.

Between	*And*				
Referring flag	Bolroyndroog	96°	36′	48″	
				46.25	
				44	
				49.25	
				44.75	46″.3
				48	
				45.25	
				47·5	
				45.75	
				44.25	
Referring Flag.....	Bomanelly Hill ..	143	23	00.25	
	Savendroog.....	97	41	34.36	
Bomanelly Hill	Savendroog.....	45	41	25.89	
Referring Flag.....	Mysoor Hill	37	59	12.58	
	Savendroog	97	41	34.36	
Savendroog	Mysoor Hill	59	42	21.78	
Referring Flag.....	Bomanelly Hill ..	143	23	00.25	
	Daesauneegooda	150	36	33.6	
Bomanelly Hill	Daesauneegooda	66	00	26.15	
Referring Flag.....	Daesauneegooda..	150	36	33.6	
	Koondoor Hill ..	71	37	22.94	
Daesauneegooda	Koondoor Hill ..	78	59	10.66	
Referring Flag.....	Daesauneegooda..	150	36	33.6	
	Koondhully Hill..	55	38	44.68	
Daesauneegooda	Koondhully Hill..	94	57	48.92	
Hannabetta	Koondhully Hill..	45	32	00.65	
Hannabetta	Daesauneegooda..	49	25	48.27	
Referring Flag.....	Koondoor Hill ..	71	37	22.94	
	Koondhully Hill..	55	38	44.68	
Koondoor Hill.....	Koondhully Hill..	15	58	38.26	
Hannabetta	Koondhully Hill..	45	32	00.65	
Hannabetta	Koondoor Hill ..	29	33	22.39	
Referring Flag.....	Koondhully Hill..	55	38	44.68	
	Balroyndroog	96	36	46.3	
Koondhully Hill	Balroyndroog	40	58	1.62	

At Mullapunnabetta, continued.

Between	*And*				
Referring Lamp ..	Pole-star's greatest W. elongation	170°	48′	15″.25	
				18	
				18.37	
				19.13	
				19.38	
				20	
				19.62	
				20	
				19.25	
				19.25	
		170	48	49	
				48.25	
				48.13	
				47.75	
				49.25	
				48.2	
				48.5	
				50.25	

At Bundhully.

Savendroog	Deorabetta	37	30	28.5	30″.12
				31.75	
	Mysoor Hill	80	2	42.44	44.19
				45.94	

At Cheetkul Hill.

Savendroog	Devaroydroog	134	49	45.13	45.16
				44.25	
				44.25	
				47	

At Mysoor Hill.

Referring flag	Bundhully Hill ..	55	26	46	45.22
				45.75	
				43.9	
	Savendroog	108	17	44	45.19
				43.75	
				46	
				47	

At Mysoor Hill, continued.

Between	*And*					
Referring Flag.....	Mullapunnabetta	177	47′	26″		
				25.45		
				27.89		
				28.5		
				27		26″.5
				27.5		
				25.25		
				25.5		
				25.43		
Referring Flag.....	Bundhully Hill ..	55	26	45.22		
	Savendroog.....	108	17	45.19		
Bundhully Hill.....	Savendroog.....	52	50	59.97		
Referring Flag.....	Savendroog.....	108	17	45.19		
	Mullapunnabetta	177	47	26.5		
Savendroog	Mullapunnabetta	73	54	48.31		

At Daesauneegooda.

Mullapunnabetta....	Bomanelly Hill ..	69	10	25.38		
				26.5		25.94
	Hannabetta.....	89	54	5.63		
				5		6
				7.37		
	Koondoor Hill ..	47	3	26.5		
				23.37		24.93
Hannabetta	Koondoor Hill ..	42	50	41.62		
				39.13		40.37

At Koondoorbetta.

Mullapunnabetta....	Daesauneegooda..	53	57	29		
				32.75		31.17
				31.75		
	Hannabetta.....	119	34	16.25		16.25
	Balroyndroog	141	10	47.5		
				47		47.25
Koondhully Hill	Balroyndroog	75	12	19		
				15.75		17.37
Mullapunnabetta....	Balroyndroog	141	10	47.25		
	Hannabetta.....	119	34	16.25		
Balroyndroog	Hannabetta.....	21	36	31		

At Koondoorbetta, continued.

Between	*And*				
Mullapunnabetta	Daesauneegooda	53°	57′	31″.17	
	Hannabetta	119	34	16 .25	
Daesauneegooda	Hannabetta	65	36	45 .08	
Mullapunnabetta	Balroyndroog	141	10	47 .25	
Koondhully Hill	Balroyndroog	75	12	17 .37	
Mullapunnabetta	Koondhully Hill	143	36	55 .38	

At Koondhully Hill.

Koondoorbetta	Bettatipoor Hill ..	78	18	11.5	12″.08
				10.75	
				14	
Mullapunnabetta	Bettatipoor Hill ..	57	53	42.5	41.44
				41	
				42.5	
				39.75	
	Balroyndroog	99	12	24.25	22.25
				22.25	
				20.25	
Koondoorbetta	Bettatipoor Hill ..	78	18	12.08	
Mullapunnabetta	Bettatipoor Hill ..	57	53	41.44	
Mullapunnabetta	Koondoorbetta ..	20	24	30.64	

At Hannabetta.

Daesauneegooda	Koondoorbetta ..	71	32	35	35
				35	
Koondoorbetta	Balroyndroog	136	19	19.87	17.37
				14.18	

At Balroyndroog.

Referring flag	Bullamully Hill ..	169	57	5.13	4.41
				6.37	
				3.75	
				2.37	
	Koondhully Hill ..	88	44	51	52.75
				54.5	

At Balroyndroog, continued.

Between	*And*				
Referring Lamp,	Pole-star's W. elongation	56°	46′	43″.5	
				43 .75	
				43 .25	
				43	
				44 .5	
				44 .25	
				43 .44	
Referring Flag	Koondhully Hill	88	44	52 .75	
	Bullamully Hill	169	57	4 .41	
Koondhully Hill	Bullamully Hill	81	12	11 .66	

At Bullamully.

Koondhully Hill	Balroyndroog	57	46	30	
				29.25	
				27.25	30″.42
				31.5	
				31.75	
				32.75	
Balroyndroog	Kunnoor Hill	118	21	13.5	13.5
	Bullanaudgooda	80	53	15.75	
				22	
				21.75	19.19
				17.25	
Bullanaudgooda	Goompay Hill	79	17	39	
				43.13	42.17
				44.37	
Goompay Hill	Kuddapoonabetta	89	14	44.17	
				41.13	41.56
				39.38	
Meejar Hill	Kuddapoonabetta	34	37	35.25	
				30.5	32.87
Balroyndroog	Mangalore	123	11	27.75	
				25.5	25.92
				24.5	
Kunnoor Hill	Balroyndroog	118	21	13.5	
Bullanaudgooda	Balroyndroog	80	53	19.19	
Kunnoor Hill	Bullanaudgooda	160	45	27.31	
	Goompay Hill	79	17	42.17	
Goompay Hill	Kunnoor Hill	81	27	45.14	
	Kuddapoonabetta	89	14	45.56	
Kunnoor Hill	Kuddapoonabetta	7	46	56.42	
Balroyndroog	Bullanaudgooda	80	53	19.19	
Bullanaudgooda	Goompay Hill	79	17	42.17	

At Bullamully, continued.

Between	*And*			
Balroyndroog	Goompay Hill	160°	11′	1″.36
	Mangalore	123	11	25.92
Goompay Hill	Mangalore	76	37	32.72
Balroyndroog	Kunnoor Hill	118	21	13.5
Kunnoor Hill	Kuddapoonabetta	7	46	56.42
Kuddapoonabetta ..	Balroyndroog	110	34	17.08
Meejar Hill	Kuddapoonabetta	34	37	32.87
	Balroyndroog	75	56	44.21

At Ungargooda.

Balroyndroog	Bullamully Hill ..	91	20	62.25	60′.75
				59.25	
				59.5	
				62	
Bullamully Hill	Meejar Hill	126	11	27.5	27.88
				25.75	
				30.25	
				28.	
Meejar Hill	Booggargooda ..	28	59	12.75	10.25
				13	
				9	
				6.25	

At Booggargooda.

Bullamully Hill	Meejar Hill.....	113	5	40.75	43.08
				43.25	
				41	
				44	
				45.75	
				44	
				41	
				44.75	
	Ungargooda	21	3	58	55.5
				55	
				54	
				55.75	
				56.5	
				53.75	
Bullamully Hill	Meejar Hill.....	113	5	43.08	
	Ungargooda	21	3	55.5	
Meejar Hill	Ungargooda	134	9	38.58	

At Meejar Hill.

Between	*And*					
Bullamully Hill	Booggargooda	54°	37′	20″.62 17 .88 17 .5	}	18″.67
	Kuddapoonabetta	49	7	52 52 .25 56 .75	}	53.67
Kuddapoonabetta ..	Kooliebogooda ..	37	55	18 .5 19 .75 20 .25 21 .25	}	19.94

At Kuddapoonabetta.

Bullamully Hill	Meejar Hill	96	14	31 .5 31. 25	}	31.37
	Kunnoor Hill	48	38	44 .25 46 .75	}	45.5
Kooliebogooda.....	Meejar Hill	58	24	55 .25 57 .75 55 58 .5	}	56.62
	Eedgah Station ..	86	11	35 .5 30 30 .75	}	32.08

At Kunnoor Hill.

Bullamully Hill....	Kuddapoonabetta	123	34	21 .25 21	}	21.12

V. TRIANGLES.

Bonnairgottah from Savendroog 107968.7

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
66	Bonnairgottah	83° 20′ 16″.17	—0″.79			83° 20′ 15″.4	
	Savendroog.....	. . .				35 4 53 .8	
	Dodagoontah Stat^{n}.	61 34 51 .29	—0 .52			61 34 50 .8	
						180 00 00	
	Dodagoontah Station from	Bonnairgottah.....					70556.7
		Savendroog					121933.2

TRIANGLES—CONTINUED.

Savendroog from Deorabetta 159828.8.

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	Savendroog	44° 41′ 40″.93	—1″.4			44° 41′ 39″.5	
	Deorabetta	97 47 57 .75	—4 .0			97 47 52	
	Bundhully	37 30 30.12	—1 .5			37 30 28 .5	
67		180 00 08 .8		6″.9	+1″.9	180 00 00	
	Bundhully from { Savendroog						260072
	Bundhully from { Deorabetta						184620.5

Savendroog from Nundydroog 215226.3.

	Savendroog	50 14 6.37	—1.9			50 14 4.3	
	Nundydroog	49 53 53.48	—1.9			49 53 51.6	
	Devaroydroog	79 52 8.45	—2.8			79 52 4.1	
68		180 00 8.3		6.54	+1.76	180 00 00	
	Devaroydroog from { Savendroog						167238.7
	Devaroydroog from { Nundydroog						168058.8

Savendroog from Deorabetta 159828.8.

	Savendroog	78 57 47.5	—2.26			78 57 45.1	
	Deorabetta	47 20 38.73	—1.55			47 20 37	
	Allasoor Hill	53 41 39.59	—1.69			53 41 379.	
69		180 00 05.82		5.4	+0.42	180 00 00	
	Allasoor Hill from { Savendroog						145859.1
	Allasoor Hill from { Deorabetta						194662.8

TRIANGLES—CONTINUED.

Savendroog from Allasoor Hill 145859.1

No.	TRIANGLES.	Obsd. Angles,	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
70	Savendroog	55 41′ 34″.92	—1″.3			55 41′ 32″.8	
	Allasoor Hill.....	62 10 43 .71	—1 .4			62 10 41 .5	
	Cheetkul Hill	62 7 47 .87	—1 .4			62 7 45 .7	
		180 00 06 .5		4″.2	+2″.3	180 00 00	
	Cheetkul Hill from	Savendroog					145924.8
		Allasoor					136292.3

Savendroog from Cheetkul Hill 145924.8

71	Savendroog	6 56 13 .48	+0 .04			6 56 12 .5	
	Cheetkul Hill.....	134 49 15 .16	—2			134 49 42 .5	
	Devaroydroog	38 14 4 .75	+1 .26			38 14 5	
		180 00 3 .34		0 .7	+2 .64	180 00 00	
	Devaroydroog from	Savendroog					167224.8
		Cheetkul Hill					28477.0

Savendroog from Devaroydroog 167229.25

72	Savendroog.....	51 25 2 .12	—2 .1			51 25 00	
	Devaroydroog	89 33 44 .01	—4 .1			89 33 40	
	Bomanelly Hill.....	. . .				39 1 20	
						180 00 00	
	Bomanelly Hill from	Savendroog					265594.9
		Devaroydroog					207622.1

TRIANGLES—CONTINUED.

Savendroog from Bomanelly Hill 265594.9

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
73	Savendroog	28° 48′ 2″ .35	—2″			28° 48′ 0 ″.4	
	Bomanelly Hill	105 30 41 .06	—7.5			105 30 33 .6	
	Mullapunnabetta ...	45 41 25 .89	—1 .3			45 41 26	
		180 00 9 .3		10″.8	—1″.5	180 00 00	
	Mullapunnabetta from	Savendroog					357646.2
		Bomanelly Hill					178809.7

Savendroog from Bundhully Hill 260072

74	Savendroog	47 6 33 .68	—4 .1			47 6 29 .5	
	Bundhully	80 2 44 .19	—6 .2			80 2 38	
	Mysoor Hill	52 50 59 .97	—4 .2			52 50 52 .5	
		180 00 17 .84		14 .5	+3.34	180 00 00	
	Mysoor Hill from	Savendroog					321385.4
		Bundhully					239060

Savendroog from Mysoor Hill 321385.4

75	Savendroog	46 23 6 .26	—5 .7			46 23 00 .5	
	Mysoor Hill	73 54 48 .31	—7 .7			73 54 44	
	Mullapunnabetta ...	59 42 21 .78	—6 .3			59 42 15 .5	
		180 00 16 .35		19 .7	—3 .35	180 00 00	
	Mullapunnabetta from	Savendroog					357641.2
		Mysoor Hill					269475.6

TRIANGLES—CONTINUED.

Savendroog from Mullapunnabetta 357641.2

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	Savendroog Station	28° 48′ 2″.35	—2″.			28° 48′ 00″.4	
	Mullapunnabetta ..	45 41 25 .37	—1 .3			45 41 26	
	Bomanelly Hill	105 30 41 .06	—7 .5			105 30 33 .6	
76		180 00 8. 78		10″8	—2″.02	180 00 00	
	Bomanelly Hill from	Savendroog					265592.8
		Mullapunnabetta					178807.7

Savendroog from Mullapunnabetta 357641.2

	Savendroog Station	46 23 6.26	—5.7			46 23 0.5	
	Mullapunnabetta ..	59 42 21.78	—6.3			59 42 15.5	
	Mysoor Hill	73 54 48.31	—7.7			73 54 44	
77		180 00 16.35		19.7	—3.35	180 00 00	
	Mysoor Hill from	Savendroog Station					321387.6
		Mullapunnabetta					269477.5

Mullapunnabetta from Bomanelly 178807.7

	Mullapunnabetta ..	66 00 26.15	—1.8			66 0 23.8	
	Bomanelly Hill	44 49 14.67	—1.5			44 49 12.7	
	Daesauneegooda ..	69 10 25,94	—1.9			69 10 23.5	
78		180 00 06.76		5.2	+1.56	180 00 00	
	Daesauneegooda from	Mullapunnabetta					134849.9
		Bomanelly Hill					174777.4

TRIANGLES—CONTINUED.

Mullapunnabetta from Daesauneegooda 134849.9

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	Mullapunnabetta ..	49° 25′ 48″.27	—1″.25			49° 25′ 47″	
	Daesauneegooda ..	89 54 6 .00	—2 .37			89 54 3 .6	
	Hannabetta	. . .				40 40 90 .4	
79						180 00 00	
	Hannabetta from	Mullapunnabetta					206922.5
		Daesauneegooda					157180.4

Mullapunnabetta from Hannabetta 206922.5

	Mullapunnabetta ..	29 33 22.39	—0.02			29 33 22.4	
	Hannabetta	. . .				30 52 24.2	
	Koondoor Hill	119 34 16.25	—2.89			119 34 13.4	
80						180 00 00	
	Koondoor Hill from	Mullapunnabetta					122081.6
		Hannabetta					117355.7

Mullapunnabetta from Daesauneegooda 134849.9

	Mullapunnabetta ..	78 59 10.66	—1 .6			78 59 9.1	
	Daesauneegooda ..	47 3 24.93	—1 .1			47 3 22.3	
	Koondoor Hill	53 57 31.17	—1 .1			53 57 28.6	
81		180 0 6.76		3″.8	+2″.96	180 00 00	
	Koondoor Hill from	Mullapunnabetta					122081.2
		Daesauneegooda					163700.6

TRIANGLES—CONTINUED.

Daesauneegooda from Hannabetta 157180.4

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	Daesauneegooda ..	42° 50′ 40″.37	—1″.2			42° 50′ 40″.4	
	Hannabetta	71 32 34 .00	—1 .5			71 32 34 .7	
	Koondoor Hill	65 36 45 .08	—1 .4			65 36 44 .9	
82		180 00 0 .45		4″.1	—3″.65	180 00 00	
	Koondoor Hill from	Daesauneegooda					163701.8
		Hannabetta					117355.7

Hannabetta from Koondoorbetta 117355.7

	Hannabetta	136 19 17.37	—3.96			136 19 13.4	
	Koondoorbetta	21 36 31	+0.85			21 36 31.9	
	Balroyndroog	. . .				22 4 14.7	
83						180 00 00	
	Balroyndroog from	Hannabetta					115016
		Koondoorbetta					215698

Mullapunnabetta from Koondoorbetta 122081.4

	Mullapunnabetta ..	15 58 38.26	+1.07			15 58 39	
	Koondoorbetta ..	143 36 55.38	—4.22			143 36 50	
	Koondhully Hill ..	20 24 30.64	+1.50			20 24 31	
84		180 00 04.28		1.65	+2.63	180 00 00	
	Koondhully from	Mullapunabetta					207682.8
		Koondoorbetta					96366 .3

The side *Mullapunnabetta* from *Koondoorbetta* is the mean distance had from the 80th and 81st triangle.

TRIANGLES—CONTINUED.

Koondoorbetta from Koondhully Hill 96366.3

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
85	Koondoorbetta	75° 12′ 17″.37	—1″.7			75° 12′ 15″.67	
	Koondhully Hill ...	. . .				78 48 9 .73	
	Balroyndroog.....	. . .				25 59 34 .6	
						180 00 00	
	Balroyndroog from	Koondoorbetta					215698
		Koondhully Hill					212592.8

Koondoorbetta from Mullapunnabetta 122081.4

86	Koondoorbetta	141 10 47 .25	—9 .41			141 10 37 .8	
	Mullapunnabetta ...	. . .				24 59 21 .75	
	Balroyndroog.....	. . .				13 50 00 .45	
						180 00 00 00	
	Balroyndroog from	Koondoorbetta.....					215698
		Mullapunnabetta					320094.5

Mullapunnabetta from Koondhully Hill 207682.8

87	Mullapunnabetta ...	40 58 01 .62	—2 .1			40 57 59 .5	
	Koondhully	99 12 22 .25	—6 .1			99 12 16 .2	
	Balroyndroog.....	. . .				39 49 44 .3	
						180 00 00 .00	
	Balroyndroog from	Mullapunnabetta					320075
		Koondhully Hill					212584.2

TRIANGLES—CONTINUED.

Koondhully Hill from Balroyndroog 212588.5

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
88	Koondhully Hill ...	. . .				41° 01′ 23″.8	
	Balroyndroog.....	81° 12′ 11″.66	—3.5			81 12 8.2	
	Bullamully	57 46 30.42	—2.4			57 46 28	
						180 00 00	
	Bullamully from	Koondhully Hill					248343.2
		Balroyndroog					164944.6

The side *Koondhully* hill from *Balroyndroog* is the mean distance found in the 85th and 87th triangle.

Balroyndroog from Bullamully 164944.6

89	Balroyndroog.....	. . .				28 44 41.5	
	Bullamully	50 54 19.37	—0.6			59 54 19.2	
	Ungargooda	91 21 00.75	—0.4			91 20 59.3	
						180 00 00	
	Ungargooda from	Balroyndroog					142749.3
		Bullamully					79345.5

The supplemental chord angle at *Bullamully*, between *Meejar* hill and *Ungargooda*, corrected, is subtracted from the observed angle between *Balroyndroog* and *Meejar* hill, to get the angle at *Bullamully*, between *Balroyndroog* and *Ungargooda*, as an observed one.

Bullamully from Ungargooda 79345.5

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	Bullamully	. . .				16° 02′ 24″.8	
	Ungargooda	126° 11′ 27″.88	—0″.7			126 11 27 .2	
	Meejar Station	37 46 8 .19	+0 .2			37 46 08	
90						180 00 00 00	
	Meejar Station from { Bullamully						104550.2
		Ungargooda					35795.8

At *Meejar* hill, the supplemental chord angle between *Booggargooda* and *Ungargooda*, corrected as an observed one, and subtracted from the observed angle between *Booggargooda* and *Bullamully*, gives the angle between *Bullamully* and *Ungargooda* as an observed angle.

Bullamully from Meejar Station 104550.2

	Bullamully	34 37 32.87	—0.26			34 37 33.75	
	Meejar Station	49 07 53.67	—0.27			49 07 54.5	
	Kudapoonabetta ..	96 14 31.37	—0.58			96 14 31.75	
91		179 59 57.91		1.11	—3 .2	180 00 00	
	Kudapoonabetta from { Bullamully						79536
		Meejar Station					59763

Bullamully from Kudapoonabetta 79536

	Bullamully	7 46 56.42	—0.02			7 46 55.5	
	Kudapoonabetta ..	48 38 45.5	+0.17			48 38 44.7	
	Kunnoor Station ..	123 34 21.12	—0.33			123 34 19.8	
92		180 00 03.04		0.18	+2.86	180 00 00 00	
	Kunnoor Station from { Bullamully						71655.7
		Kudapoonabetta					12925.8

SECTION. III.

Southern series of triangles, commencing from *Mullapunnabetta* and *Mysoor* hill, and continued to the *Malabar* coast, terminating with the distance from *Bullamully* to *Kunnoor* station, which is also brought out by the northern series.

VI. ANGLES.

At Mysoor Hill.

Between	*And*				
Referring Flag	Mullapunnabetta	177°	77′	26″	
				25.45	
				27.89	
				28.5	
				27	26″.50
				27.5	
				25.25	
				25.5	
				25.43	
	Bettatipoor Hill ..	136	06	58.65	
				57.42	57.01
				56.25	
				55.73	
Referring flag, ...	Mullapunnabetta	177	47	26.50	
	Bettatipoor Hill ..	136	06	57.01	
Mullapunnabetta	Bettatipoor Hill ..	41	40	29.49	

At Mullapunnabetta.

Referring flag	Mysoor Hill ..	37	59	12	
				10.75	
				12.75	
				12.25	
				14	
				10.5	12.58
				12	
				12.25	
				14	
				13.25	
				14.5	
				12.75	
	Bettatipoor Hill ..	12	26	40.75	
				38.5	
				40.5	
				39.5	
				40.75	39.97
				39.25	
				40.75	
				40.5	
				40	
				39.25	

At Mullapunnabetta, continued.

Between	*And*				
Referring flag	Soobramanee	59°	05′	03″.25	
				07 .5	
				5.75	
				6.75	06″.
				4.75	
				8	
Referring flag	Mysoor Hill	37	59	12.58	
	Bettatipoor Hill ..	12	26	39.97	
Mysoor Hill	Bettatipoor Hill ..	50	25	52.55	
Referring flag	Soobramanee	59	5	06	
	Bettatipoor Hill ..	12	26	39.97	
Bettatipoor Hill	Soobramanee	46	38	26.03	

At Bettatipoor Hill.

Mullapunnabetta	Mysoor Hill	87	53	46	
				50.75	48.67
				49.25	
	Soobramanee	83	35	12.75	
				11.5	
				9	11.26
				11.55	
				11.5	
Soobramanee	Taddiandamole ..	51	37	49.75	
				52.25	
				54.75	52
				49.5	
				53.75	

At Taddiandamole.

Bettatipoor Hill	Soobramanee	54	50	32.25	
				30.5	
				32.75	
				32.5	31.14
				29.75	
				32	
				28.25	
Soobramanee	Mount Dilli	124	57	23	
				23.5	
				19.25	22.1
				22.5	
				21.75	

At Mount Dilli.

Between	*And*					
Kunduddakamully ..	Taddiandamole ..	60°	21′	24″.75		
				31 .5		28″.08
				28		
	Munjuimpuddy ..	19	17	8 .25		
				9 .5		9.33
				10 .25		

At Kunduddakamully.

Goompay Hill	Annantapoor Hill ..	15	56	12		
				10 .25		10.69
				11 .5		
				9		
Baekul	Annantapoor Hill ..	37	41	43		
				43 .5		43.25
				43 .25		
Goompay Hill	Ballanandgooda ..	26	14	38 .25		
				41 .25		
				36		39.35
				40 .25		
				41		
	Taddiandamole ..	151	2	30		
				24		27
Munjuimpuddy	Baekul	25	44	28 .25		
				28		29.75
				33		
Goompay Hill	Annantapoor	15	56	10 .69		
Taddiandamole	Goompay Hill ..	151	2	27		
Annantapoor	Taddiandamole ..	166	58	37 .69		
	Baekul	37	41	43 .25		
Baekul	Taddiandamole ..	155	19	39 .06		
Annantapoor	Baekul	37	41	43 .25		
Goompay Hill	Annantapoor	15	56	10 .69		
Baekul	Goompay	53	37	53 .94		
Taddiandamole	Baekul	155	19	39 .06		
Baekul	Munjuimpuddy ..	25	44	29 .75		
Munjuimpuddy	Taddiandamole ..	129	35	9 .31		

At Baekul,

Between	*And*					
Munjuimpuddy	Mount Dilli	32°	37′	56″.75		
				57 .75		57″.67
				58 .5		
	Kunduddakamully	32	31	59 .75		
				63		61.37
Goompay Hill	Annantapoor	11	45	56		
				60 .75		59.58
				62		
Goompay Hill	Kunduddakamully	92	36	56 .25		
				55 .25		
				55 .25		55.58
				55 .25		
Munjuimpuddy	Mount Dilli	32	37	57 .67		
	Kunduddakamully	32	32	01 .37		
Mount Dilli	Kunduddakamully	65	09	59 .04		

At Munjuimpuddy Hill.

Kunduddakamully ..	Mount Dilli	100	26	09		
				10 .5		
				9 .25		9.31
				8 .5		

At Annantapoor Hill.

Goompay Hill	Kunduddakamully	107	11	12 .5		
				16 .25		14.67
				17 .25		

At Goompay Hill.

Ballanandgooda	Bullamully	35	09	13 .5		
				16 .25		14.94
				14		
				16		
	Annantapoor	140	37	3 .75		
				4 .75		4.37
				6 .5		
				2 .5		
	Kunnoor Station	93	6	48 .5		
				50		48.25
				46 .25		
Ballanandgooda	Bullamully	35	9	14 .94		
	Kunnoor Station	93	6	48 .25		
Bullamully	Kunnoor Station	57	57	33 .31		

At Bullamully.

Between	*And*				
Ballanandgooda	Goompay Hill ..	79°	17′	39″	
				43 .13	42″.17
				44 .37	
	Balroyndroog	80	53	15 .75	
				22	
				21 .75	19.19
				17 .25	
Balroyndroog	Kunnoor Station	118	21	13 .5	
Balroyndroog	Ballanandgooda ..	80	53	19 .19	
Ballanandgooda	Kunnoor Station	160	45	27 .31	
Ballanandgooda	Goompay Hill ..	79	17	42 .17	
Goompay Hill	Kunnoor Station	81	27	45 .14	

VII. TRIANGLES.

Mullapunnabetta from Mysoor Hill 269477.5

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
	Mullapunnabetta ..	50° 25′ 52″.55	—2″.3			50° 25′ 49″.6	
	Mysoor Hill	41 40 29 .49	—2 .3			41 40 26 .6	
	Bettatipoor Hill ..	87 53 48 .67	—4 .2			87 53 43 .8	
93		180 00 10 .71		8′.8	+1″.91	180 00 00	
	Bettatipoor Hill from	Mullapunnabetta					179294.4
		Mysoor Hill					207867.4

Mullapunnabetta from Bettatipoor Hill 179294.4

	Mullapunnabetta ..	46 38 26.03	—1.98			46 38 24	
	Bettatipoor Hill ..	83 35 11.26	—3.23			83 35 8	
	Soobramanee	. . .				49 46 28	
94						180 00 00	
	Soobramanee from	Mullapunnabetta					233359.7
		Bettatipoor Hill					170734

Bettatipoor Hill from Soobramanee 170734

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
95	Bettatipoor Hill.....	51° 37′ 52″	—1″.9			51° 37′ 50″.1	
	Soobramanee	. . .				73 31 40 .7	
	Taddiandamole	54 50 31 .14	—1 .96			54 50 29 .2	
						180 00 00 00	
	Taddiandamole from	Bettatipoor Hill					200262.3
		Soobramanee Hill.....					163730.4

Soobramanee Hill from Taddiandamole 163730.4

96	Soobramanee Hill...	. . .				49 11 36 .6	
	Taddiandamole.....	74 37 12 .54	— 2.21			74 37 10 .3	
	Kunduddakamully	56 11 14 .75	— 1.71			56 11 13 .1	
						180 00 00	
	Kunduddakamully from	Soobramanee Hill					190004.3
		Taddiandamole					149160.2

The supplemental chord angle at *Taddiandamole*, between *Kunduddakamully* and *Mount Dilli*, reduced as an observed one, is subtracted from the angle *Soobramanee* hill and *Mount Dilli*, as observed at *Taddiandamole*, to give the angle *Kunddudakamully* and *Soobramanee* hill. The station at *Kunduddakamully* could not be seen when the angles were taken at *Taddiandamole*.

Taddiandamole from Kunduddakamully 149160.2

97	Taddiandamole.....	. . .				50 20 8 .26	
	Kunduddakamully	69 18 26 .71	—1 .61			69 18 25 .10	
	Mount Dilli	60 21 28 .08	—1 .44			60 21 26 .64	
						180 00 00	
	Mount Dilli from	Taddiandamole					160548.9
		Kunduddakamully					132113

The supplemental chord angle at *Kunduddakamully*, between *Mount Dilli* and *Munjuimpuddy*, made as an observed angle by applying the correction, and subtracted from the observed angle between *Munjuimpuddy* and *Taddiandamole*, gives the angle *Mount Dilli* and *Taddiandamole* as an observed angle.

TRIANGLES—CONTINUED.

Kunduddakamully from Mount Dilli 132113

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
98	Kunduddakamully	86° 01′ 12″.35	—1″			86° 01′ 11″.35	
	Mount Dilli	. . .				28 18 50 .21	
	Baekul	65 09 59 .04	—0 .6			65 09 58 .44	
						180 00 00 00	
	Baekul from	Kunduddakamully					70162
		Mount Dilli					145223.2

In this triangle the same supplemental chord angle between *Mount Dilli* and *Munjuimpuddy*, corrected, is added to the observed angle at *Kunduddakamully*, between *Baekul* and *Munjuimpuddy*, to get the observed angle between *Mount Dilli* and *Baekul*.

Kunduddakamully from Baekul 70162

99	Kunduddakamully	53 37 53.94	—0 .4			53 37 53.54	
	Baekul	92 36 55.58	—0 .9			92 36 54.68	
	Goompay Hill	. . .				33 45 11.78	
						180 00 00.00	
	Goompay Hill from	Kunduddakamully					126145.9
		Baekul					101681.2

TRIANGLES—CONTINUED.

Kunduddakamully from Goompay Hill 126145.9

No	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
100	Kunduddakamully	26° 14′ 39″.35	—0″.6			26° 14′ 38″.75	
	Goompay Hill	83 44 30 .21	—0 .7			83 44 29 .5	
	Ballanandgooda ...	. . .				70 00 51 .75	
						180 00 00	
	Ballanandgooda from { Kunduddakamully						133429.4
		Goompay Hill					59335.8

Goompay Hill from Ballanandgooda 59355.8

101	Goompay Hill	35 09 14 .94	—0 .12			35 09 14 .8	
	Ballanandgooda ...	. . .				65 33 02 .7	
	Bullamully	79 17 42 .71	—0 .18			79 17 42 .5	
						180 00 00 00	
	Bullamully from { Goompay Hill						54990.2
		Ballanandgooda					34781

Goompay Hill from Bullamully 54990.2

102	Goompay Hill	57 57 33 .31	—0 .28			57 57 33	
	Bullamully	81 27 45 .14	—0 .39			81 27 44 .75	
	Kunnoor Station...	. . .				40 34 42 .25	
						180 00 00 .00	
	Kunnoor Station from { Goompay Hill						83600.1
		Bullamully					71659.4

The same side *Bullámully* from *Kunnoor* hill brought out down from the northern series is 71655.7 feet: therefore the mean will be 71657.55 feet. Hence, as the side *Bullamully* from *Kunnoor* hill, brought down from the northern series, is the mean, so is the side *Meejar* hill and *Kuddapoonabetta*, brought down from the northern series, to 59764.6 feet, as derived from the mean of both series.

TRIANGLES—CONTINUED.

Meejar Hill from Kudapoonabetta 59764.6

No.	TRIANGLES.	Obsd. Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distance in feet.
—	Meejar Hill.....	37° 55′ 19″.94	—0″.12			37° 55′ 19″.8	
	Kudapoonabetta ...	58 24 56 .62	—0 .17			58 24 56 .5	
	Kooliebogooda	. . .				83 39 43 .7	
103						180 00 00 00	
	Kooliebogooda from	Meejar Hill					51224.7
		Kudapoonabetta.....					36956.5

SECONDARY TRIANGLES.

Kudapoonabetta from Kooliebogooda 36956.5

No.	TRIANGLES.	Obsd. Angles.	Distances from the intersected Objects in Feet.	
	Kudapoonabetta ..	86 11 32	Eedgah Station	17110.2
	Kooliebogooda ..	25 28 59		39680.7
	Eedgah Station ..	68 19 19		

Eedgah Station from Kooliebogooda 39680.7

	Eedgah Station ..	66 09 43	Station on the Beach	10073
	Kooliebogooda ..	14 30 24		36782.3
	Station on the Beach	99 19 53		

Bullamully from Goompay Hill 54990.2

	Bullamully	76 37 33	Mangalore	91763.7
	Goompay Hill	69 16 59		95446.7
	Mangalore	34 05 28		

Bullamully from Kunnoor Station 71659.4

	Bullamully	4 50 12	Mangalore	91761.4
	Kunnoor Station ..	158 37 57		21234.9
	Mangalore	16 31 51		

Mount Dilli from Kunduddakamully 132113

	Mount Dilli.....	132 10 39	Cannanore	87563.4
	Kunduddakamully	18 46 24		201632.7
	Cannanore	29 02 57		

Taddiandamole from Mount Dilli 160548.9

	Taddiandamole ..	31 59 09	Cannanore	157072
	Mount Dilli.....	71 49 11		87574.2
	Cannanore	76 11 40		

Taddiandamole from Cannanore 157072

	Taddiandamole ..	16 51 05	Station in Redoubt ..	171686.4
	Cannanore	98 16 45		50294.4
	Station in Redoubt	64 52 10		

Taddiandamole from Station in Redoubt 171686.4

	Taddiandamole ..	29 26	Tellicherry	175846.6
	Station in Redoubt	132 52 33		6143.1
	Tellicherry	46 38 01		

SECTION IV.

Latitude of Dodagoontah *Station, with the position of its Meridian.*

Dodagoontah station is selected as the point of departure in preference to the observatory at *Madras*, as it is nearly in the middle of the *Peninsula*, and its meridian is intended to be carried down to *Cape Comorin*. It has already been extended below the latitude of 11°, and the series of triangles from which it is deduced, being to form the foundation of all the branches which may hereafter be carried to each coast, I have considered it as the properest meridian to which all latitudes and relative longitudes should be referred.

8. Zenith distances of stars observed at *Dodagoontah*, with their corrections for precession, nutation, aberration, and the semi-annual solar equation, back to the beginning of the year 1805, for determining the latitude of that station.

OBSERVATIONS AT DODAGOONTAH.

α SERPENTIS.

NEAREST POINT ON THE LIMB 5° 55′ S.

1805. Month.	Face.	Obsd. Zenith Distances.	Corrections.	Correct Zenith Distances.	Thermometers. Upper.	Lower.
			—			
July 10.	E.	5° 57′ 04″.49	7″.14	5° 56′ 57″.35	70°	70°
12.	W.	5 56 59 .38	6 .93	5 56 52 .45	73	73
15.	E.	5 57 07 .74	6 .64	5 57 01 .10	79 .5	79
18.	W.	5 56 54 .73	6 .36	5 56 48 .37	78	78
19.	E.	5 57 9 .64	6 .26	5 57 3 .38	76	76
24.	W.	5 56 59 .24	5 .82	5 56 53 .43	79 .5	79
26.	E.	5 57 05 .74	5 .66	5 57 00 .08	75 .5	75
27.	W.	5 56 52 .13	5 .58	5 56 46 .55	79	79
29.	E.	5 56 59 .41	5 .43	5 56 53 .98	72	72
31.	W.	5 56 52 .73	5 .28	5 56 47 .45	75 .5	76
1806, June 19.	E.	5 56 16 .76	19 .08	5 56 57 .68	73	73
20.	W.	5 56 10 .88	18 .95	5 56 51 .93	72	72
22.	W.	5 56 07 .38	18 .70	5 56 48 .68	76	76
23.	E.	5 56 13 .21	18 .57	5 56 54 .64	73	73
				Mean····	75 .1	75 .1

α HERCULIS.

NEAREST POINT ON THE LIMB 1° 35′ N.

1805. Month.	Face.	Obsd. Zenith Distance.	Correction.	Correct Zenith Distance.	Thermometers. Upper.	Lower.
			+			
July 12.	E.	1° 37′ 19″.83	0″.39	1° 37′ 20″.22	68°	69°
			—			
16.	E.	1 37 20 .53	0 .27	1 37 20 .26	72 .5	73
19.	W.	1 37 37 .14	0 .73	1 37 36 .41	75	76
28.	W.	1 37 35 .88	2 .03	1 37 33 .85	74	74
29.	E.	1 37 22 .55	2 .16	1 37 20 .39	76	76
31.	E.	1 37 23 .16	2 .42	1 37 20 .74	69	68 .5
August 2.	W.	1 37 35 .26	2 .66	1 37 32 .60	77 .5	77 .5
7.	E.	1 37 24 .76	3 .26	1 37 21 .50	71 .5	72
8.	W.	1 37 36 .89	3 .37	1 37 33 .52	71 .5	71
9.	E.	1 37 25 .56	3 .48	1 37 22 .08	71	71
10.	W.	1 37 36 .79	3 .58	1 37 33 .21	73	73
12.	E.	1 37 24 .76	3 .78	1 37 20 .98	74	74
14.	W.	1 37 37 .87	3 .98	1 37 33 .89	74	74
16.	E.	1 37 27 .06	4 .17	1 37 22 .89	71 .5	71
				Mean	73	73 .5

α OPHIUCHI.

NEAREST POINT ON THE LIMB 0° 15′ S.

			+			
July 12.	E.	0 17 14 .49	0 .29	0 17 14 .78	69	70
13.	W.	0 17 03 .10	0 .46	0 17 03 .36	71	72
15.	E.	0 17 13 .54	0 .77	0 17 14 .31	71	71 .5
19.	E.	0 17 11 .60	1 .43	0 17 13 .03	75	75
22.	W.	0 16 59 .10	1 .89	0 17 00 .99	74	74
28.	E.	0 17 10 .74	2 .76	0 17 13 .50	74	74
29.	W.	0 16 57 .63	2 .89	0 17 00 .52	76 .5	76
30.	E.	0 17 09 .24	3 .02	0 17 12 .26	77	77
31.	W.	0 16 58 .93	3 .15	0 17 02 .08	69 .5	69
August 7.	E.	0 17 08 .51	4 .02	0 17 12 .53	72	72
8.	W.	0 16 57 .24	4 .14	0 17 01 .38	71	71
9.	E.	0 17 09 .08	4 .25	0 17 13 .33	71	71
10.	W.	0 16 57 .76	4 .36	0 17 02 .12	73	73
12.	E.	0 17 07 .54	4 .58	0 17 12 .12	73	73
14.	W.	0 16 55 .13	4 .78	0 16 59 .91	74	74
17.	E.	0 17 8 .74	5 .07	0 17 13 .81	72 .5	72 .5
				Mean	72 .7	72 .8

AQUILÆ.

NEAREST POINT ON THE LIMB 2° 50′ S.

1805. Month.	Face.	Observed Zenith Distance.	Correction.	Correct Zenith Distance.	Thermometer. Upper.	Lower.
			+			
July 12.	E.	2° 50′ 55″.13	7″.96	2° 51′ 03″.09	67°.5	68°
13.	W.	2 50 42 .80	8 .17	2 50 50 .97	70	70
15.	E.	2 50 51 .50	8 .57	2 51 0 .07	69	70
16.	W.	2 50 42 .50	8 .77	2 50 51 .27	70	71
19.	E.	2 50 55 .50	9 .36	2 51 4 .86	74	73
22.	W.	2 50 37 .40	9 .94	2 50 47 .34	73	72 .5
31.	E.	2 50 50 .40	11 .58	2 51 1 .98	69	69
August 7.	W.	2 50 39 .40	12 .76	2 50 52 .16	70	70
8.	E.	2 50 46 .13	12 .92	2 50 59 .05	69 .5	70
9.	W.	2 50 40 .75	13 .08	2 50 53 .83	70	70
10.	E.	2 50 49 .50	13 .24	2 51 2 .74	70	70
12.	W.	2 50 38 .33	13 .55	2 50 51 .88	73	72
13.	E.	2 50 48 .63	13 .70	2 51 2 .33	70	70
17.	W.	2 50 38 .30	14 .27	2 50 52 .57	72	72
20.	E.	2 50 49 .00	14 .70	2 51 3 .70	70	70
30.	W.	2 50 38 .20	15 .91	2 50 54 .11	72	72
				Mean····	70 .6	70 .6

ATAIR.

NEAREST POINT ON THE LIMB 4 35 S.

			+			
July 12.	E.	4 37 55 .62	8 .49	4 38 04 .11	67 .5	68
13.	W.	4 37 42 .39	8 .68	4 37 51 .07	70	70
15.	E.	4 37 56 .47	9 .07	4 38 05 .54	69	70
16.	W.	4 37 43 .39	9 .26	4 37 52 .65	70	71
19.	E.	4 37 56 .14	9 .83	4 38 5 .97	73	72 .5
22.	W.	4 37 42 .01	10 .41	4 37 52 .42	73	73
29.	E.	4 37 53 .89	11 .65	4 38 5 .54	74 .5	74 .5
30.	W.	4 37 40 .39	11 .82	4 37 52 .21	76	76
31.	E.	4 37 51 .84	11 .99	4 38 3 .83	69	69
August 7.	W.	4 37 40 .96	13 .13	4 37 54 .09	71	71
8.	E.	4 37 48 .37	13 .28	4 38 01 .66	69 .5	70
9.	W.	4 37 41 .89	13 .44	4 37 55 .33	70	70
10.	E.	4 37 48 .34	13 .59	4 38 1 .93	70	70
12.	W.	4 37 39 .76	13 .89	4 37 53 .65	73	72
13.	E.	4 37 48 .17	14 .04	4 38 2 .21	70	70
17.	W.	4 37 41 .86	14 .60	4 37 56 .45	72	72
20.	E.	4 37 49 .37	14 .99	4 38 4 .36	70	70
30.	W.	4 37 37 .89	16 .16	4 37 54 .05	72	72
				Mean····	71 .1	71 .2

β AQUILÆ.

NEAREST POINT ON THE LIMB 7° 5′ S.

1806. Month.	Face.	Observed Zenith Distance.	Correction.	Correct Zenith Distance.	Thermometer. Upper.	Lower.
			+			
August 25.	E.	7° 03′ 38″.62	26″.27	7° 4′ 4″.89	76°	76°
26.	W.	7 03 29 .87	26 .37	7 3 56 .24	72	73
27.	E.	7 03 40 .87	26 .47	7 4 7 .34	71	71
				Mean····	73	73.3

ARCTURUS.

NEAREST POINT ON THE LIMB 7 10 N.

1805.						
			+			
July 11.	W.	7 12 12 .43	7 .50	7 12 19 .93	74 .5	74 .5
13.	E.	7 11 58 .13	7 .36	7 12 65 .49	74	74 .5
16.	W.	7 12 11 .36	7 .16	7 12 18 .52	77	77
22.	E.	7 11 59 .98	6 .85	7 12 6 .83	80	79 .5
26.	W.	7 12 13 .26	6 .60	7 12 19 .95	84	83
				Mean····	77 .9	77 .7

MARKAB.

NEAREST POINT ON THE LIMB 1 10 N.

			−			
August 13.	E.	1 9 50 .40	22 .11	1 9 28 .28	68	68
14.	W.	1 10 5 .30	22 .32	1 9 42 .98	69	70
17.	E.	1 9 55 .00	22 .93	1 9 32 .07	69	70
21.	W.	1 10 5 .30	23 .72	1 9 41 .58	68	69
23.	W.	1 10 06 .00	24 .09	1 9 41 .91	72	72
28.	W.	1 10 4 .40	24 .98	1 9 39 .42	68	69
29.	E.	1 10 00 .00	25 .18	1 9 34 .82	72	72
30.	W.	1 10 6 .50	25 .35	1 9 41 .15	71	71
				Mean····	69 .6	70 .1

PEGASI.

NEAREST POINT ON THE LIMB 1 5 N

			−			
August 22.	E.	1 6 21 .26	24 .04	1 5 57 .22	68	69
23.	W.	1 6 31 .63	24 .42	1 6 07 .21	70	71
27.	E.	1 6 23 .50	24 .93	1 5 58 .56	68	69
30.	W.	1 6 35 .13	25 .44	1 6 09 .69	68	70
				Mean····	68 .5	69 .8

Means of the Zenith Distances taken on the right and left Arcs, corrected for refraction, equation of the sectorial tube, and the mean runs of the Micrometer.

Previous to this arrangement of the zenith distances it may be proper to say a few words on the different corrections here mentioned.

The refraction is had from the tables of mean refraction, and no notice taken of the barometer or thermometer, or of the heights of the stations above the level of the sea, considering it doubtful what corrections to apply until observations are made, and tables of refraction constructed, for this climate, and for different elevations.

The corrections for the micrometer were determined by taking the runs between every dot on the arc when the mean temperature was 74°, it having been discovered upon more minute attention, that one degree on the limb was more than 3600 divisions marked seconds on the micrometer; and the average of all the results gave 3604. Therefore one minute counted by that scale required a deduction of 0″.066 to give its true measure from the nearest dot. In all these observations two thermometers were used, one opposite the upper axis, the other opposite the arc, and the experiments for ascertaining the runs were made when the thermometers stood at the same degree.

This error in the scale of the micrometer has doubtless arisen in a great measure from the unequal expansion of the sectorial tube and the frame which carries it, whereby the point of the screw does not coincide with the centre of the steel plate against which it presses, and in consequence causes a greater equation than what would arise simply from the expansion of

the arc while the point rested on the centre of the plate. Exclusive of the above correction, I have endeavoured to make some allowance for the variation of temperature from 74°, but I have found it too trifling to be noticed.

The correction for the sectorial tube, is a small equation which arises when the temperature above is different from that below; on which account the expansion and contraction of the tube are not in the same ratio with those of the arc. This irregularity, like the last, is in general very inconsiderable, though the correction for it is taken into account.

ZENITH DISTANCES at Dodagoontah, *arranged and finally corrected.*

α SERPENTIS.

1805. Month.	Left Arc.	1805. Month.	Right Arc.	Mean.
July 10.	5° 56′ 57″.35	July 12.	5° 56′ 52″.45	Mean ..... 5° 56′ 53″.82
15.	5 57 1 .10	18.	5 56 48 .37	Refraction, &c.. + 5.82
19.	5 57 3 .38	24.	5 56 53 .42	
26.	5 57 0 .08	27.	5 56 46 .55	Zenith Distances 5 56 59 .64
29.	5 56 53 .98	31.	5 56 47 .45	
1806. June 19.	5 57 57 .68	1806. June 20.	5 56 51 .93	
23.	5 56 54 .64	22.	5 56 48 .68	
Mean....	5 56 57 .67	Mean....	5 56 49 .97	

α HERCULIS.

1805. Month.	Left Arc.	1805. Month.	Left Arc.
July 19.	1° 37′ 36″.41	July 12.	1° 37′ 20″.22
28.	1 37 33 .85	16.	1 37 20 .26
August 2.	1 37 32 .60	29.	1 37 20 .39
8.	1 37 33 .52	31.	1 37 20 .74
10.	1 37 33 .21	August 7.	1 37 21 .50
14.	1 37 33 .89	9.	1 37 22 .08
		12.	1 37 20 .98
		16.	1 37 22 .89
Mean....	1 37 33 .91	Mean....	1 37 21 .13

Mean		
Mean.....	1° 37′	27″.52
Refraction, &c.	+	1 .47
Zenith Distance	1 37	28 .99

α OPHIUCHI.

July 12.	0 17 14 .78	July 13.	0 17 03 .56
15.	0 17 14 .31	22.	0 17 0 .99
19.	0 17 13 .03	29.	0 17 0 .52
28.	0 17 13 .5	31.	0 17 2 .08
30.	0 17 12 .26	August 8.	0 17 1 .38
August 7.	0 17 12 .53	10.	0 17 2 .12
9.	0 17 13 .33	14.	0 16 59 .91
12.	0 17 12 .12		
17.	0 17 13 .81		
Mean....	0 17 13 .30	Mean....	0 17 1 .51

Mean		
Mean	0 17	7 .40
Refraction, &c..	+	0 .31
Zenith Distance	0 17	7 .71

γ AQUILÆ.

July 12.	2 51 3 .09	July 13.	2 50 50 .97
15.	2 51 0 .07	16.	2 50 51 .27
19.	2 51 4 .86	22.	2 50 47 .34
31.	2 51 1 .98	August 7.	2 50 52 .16
August 8.	2 50 59 .05	9.	2 50 53 .83
10.	2 51 2 .74	12.	2 50 51 .88
13.	2 51 2 .33	17.	2 50 52 .57
20.	2 51 3 .70	30.	2 50 54 .11
Mean....	2 51 2 .23	Mean....	2 50 51 .77

Mean		
Mean	2 50	57 .0
Refraction, &c.	+	2 .78
Zenith Distance	2 50	59 .78

ATAIR.

1805. Month.	Left Arc.	1805. Month.	Right Arc.	Mean.
July 12.	4° 38′ 4″.11	July 13.	4° 37′ 51″.07	Mean ..... 4° 37′ 58″.73
15.	4 38 5 .54	16.	4 37 52 .65	Refraction, &c. + 4 .61
19.	4 38 5 .97	22.	4 37 52 .42	
29.	4 38 5 .54	30.	4 37 52 .21	Zenith Distance 4 38 3 .34
31.	4 38 3 .83	August 7.	4 37 54 .09	
August 8.	4 38 1 .66	9.	4 37 55 .33	
10.	4 38 1 .93	12.	4 37 53 .65	
13.	4 38 2 .21	17.	4 37 56 .45	
20.	4 38 4 .36	30.	4 37 54 .05	
Mean	4 38 3 .91	Mean	4 37 53 .55	

β AQUILÆ.

1806.		1806.		
August 25.	7 4 4 .89	August 26.	7 3 56 .24	Mean ..... 7 4 1 .18
27.	7 4 7 .34			Refraction, &c.. + 7 .18
Mean	7 4 6 .11	Mean	7 3 56 .24	Zenith Distance 7 4 8 .36

MARKAB.

1805.				
August 14.	1 9 42 .98	August 13.	1 9 28 .28	Mean ..... 1 9 36 .57
21.	1 9 41 .58	17.	1 9 32 .07	Refraction, &c. + 1 .19
23.	1 9 41 .91	29.	1 9 34 .82	
28.	1 9 39 .42			Zenith Distance 1 9 37 .76
30.	1 9 41 .15			
Mean	1 9 41 .41	Mean	1 9 31 .73	

PEGASI.

August 23.	1 6 7 .21	August 22.	1 5 57 .22	Mean ..... 1 6 3 .17
30.	1 6 9 .69	27.	1 5 58 .56	Refraction, &c. + 1 .06
Mean	1 6 8 .45	Mean	1 5 57 .89	Zenith Distance 1 6 4 .23

ARCTURUS.

1805.				
July 11.	7° 12′ 19″.93	July 13.	7° 12′ 5′.49	Mean ..... 7° 12′ 12″.81
16.	7 12 18 .52	22.	7 12 6 .83	Refraction, &c.. + 7 .03
26.	7 12 19 .95			Zenith Distance.. 7 12 19 .84
Mean....	7 12 19 .47	Mean....	7 12 6 .16	

The Latitude of Dodagoontah *Station, deduced from the foregoing Stars.*

STARS.	From the beginning of 1805. Mean Declination.	Correct Z. Distance.	Latitude.
. Arcturus.....	20° 12′ 19″.23 N.	7° 12′ 19″.84 N.	12° 59′ 59″.39 N.
α Serpentis.....	7 3 0 .3	5 56 59 .64 S.	59 .97
α Herculis.....	14 37 30 .96	1 37 28 .99 N.	61 .97
α Ophiuchi	12 42 50 .91	0 17 7 .71 S.	58 .62
ε Aquilæ	10 8 58 .34	2 50 59 .78 S.	58 .12
Atair	8 21 53 .53	4 38 3 .34 S.	56 .87
β Aquilæ	5 55 52 .71	7 4 8 .73 S.	61 .44
Markab	14 9 40 .09	1 9 37 .76 N.	62 .33
ε Pegasi.....	14 6 4 .7	1 6 4 .23 N.	60 .47
		Mean....	12 59 59 .91

This is one of the stations alluded to in the note p. 291, where the plummet is supposed to have been drawn to the northward; in which case the latitude here deduced must be something in defect.

Pole-star observations at *Dodagoontah* Station, reduced for determining the position of the Meridian.

1805. Month.	Apparent Polar Distance.	Latitude.	Azimuths.	Angle between the Pole-star and Lamp.	Angle between the N. Pole and Lamp.
July 19.	1° 43′ 58″.20	12° 59′ 59″.91	1° 46′ 42″.16	1° 31′ 53″.00	0° 14′ 49″.16
22.	1 43 57 .57		1 46 41 .70	1 31 56 .25	0 14 45 .45
August 8.	1 43 54 .07		1 46 38 .10	1 31 51 .25	0 14 46 .85
12.	1 43 53 .05		1 46 37 .06	1 31 48 .50	0 14 48 .56
17.	1 43 51 .70		1 46 35 .67	1 31 46 .25	0 14 49 .42
18.	1 43 51 .44		1 46 35 .40	1 31 47 .50	0 14 47 .90
19.	1 43 51 .16		1 46 35 .10	1 31 45 .50	0 14 49 .60
23.	1 43 50 .04		1 46 33 .97	1 31 45 .50	0 14 48 .47
26.	1 43 49 .09		1 46 32 .99	1 31 43 .50	0 14 49 .49
27.	1 43 48 .82		1 46 32 .73	1 31 44 .50	0 14 48 .23
Angle between the N. Pole and Referring Lamp N. easterly.....					0 14 48 .31
Angle between the Referring Flag and Savendroog					104 4 29 .68
Angle between the N. Pole and Savendroog Station					103 49 41 .37

SECTION V.

Length of the Perpendicular Degree, and the Latitudes and relative Longitudes of all the great Stations of Observation, and other places on the two Coasts.

10. The measurement of an arc perpendicular to the meridian, and the length of a degree in latitude 12° 55′ 10″.

For determining the latitude of *Savendroog*, we have at *Dodagoontah* station, the bearing of *Savendroog* station with the meridian 76° 10′ 18″.63 S. W^{ly}. and the distance between these two stations = 121933.2 feet. These will give the westing of *Savendroog* = 118399.2 feet, and the southing of the point on the meridian of *Dodagoontah*, where the perpendicular let fall from *Savendroog*, will cut the said meridian = 29143.3 feet, which is equal to an arc of 4′ 48″.88, and this deducted from the latitude of *Dodagoontah* gives 12° 55′ 11″.03. The westing will give an arc perpendicular to the meridian 19′ 29″.04, with which, and the co-latitude of the above point, the latitude of *Savendroog* will be had 12° 55′ 10″.24.

NOTE. *The meridional degree is taken at* 60498 *fathoms, being the computed degree for Latitude* 12° 55′ 10″, *as deduced from the measured degrees for latitude* 11° 59′ 55″ *and latitude* 52° 02′ 30″.

Pole-Star Observations at Savendroog *Station, reduced for determining the position of the Meridian.*

1804 Month.	Apparent Polar Distance.	Latitude	Azimuths.	Angle between the Pole-star and Referring Lamp.	Angle between the N. Pole and Referring Lamp.
March 6.	1° 43′ 57″.66	12° 55′ 10″.24	1° 46′ 39″.72	2° 28′ 56″.75	0° 42′ 17″.03
7.	1 43 57 .94		1 46 40	2 28 57 .25	0 42 17 .25
8.	1 43 58 .23		1 46 40 .3	2 28 54	0 42 13 .7
9.	1 43 58 .49		1 46 40 .57	2 28 53 .5	0 42 12 .93
10.	1 43 58 .77		1 46 40 .86	2 28 57 .75	0 42 16 .89
13.	1 43 59 .62		1 46 41 .73	2 28 56	0 42 14 .27
14.	1 43 59 .91		1 46 42 .03	2 28 58 .75	0 42 16 .72
15.	1 44 00 .19		1 46 42 .31	2 28 58 .75	0 42 16 .44
16.	1 44 00 .49		1 46 42 .62	2 28 58 .25	0 42 15 .63
21.	1 44 00 .96		1 46 43 .11	2 29 01 .12	0 42 18 .02

Angle between the North Pole and Referring Lamp	0 42 15 .89 E.
Angle between the Referring Lamp and Mullapunnabetta	90 40 01 .16
Angle between the North Pole and Mullapunnabetta	89 57 45 .27 W.

Angle between the North Pole and Referring Lamp	0 42 15 .89 E.
Angle between the Referring Lamp and Yerracondah	92 04 49 .45
Angle between the North Pole and Yerracondah	92 47 05 .34 E.

Pole-Star Observations at Mullapunnabetta *Station, reduced for determining the position of the Meridian.*

Nov. 7.	1 43 42 .37	12 55 05 .6	1 46 24	170 43 15 .25	172 29 39 .25
8.	1 43 42 .03		1 46 23 .65	170 43 18	172 29 41 .65
10.	1 43 41 .36		1 46 22 .96	170 43 18 .37	172 29 41 .33
12.	1 43 40 .71		1 46 22 .29	170 43 19 .13	172 29 41 .42
13.	1 43 40 .39		1 46 21 .96	170 43 19 .38	172 29 41 .34
14.	1 43 40 .07		1 46 21 .64	170 43 20	172 29 41 .64
15.	1 43 39 .75		1 46 21 .31	170 43 19 .62	172 29 40 .93
16.	1 43 39 .42		1 46 20 .97	170 43 20	172 29 40 .97
17.	1 43 39 .11		1 46 20 .65	170 43 19 .25	172 29 39 .9
19.	1 43 38 .49		1 46 20 .02	170 43 19 .25	172 29 39 .27
1805 Dec. 12.	1 43 13 .24		1 45 54 .11	170 43 49	172 29 43 .11
13.	1 43 13 .04		1 45 53 .9	170 43 48 .25	172 29 42 .15
14.	1 43 12 .85		1 45 53 .71	170 43 48 .12	172 29 41 .83
15.	1 43 12 .67		1 45 53 .52	170 43 47 .75	172 29 41 .27
16.	1 43 12 .49		1 45 53 .34	170 43 49 .25	172 29 42 .59
20.	1 43 11 .84		1 45 52 .67	170 43 48 .2	172 29 40 .87
24.	1 43 11 .29		1 45 52 .11	170 43 48 .5	172 29 40 .61
25.	1 43 11 .16		1 45 51 .99	170 43 50 .35	172 29 42 .34

Angle between the North Pole and Referring Lamp	172 29 41 .25 W.
Angle between the Referring Lamp and Savendroog	97 41 34 .36
Angle between the North Pole and Savendroog	89 48 44 .39 E.

Pole-Star Observations at Yerracondah *Station, reduced for determining the position of the Meridian.*

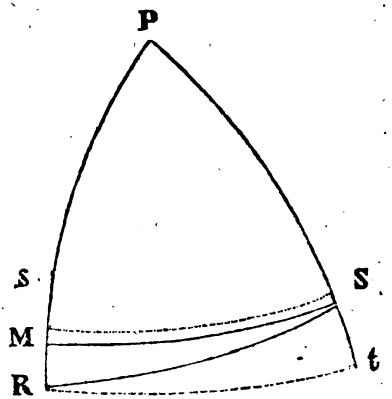
1804 Month.	Apparent Polar Distance.	Latitude	Azimuths.	Angle between the Pole-star and Referring Lamp.	Angle between the N. Pole and Referring Lamp.
Jan. 15.	1° 43′ 49″.81	12° 52′ 14″.36	1° 46′ 30″.42	9° 3′ 6″.5	7° 16′ 36″.08
16.	1 43 49 .82		1 46 30 .43	9 3 3 .85	7 16 33 .42
19.	1 43 49 .9		1 46 30 .51	9 3 2	7 16 31 .49
20.	1 43 49 .92		1 46 30 .53	9 3 3 .5	7 16 32 .97
21.	1 43 49 .95		1 46 30 .56	9 3 5 .5	7 16 34 .94
22.	1 43 50 .02		1 46 30 .63	9 3 3 .75	7 16 33 .12
23.	1 43 50 .07		1 46 30 .68	9 3 4	7 16 33 .32
26.	1 43 50 .26		1 46 30 .87	9 3 5	7 16 34 .12
27.	1 43 50 .35		1 46 30 .96	9 3 4 .25	7 16 33 .3
Angle between the North Pole and Referring Lamp					7 16 33 .64 E.
Angle between the Referring Lamp and Savendroog					94 16 14 .97
Angle between the North Pole and Savendroog					86 59 41 .33 W.

As the latitudes were necessary for computing the azimuths, they were first had spherically for the two stations at *Mullapunnabetta* and *Yerracondah*, by taking the westing and easting from the meridian of *Savendroog*, and converting them into parts of great circles. These came so near the truth, that on recomputing the azimuths by the latitudes finally brought out, there was no sensible difference.

It may be remarked here, that no double azimuths have been taken. The pole-star being so low, and the vapour in the atmosphere so great in general, that I have never, except in two instances, been able to discern it while the sun was above the horizon.

The Arc comprehended by the Meridians of Savendroog *and* Mullapunnabetta.

Let S and M be the stations at *Savendroog* and *Mullapunnabetta*, and P the pole, and SR be a great circle perpendicular to the meridian SP at S, and also Ss a parallel of latitude at the same point S. Then we have given the observed angles PSM and PMS, the distance SM, and the latitude of S, to find the latitude of M.



In the spheriodical triangle MSR, the angle MSR $= 90° - \angle$ PSM $= 0° 2' 14''.73$, and the angle SMR $= 180° - \angle$ PMS $= 90° 11' 15''.61$, and these being corrected for the chords, we shall have the angle MSR $= 0\ 2'\ 14''.73$, and the angle RMS $= 90°\ 11'\ 15''.58$ for the chord angles. Whence the angle SRM $= 180°$ — sums of the above angles, or $89°\ 46'\ 29.69$, and with these and the side or chord MS, the distance given by the triangles, we shall find the chord of the perpendicular arc SR $= 357644.6$ and the side MR $= 233.64$ feet, and this last may be taken either as a chord or arc indifferently.

Now the spherical excess of the triangle SMR is $0''.02$, and the sum of the corrections for the angles MSR and SMR being $- 0''.03$, the difference between this sum and the said spherical excess is $+ 0''.01$ the correction for the angle MSR, which applied to the chord angle, we get the angle MRS or PRS as an observed angle, equal $89°\ 46'\ 29''.68$.

Continue the meridian PS to t, and draw Rt parallel to Ss. Then, since the small angle SRt, or its equal RSs, is half the difference between the angles

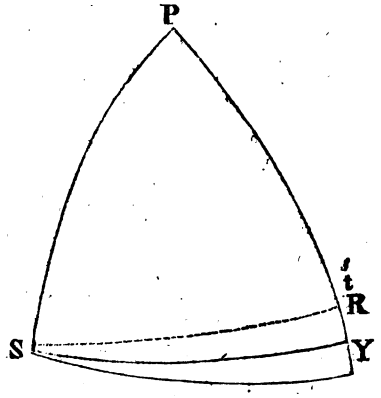
PRS and PSR, that is half the difference between 90° and the angle PRS as an observed one, we have $\frac{90° - (89° 46' 29''.68)}{2} = 6' 45''.16$, the angle RSs. Hence in triangle RSs considered as a plane one, there are given the angles at R and S and the side SR, as formerly found, from which will be had Ss and Rs equal 357642.6 feet and 702.51 feet respectively; as also Ms (= RS — RM) equal 468.87 feet, which measures the distance between the parallels of S and M. But 468.87 feet as an arc on the meridian is 4''.65, which substracted from the latitude of S gives 12° 55' 05''.59 for the latitude of M, the station at *Mullapunnabetta*.

Hence in the triangle SPM there are given the sides SP and MP (the co-latitudes of S and M) and the angles PSM; PMS, the observed angles at S and M. Then, as the tangent 77° 4' 52''.085 : tangent 0° 0' 2''.325 :: tangent 89° 53' 14''.83 : tangent 0° 4' 31''.26; which last applied to the half sum of the observed angles, we get 89° 53' 14''.83 + 4' 31''.26 = 89° 57' 46''.09 and 89° 53' 14''.83 — 4' 31''.26 = 89° 48' 43''.57 for the angles at *Savendroog* and *Mullapunnabetta* such as they would have been observed on a sphere. Then proceeding by spherical computation with the sides PS, PM, and the angles PSM and PMS given, the angle SPM, or difference of longitude of S and M will be had equal 1° 00' 24''.44, from which and the side SP in the right angled spherical triangle PSR the side SR or arc SR perpendicular to the meridian PS at the point S will be had equal 0° 58' 52''.71.

Now the chord of the arc SR is had = 357644.6 feet, half of which will be as the sine of half the arc SR, and from which is got the radius of the same arc, and thence the length of the arc SR is found to be 357650.8 feet. Then as 58' 52''.71 : 357650.8 :: 60' : 364463.3 feet, or 60743.8 fathoms, for the measure of the degree at right angles to the meridian of *Savendroog*.

The Arc comprehended by the Meridians of Savendroog *and* Yerracondah.

Let S and Y be the stations at *Savendroog* and *Yerracondah* respectively, and let the latitude of Y be deduced from that of S, the angles PSY and PYS having been observed. Let SR be a great circle perpendicular to the meridian SP at S, and St′ a parallel of latitude at the same point S. Here the angle RSY = PSY − 90° = 2° 47′ 5″.34, and the angle RYS being the observed angle at Y = 86° 59′ 41″.33. These angles being corrected for the chords, the supplement to their sum will be the chord angle at R in the spheriodical triangle SRY. Let the chords of SR and YR be computed with the corrected angles, then if the angle at R be augmented by the difference between the sum of the corrections for the other two angles and the spherical excess, it will become 90° 13′ 14″.74, or such as would have been observed at R. Hence 180° − ∠ SRY = 89° 46′ 45″.26 the angle t′RS, and by considering the triangle St′R as a plane one, the small angle t′SR is equal $\frac{90-\angle t'RS}{2}$ = 0° 6′ 37″.37. With this angle, and the angle t′RS, and the distance SR, as found above, the small side t′R is had = 675.86 feet, which added to RY = 17067.72 gives t′Y = 17743.58 feet, the distance between the parallels of S and Y. But 17743.58 feet is equal to an arc on the meridian of 2′ 55″.98, and this deducted from the latitude of *Savendroog*, gives 12° 52′ 14″.26 for the latitude of *Yerracondah*.



Hence, with the co-latitudes of *Savendroog* and

Yerracondah, and the observed angles PSY and PYS, we have, the tangent of half the sum of the first, to the tangent of half their difference, as the tangent of half the sum of the second, to tangent of 2° 54′ 25″.92, their half difference: from which we get the greater angle at S = 92° 47′ 49″.25, and the less angle at Y = 86° 58′ 57″.41 thus corrected for computing spherically: and with these and co-latitudes, proceeding as before, the angle SPY will be had = 0° 59′ 14″.83, and the perpendicular arc = 0° 57′ 44″.86. But the chord subtended by this arc is 350824 feet, and therefore the arc itself 350827.7 feet. Then, as 57′.74767 : 350827.7 feet :: 60′ : 364510.8 feet, or 60751.8 fathoms, for the length of the degree at right angles to the meridian of *Savendroog*, as deduced from the distance between *Savendroog* and *Yerracondah*; and the length of the perpendicular degree deduced from the distance between *Savendroog* and *Mullapumabetta* being 60743.8 fathoms, the mean of these two, or 60747.8 fathoms, may be considered as nearly the true measure for latitude 12° 55′ 10″.

If the ratio of the earth's diameters be taken as 1 : 1.003125, and the meridional degree in latitude 11° 59′ 55″ be 60494 fathoms; then, by using these data, the *computed* meridional degree on the ellipsoid in latitude 12° 55′ 10″ will be 60498 fathoms; with which and the above ratio, the *computed* degree at right angles to the meridian in the same latitude will be had 60858 fathoms, which exceeds the measured one by 110 fathoms nearly; so that we may infer from this, either that the earth is not an ellipsoid, or that this measurement is incorrect.

The more we investigate this interesting subject, and the more ample means we employ to ascertain the exact figure of the earth, the more seems to be wanting to satisfy our research; and if we feel reluctant in giving up the elliptic hypothesis, because it is consonant to that harmony and order with which we are familiar, the discord which these results indicate, afford by no means sufficient evidence

to induce us to abandon that theory. The great nicety in making the pole-star observations is well understood, and it will be made more manifest in the case before us by increasing or diminishing the half sum of the angles with the meridians, reciprocally taken at *Mullapunnabetta* and *Savendroog*, by one second only, when it will appear that a difference of nearly *one hundred and fifty fathoms*, in the perpendicular degree, will be occasioned thereby.

I am fully aware of the delicacy necessary in taking these angles, and I am also aware that some eminent mathematicians consider the method of determining the difference of longitude by the convergency of meridians as insufficient in these low latitudes; yet I am of opinion that by repeating these observations whenever stations can be found, either in the same, or in different latitudes, the truth may ultimately be very nearly attained. I at one time had determined on increasing the number of observations at *Mullapunnabetta*, *Savendroog* and *Yerracondah*, on my return to the eastward; but when I was at *Mullapunnabetta* a second time, and had increased the number of pole-star observations there to eighteen. and had also taken several other angles between *Savendroog* and the referring lamp, and after all finding that the angle between the meridian and *Savendroog* was altered only $\frac{1}{25}$ part of a second, I did not think it necessary to go to the other stations, particularly as the observations there had been made under the most favorable circumstances. It is, notwithstanding, desirable that many more measurements of the kind should be made, and that other methods should be tried for getting the length of a degree of longitude, particularly that of carrying a good time-keeper between two meridians at a known distance, a method which has been strongly represented to me by the Astronomer Royal, and which I mean to put in practice in the course of my future operations. I had also devised another method by the instantaneous extinction of large blue lights fired at *Savendroog*, the times of which were to be noticed by observers at

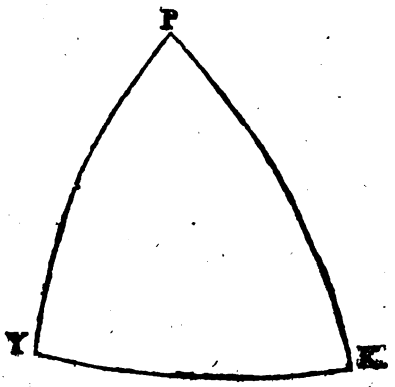
Mullapunnabetta and *Yerracondah*, the distance of whose meridians on a parallel of latitude passing through *Savendroog* being nearly 135 miles. The experiments were attempted, but the weather was so dull that the lights could scarcely be distinguished. There is besides a difficulty in fixing the precise moment of extinction; and even in the most favorable state of the atmosphere, when the lights may be distinctly seen with the naked eye at near seventy miles distance, to come within half a second of the truth, would be as near as the eye is capable of, which is equal to $7''\frac{1}{2}$ in an angle at the pole: but the mean of a great number of successful results might come very near the truth.

Since the triangles in this survey have been carried direct from the observatory at *Madras* to *Mangalore*, by which easy means are offered to determine the length of a parallel of latitude subtended by two meridians nearly five degrees and a half distant from each other, it may be further suggested, whether a long course of corresponding observations made at *Madras* observatory and at another place on the *Malabar* coast, by the eclipses of the satellites, occultations of stars by the moon, &c. might not afford another eligible method for determining the length of a degree of longitude.

In short, the difficulty of obtaining this desideratum, and the important advantages to geography and physical science which must accrue therefrom, are such powerful incitements to a zealous prosecution of the inquiry, that I may venture an assurance of leaving nothing undone, which may come within the compass of my abilities, to give every possible satisfaction on the subject; and if my endeavours to throw some light on the path to future discovery be successful, I shall close the period of my labours with the grateful reflection, that, while employed in conducting a work of national utility, I shall have added my humble mite to the stock of general science.

11. Latitude and longitude of *Kylasghur*.

Let Y be *Yerracondah*, K *Kylasghur*, and P the pole. Then in the spherical triangle PYK there are given YP = 77° 7′ 45″.74, the co-latitude of *Yerracondah*, YK = 46′ 33″.51, the oblique arc as computed on the spheroid; and the angle PYK = 92° 13′ 46″.11, as observed at *Yerracondah*, to find PK, the co-latitude of *Kylasghur* which by spherical computation will be had equal 77° 9′ 38″.7, and therefore the latitude equal 12° 50′ 21″.3, with which latitude the azimuths being reduced, the pole-star observations at *Kylasghur* will stand as follow:



1803. Month.	Apparent Polar Distance.	Latitude	Azimuths.	Angle between the Pole-star and Referring Lamp.	Angle between the North Pole and Referring Lamp.
Dec. 3.	1° 43′ 54″.74	12° 50′ 21″.3	1° 46′ 35″.41	3° 28′ 57″	1° 42′ 21″.59
7.	1 43 53 .82		1 46 34 .51	3 28 52 .4	1 42 17 .89
12.	1 43 52 .84		1 46 33 .56	3 28 55 .25	1 42 21 .69
13.	1 43 52 .5		1 46 33 .46	3 28 53 .5	1 42 20 .04
Angle between the North Pole and Referring Lamp					1 42 20 .30 E.
Angle between the Referring Lamp and Yerracondah					89 17 57 .607
Angle between the North Pole and Yerracondah					87 35 37 .307 W.

If the same angle be brought out by using the co-latitudes of *Yerracondah* and *Kylasghur*, and the observed angle at *Yerracondah*, between the N. pole and *Kylasghur*, it will be 87° 35′ 37″, very nearly the same as was observed.

Then again, as the sine of either of the co-latitudes, is to the sine of the opposite angle, so is the sine of the oblique arc KY, to sine of the angle KPY, equal

47′ 42″.98, the difference of longitude; to which add the difference of longitude between *Yerracondah* and *Savendroog*, equal 59′ 14″.83, we have 1° 46′ 57″.81 for the longitude of *Kylasghur*, east from the meridian of *Savendroog*.

12. Latitude and Longitude of *Karnatighur*, and the position of its meridian, deduced from that of *Kylasghur*.

The southing of *Karnatighur* from *Kylasghur* is 95144 feet, equal to an arc of 15′ 43″.61 on the meridian of *Kylasghur;* and the easting is 1093.83 feet, equal to 10″.8 of a great circle at right angles to the said meridian, and passing through *Karnatighur*. From the nearness of the meridians of these two stations, the former arc may be considered as the difference of latitude, and therefore being subtracted from the latitude of *Kylasghur*, we have 12° 34′ 37″.69 for the latitude of *Karnatighur*. Hence, by using the co-latitude 77° 25′ 22″.31, and the small perpendicular arc 10″.8, we shall have the difference of longitude 11″.06, and the convergency of the meridian of *Karnatighur* towards that of *Kylasghur* 2″.46 nearly. The former of which being applied to the longitude of *Kylasghur*, will give 1° 47′ 8″.87 for the longitude of *Karnatighur* from the meridian of *Savendroog*, E.

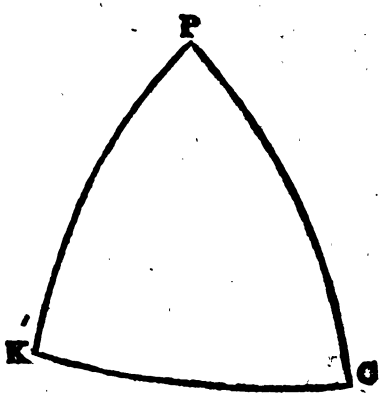
Now the observed angle at *Kylasghur*, between the north pole and *Karnatighur*, was 179° 20′ 28″.83, whose supplement is 0° 39′ 31″.17, which will therefore be the angle at *Karnatighur*, between the north pole and the parallel to the meridian of *Kylasghur;* from which subtract the convergency, we get 0° 39′ 28″.71 for the angle between the north pole and *Kylasghur*, westerly; and this subtracted from 93° 28′ 42″.22, the angle formerly taken at *Karnatighur*, between *Kylasghur* and *Carangooly*, gives 92° 49′ 13″.51 for the angle between the north pole and *Carangooly*.

The same angle taken at *Karnatighur*, in 1803,

was 92° 49′ 15″.93, but as there is reason to doubt the accuracy of that angle, from reasons already given, to which may perhaps be added the want of experience, I shall reject it and adopt the one now brought out for determining

13. The latitude and longitude of *Carangooly* Hill.

The length of the arc comprehended by the stations at *Karnatighur* and *Carangooly*, as determined by the triangles in 1803, was 291196.9 feet, which, as an oblique arc, according to the present scales, will be equal 47′ 56″.21.



Let P be the pole, K *Karnatighur*, and C *Carangooly;* and therefore K′C the oblique arc = 47′ 56″.21. Then if * the observed angle at *Carangooly*, be made use of, (which must be accurate enough for this purpose) we have sine PK′: sine ∠ PCK′ :: sine K′C: sine angle K′PC equal 49′ 2″.9. the difference of longitude. Hence 1° 47′ 8″.87 + 49′ 2″.9 = 2° 36′ 11″.77, the longitude of *Carangooly* from the meridian of *Savendroog*.

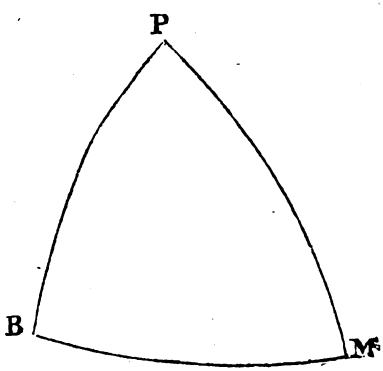
And as sine angle PCK′ : sine K′P :: sine ∠ PK′C : PC = 77° 27′ 42″.2, the co-latitude of *Carangooly*, whose complement 12° 32′ 11″.8 is therefore the latitude.

14. Latitude and longitude of *Balroyndroog*, with the position of its meridian.

As the atmosphere was so extremely dull when

* As determined in 1803, equal 87° 00′ 07″.54.

the pole-star observations were made at *Balroyndroog*, the angle between its meridian and the station at *Mullapunnabetta*, could not be taken, we must therefore depend altogether on computations made with the oblique arc, the latitude of *Mullapunnabetta*, and the angle at that station with the N. pole, and the station at *Balroyndroog*.



Let M and B be the stations at *Mullapunnabetta* and *Balroyndroog* respectively, and let P be the pole, then having given PM equal 77° 4′ 54″.41, BM the oblique arc equal 52′ 42″.12, and the observed angle PMB equal 75° 52′ 54″.95, we shall obtain by spherical computation the side BP = 76° 52′ 08″.4 the co-latitude, and the angle BPM 52′ 28″.94 the difference of longitude, which add to the longitude of *Savendroog* from *Carangpoly* hill, and *Mullapunnabetta* from *Savendroog*, there will be 4° 29′ 05″.15, the longitude of *Balroyndroog* from *Carangooly* hill.

Taking the latitude thus found for computing the azimuths, the pole-star observations at *Balroyndroog* will stand as follow:

1805 Month.	Apparent Polar Distance.	Latitude	Azimuths.	Angle between the Pole-star and Referring Lamp.	Angle between the N. Pole and Referring Lamp.
Feb. 20.	1° 43′ 34″.15	13° 07′ 51″.6	1° 46′ 21″.05	56° 46′ 43″.50	55° 00′ 22″.45
23.	1 43 34 .82		1 46 21 .73	56 46 43 .75	55 00 22 .02
24.	1 43 35 .06		1 46 21 .98	56 46 43 .25	55 00 21 .27
25.	1 43 35 .33		1 46 22 .25	56 46 43	55 00 20 .75
26.	1 43 35 .57		1 46 22 .50	56 46 44 .5	55 00 22
27.	1 43 35 .80		1 46 22 .74	56 46 44 .25	55 00 21 .51
28.	1 43 36 .03		1 46 22 .97	56 46 43 .44	55 00 20 .44
Angle between the North Pole and Referring Lamp					55 00 21 .49 N.

15. Reduction of some principal places on the two coasts in latitude and longitude.

TABLE 1. *Containing the angles with the Meridian of* Balroyndroog *and its parallels, and the distances of certain places on the* Malabar *coast from that Meridian, and from its perpendicular.*

STATIONS AT	Places computed.	Bearings referred to the Meridian of Balroyndroog.	Dists.	Distances on the		Distances from Balroyndroog on the	
				Perpendic.	Meridian.	Perpendic.	Meridian.
			feet.	feet.	feet.	feet.	feet.
Balroyndroog	Bullamully	44° 57′ 26″ S. W.	164945	116546 W.	116722 S.	116546 W.	116722 S.
Bullamully	Mangalore	78 13 58 N. W.	91762	89834 W.	18714 N.	206380 W	98008 N.
	Goompay Hill	25 08 29 S. W.	54990	23363 W.	49780 S.	139909 W.	166502 S.
Goompay	Baekul	2 12 35 S. E.	101681	3920 E.	101606 S.	135989 E.	268107 S.
	Kunduddakamully	35 57 46 S. E.	126146	74080 E.	102102 S	65829 W.	268603 S.
Kunduddakamully	Mount Dilli	4 23 08 S. W.	132113	10102 W.	131726 S	75931 W.	400329 S.
	Taddiandamole ..	64 55 19 S. E.	149160	135101 E.	63223 S.	69272 E.	331826 S.
Taddiandamole ..	Cannanore	32 45 22 S. W.	157072	84986 W.	132094 S	15714 W	463920 S.
	Tellicherry	14 25 51 S. W.	175847	43773 W.	170311 S.	25499 W.	502137 S.

TABLE 2. *Containing the angles, with the Meridian of* Carangooly *and its parallels, and the distances of certain places on the* Coromandel *coast from that Meridian, and from its perpendicular.*

STATIONS AT	Places computed.	Bearings referred to the Meridian of Carangooly.	Dists.	Distances on the		Distances from Carangooly on the	
				Perpendic.	Meridian.	Perpendic.	Meridian.
			feet.	feet.	feet.	feet.	feet.
Carangooly Hill ..	Mullapode	17° 47′ 01″ N. E.	144405	44105 E.	137505 N.	44105 E.	137505 N.
	Permacoil	24 14 20 S. W.	134240	55111 W.	122406 S.	55111 W.	122406 S.
Mullapode Hill	Fort St. George ..	58 27 57 N. E.	113759	96960 E.	59497 N.	141065 E.	197002 N.
	Mowbrey's House ..	64 16 15 N. E.	92027	82903 E.	39951 N.	127008 E.	177456 N.
Mowbrey's House ..	Madras Observatory	0 00 18 N. E.	15914	1 E.	15914 N.	127009 E.	193370 N.
Permacoil Hill	Mooratan Station ..	12 20 28 S. E	83352	17815 E.	81426 S.	37296 W.	203832 S.
Mooratan Station ..	Pondicherry	47 38 45 S. E	23207	17150 E.	15635 S.	20146 W.	219467 S.
	Trivandeporum ..	17 43 21 S. W.	87363	26594 W.	83217 S.	63890 W.	287049 S.
Trivandeporum ..	Cuddalore	70 23 02 S. E	24644	23214 E	8273 S.	40676 W.	295322 S.

By table the first, *Mangalore* flag-staff is west from the meridian of *Balroyndroog* 206380 feet, and south 98008 feet from the station; and these converted into arcs according to the above scales, will give 33′ 58″ and 16′ 12″ respectively, and the latter arc added to the co-latitude of *Balroyndroog* (equal 76° 52′ 8″.4) gives 77° 08′ 20″ for the co-latitude of the point where a perpendicular from *Mangalore* will cut the meridian of *Balroyndroog* at right angles. Then as Rad. : Cos. 77° 8′ 20″ :: Cos. 33′ 58″ (the perpendicular) : 77° 08′ 22″, the co-latitude of *Mangalore*.

And again, as Tan. 33′ 58″ : Sin. 77° 08′ 20″ :: Rad. : Cot. 34′ 50″, the difference of longitude between *Balroyndroog* and the flag-staff at *Mangalore*.

By proceeding in the same manner with the other places on that coast, we shall have their latitudes, and their longitudes from the meridian of *Balroyndroog* as follow:

Names of Places.	Latitudes.	Longitudes from Balroyndroog.
Mangalore Flag-staff	12° 51′ 38″	0° 34′ 50″ W.
Baekul Fort S. E. Cavalier	12 23 32	0 22 55 W.
Mount Dilli Station	12 01 41	0 12 47 W.
Cannanore Flag-staff	11 51 11	0 02 38 W.
Tellicherry Flag-staff	11 44 52	0 04 17 E.

By table 2d, the observatory at *Madras* is 127009 feet east, and 193370 feet north from the station at *Carangooly*, which converted into arcs give 20′ 54″.45 and 31′ 57″.78 respectively; which being applied to the meridian and its perpendicular, passing through the observatory, and computing spherically, as in the last case, we shall obtain 13° 04′ 8″.7 for the latitude of the observatory, and 21′ 27″.81 for its longitude east from the meridian of *Carangooly*. And by pursuing the same method of calculation, we shall have certain places on the *Coromandel* coast referred to the meridian of *Carangooly* as follow:

Names of Places.	Latitudes.	Longitudes from Carangooly.
Madras Observatory	13° 04′ 08″.7	0° 21′ 27″.81 E.
Fort St. George Church Steeple	13 04 45	0 23 44 E.
Pondicherry Flag-staff	11 55 56	0 03 20 W.
Cuddalore Flag-staff	11 43 23	0 06 48 W.

The difference of longitude between the meridians of *Carangooly* and *Balroyndroog*, by Art. 14, is 4° 29′ 15″.15, to which add the longitudes of the different places from the respective meridians, as heretofore deduced, we shall have the difference of longitude of those places which lie nearly in the same parallels of latitude as follows:

Difference of longitude between the observatory and *Mangalore*, - - - - - - - - - -	5° 25′ 23″
Church in *Fort St. George* and ditto,	5 27 45
Pondicherry and *Cannanore*, - -	4 28 13
Cuddalore and *Tellicherry* - -	4 18

Here it may be proper to notice that in the requisite tables, the difference of longitude between *Fort St. George* and *Mangalore* is 5° 27′ 25″, within 20″ of what is here given; but the difference of longitude between *Cuddalore* and *Tellicherry* is 4° 8′ 42″, differing no less than 9′ 18″ from the triangular measurement.

APPENDIX.

TABLE of LATITUDES and LONGITUDES of some of the principal Places, as deduced from the Operations in general.

NOTE. In the abbreviations H signifies hill; P pagoda; and Dg. droog. In all pagodas the tower is meant, unless otherwise specified; or, if they are stations, the platform is generally the place where the instrument stood, and is mostly marked by a small mill-stone. All places having the asterisk (*) annexed to them are the stations of the large theodolite, and are distinguished either by platforms with large stones in the middle, having small circles inserted thereon; or if on a rock, the circle is inserted on the rock: and in both cases the centre of the circle denotes the point over which the plummet was suspended.

Names of Places.	Latitude.	Longitude from Madras Obser.	Longitude from Greenwich.
ALLAMBADDY Fort	12° 8′ 35″ N.	2° 30′ 25″ W.	77° 46′ 5″ E.
* Allasoor H.	13 9 42	2 38 0	77 38 30
* Allicoor H.	13 16 18	0 31 34	79 44 56
ALLUMPARVA Fort	12 16 12	0 14 5	80 2 25
AMARATOOR Fort P.	12 55 23	3 18 55	76 57 35
AMBOIGE Dg.	13 23 37	2 14 48	78 1 42
AMBOOR Dg.	12 49 12	1 32 8	78 44 22
ANCHITTY Dg.	12 35 23	2 21 45	77 54 15
* ANKISGHERRY Dg.	12 40 27	2 10 3	78 5 27
ANNICUL Fort P.	12 42 33	2 33 31	77 42 59
ARCOT FORT (Nabob's house)	12 54 14	0 54 57	79 21 33
ARNEE (Monument in the Fort)	12 40 19	0 57 58	79 18 32
Atcherawauk H. and P.	12 24 14	0 26 23	79 50 7
AUVULCONDAH	13 7 40	1 1 54	79 14 36
* BAEKUL Fort	12 23 32	5 13 28	75 3 2
* Bailippee H.	13 39 7	2 58 28	77 18 2
BAILOOR Fort P.	13 9 47	4 23 42	75 52 48
B. BALLAPOOR Eedgah	13 18 24	2 43 13	77 26 17
* BALROYN Dg.	13 7 51.6	4 50 33	75 25 57
BANGALORE Palace	12 57 34	2 40 45	77 35 45
BARCELORE Peak	13 51 23	5 23 28	74 53 2
Bellagola (Great statue)	12 51 15	3 46 13	76 30 17
BELLOOR FORT P.	12 58 58	3 31 26	76 45 4
BENKIPOOR Fort	13 50 42	4 33 26	75 43 4

TABLE—CONTINUED.

Names of Places.	Latitude.	Longitude from Madras Observ.	Longitude from Greenwich.
* Bettatipoor H. and P.	12° 27′ 14″ N.	4° 8′ 23″ W.	76° 8′ 7″ E.
Bhavany P.	11 25 45	2 34 19	77 42 11
* Bodeemulla	13 12 41	1 10 55	79 5 35
Bodeelimrauz Dg.	12 26 17	2 7 13	78 9 17
Bolcondah Dg.	12 37 15	2 8 14	78 8 16
* Bomanelly H. and P.	13 16 18	3 37 1	76 39 29
* Bonnatrgottah	12 48 43	2 40 41	77 35 49
* Booggargooda	13 3 4	5 15 16	75 1 14
* Bullamully	12 48 33	5 10 14	75 6 16
* Bullanaugooda	12 45 12	5 5 28	75 11 2
* Bundhully Dg.	12 12 16	2 55 2	77 21 28
Busmungy Dg.	13 44 24	3 12 57	77 3 33
Byran Dg.	13 5 41	3 4 47	77 11 43
CANANORE FORT, Flag Staff	11 51 11	4 53 1	75 23 29
* Carangooly H.	12 32 12	0 21 28	79 55 2
Caverypoorum Fort	11 54 43	2 29 36	77 46 54
Cauverypauk Fort	12 54 15	0 47 18	79 29 12
Chalamcottah Large Tree	13 26 50	2 7 36	78 8 54
Chargul Dg.	12 53 18	1 36 19	78 40 11
Chayloor Fort	13 26 37	3 21 1	76 55 29
* Cheetkul H.	13 19 16	2 56 52	77 17 38
Chendragherry Fort	12 27 53	5 15 13	75 1 17
* Chencaud	11 56 56	0 39 45	79 36 45
Chenroyn Dg.	13 35 49	3 2 43	77 13 45
Chinglepet Fort Flag Staff	12 41 59	0 16 12	80 0 18
Chint Dg.	12 42 18	1 42 19	78 34 11
Chineroyputtun	12 54 9	3 51 53	76 28 37
Chittepet H.	12 27 58	0 51 37	79 24 53
Chittepet Mosque	12 27 55	0 53 58	79 22 32
CHITTLE Dg. Flag Staff	14 13 4	3 51 34	76 24 56
CHITTOOR Fort	13 13 5	1 9 27	79 7 3
Choreegherry Dg.	13 55 17	3 8 56	77 7 32
Chungamah	12 18 4	1 27 24	78 49 6
Colar Fort P.	13 8 20	2 6 49	78 49 41
Conjevaram Great Pagoda	12 50 47	0 32 52	79 43 38
* Coonawaucum H.	12 50 56	0 18 51	79 57 37
* Coonum H.	12 5 20	0 34 12	79 42 18
Covelong Church	12 47 36	0 0 5 E.	80 16 35
CUDDALORE Flag Staff	11 43 23	0 28 16 W.	79 48 14
Curpah Fort	13 14 39	3 24 11	76 52 19
* Daesauneegooda	13 15 46	4 6 34	76 9 56
Darampory Fort	12 3 48	2 5 5	78 11 25
Denkanicottah Fort	12 31 53	2 27 53	77 48 37
Deonelly Fort	13 14 59	2 32 38	77 43 52
* Deorabetta	12 37 32	2 37 36	77 38 54
* Devaroy Dg.	13 22 25	3 2 28	77 14 2
* Dodagoontah	12 59 59.9	2 37 40	77 38 50
Durrea Bahader Ghur	13 20 13	5 34 14	74 42 16

TABLE—CONTINUED.

Names of Places.	Latitude.	Longitude from Madras Obser.	Longitude from Greenwich.
Ennore Tree	13° 14′ 59″ N.	0° 4′ 42″ E.	80° 21′ 12″ E.
Erode Fort S. E. Cavalier	11 20 27	2 31 26 W.	77 45 4
French Rock's Pillar	12 30 31	3 33 24	76 43 6
Gingee Dg.	12 15 18	0 51 19	79 25 11
Gopaul Dg.	12 29 52	2 57 31	77 18 59
Goodeebundah Dg.	13 40 34	2 33 3	77 43 27
* Goompay H.	12 40 19	5 14 10	75 2 20
Goonicul Fort	13 1 33	3 13 34	77 2 56
Gooriattum P.	12 55 52	1 24 42	78 51 48
Gungangherry Dg.	12 25 54	1 57 47	78 18 43
Gurradan Dg.	13 28 54	4 0 47	76 15 43
* Hallagamulla P.	11 0 52	2 48 54	77 27 36
* Hanandamulla	12 55 57	0 51 14	79 15 16
Hassun	13 0 13	4 9 42	76 6 48
Hooly Dg.	12 49 13	3 13 5	77 3 25
* Hunnabetta	13 6 1	4 31 12	75 45 18
Hunnamun Dg.	13 55 41	4 19 38	75 56 32
Hurroor Fort	12 2 50	1 46 1	78 30 29
Hyderghur	13 42 6	5 15 27	75 1 3
Jainkul Dg.	13 54 35	3 59 50	76 16 40
Jemalabad Flag Staff	13 1 34	4 57 46	75 18 44
Karkul Fort	13 12 34	5 15 36	75 0 54
* Karnatighur	12 34 38	1 10 31	79 5 59
Kasragooda Fort	12 29 36	5 16 3	75 0 27
Kaumun Dg.	14 14 59	2 58 44	77 17 46
Kaup Battery	13 13 24	5 31 21	74 45 9
Kistnagherry	12 32 15	2 2 9	78 14 21
Koadicondah Dg.	13 49 49	2 28 24	77 48 6
Kongoondy Dg.	12 46 3	1 49 0	78 27 30
Koomlah Fort	12 36 5	5 19 6	74 57 24
Koondapoor Fort	13 38 10	5 34 11	74 42 19
* Koondhully H.	12 39 33	4 29 21	75 47 9
* Koondoorbetta	12 51 16	4 18 19	75 58 11
Kopa Dg.	13 32 3	4 56 5	75 20 25
Kowlae Dg.	13 43 5	5 8 27	75 8 3
* Kuddapoonabetta	12 55 37	5 22 29	74 54 1
Kul Dg.	13 38 47	4 20 56	75 55 32
* Kulkolah	13 25 14	2 39 9	77 37 21
* Kumbetarenemulla	11 35 31	2 58 57	77 17 33
* Kunduddakamully	12 23 28	5 1 39	77 14 51
* Kunnoor H.	12 51 55	1 2 59	79 13 39
* Kylasghur	12 50 21 .3	1 10 42	79 5 48
Mackly Dg.	13 25 58	2 45 4	77 31 26
Madranticum P.	12 30 36	0 43 12	79 33 18
Madras (Observatory)	13 4 8 .7	0 00 00	80 16 30
* Maillacherry Dg.	12 16 6	0 52 32	79 23 58
Mailcottah H. and P.	12 39 57	3 36 9	76 40 21
Maharajh Dg.	12 53 34	4 19 40	75 56 50

TABLE—CONTINUED.

Names of Places.	Latitude.	Longitude from Madras Obser.	Longitude from Greenwich.
* Mullapode H.	12° 54′ 56″ N.	0° 14′ 1″ W.	80° 2′ 29″ E.
Mallavilly Fort (S. W. Cavalier)	12 23 0	3 11 54	77 4 36
MANGALORE Fort (Flag Staff)	12 51 38	5 25 23	75 51 7
* Mannoor	13 0 39	0 18 51	79 57 39
Marakerra (Tree)	12 26 20	4 30 46	75 45 15
* Maumdoor H.	12 44 44	0 34 59	79 41 31
Medagashie Dg. Mosque	13 49 54	3 3 34	77 12 56
* Meejar Hill	13 3 21	5 19 21	74 57 9
Minchicul Dg	13 27 47	3 3 16	77 13 14
Moodabidderry P.	13 4 24	5 15 38	75 0 52
Mooduwaddie Dg.	12 40 57	2 48 38	77 27 52
Moolky Fort	13 5 12	5 28 13	79 48 17
Monjerabad	12 55 4	4 29 51	75 46 39
* Moratan	11 58 30	0 27 42	79 48 48
* Mount Dilli	12 1 41	5 3 20	75 13 10
Mount St. Thomas' (Flag Staff)	13 0 20	0 3 18	80 13 12
Mudduksgrah Dg.	13 56 41	2 59 0	77 17 30
Mudgherry D.	13 39 7	3 3 11	77 13 19
Muglee H. (Stone)	13 9 59	1 25 22	78 51 8
Mullanaig P.	12 44 43	1 39 2	78 37 28
* Mullapunnabetta	12 55 6	3 58 4	76 18 26
Mulwaggle Dg.	13 10 14	1 52 6	78 23 24
* Mungot H.	13 0 31	0 8 57	80 7 33
Muntapum N. of Bangalore	13 0 45	2 40 13	77 36 17
* Mylum H.	12 7 54	0 37 55	79 38 55
MYSOOR FORT (High Cavalier)	12 18 21	3 35 59	76 40 31
* Mysoor H.	12 16 40.5	3 35 2	76 41 28
Naggerry Nose	13 22 50	0 39 13	79 37 17
Nagmungatum Fort	12 49 11	3 30 1	77 46 29
Narrain Dg.	12 42 45	3 40 7	76 36 23
Narricut Dg.	13 7 54	1 3 58	79 12 32
* Naudkaunee	10 55 57	2 38 10	77 38 20
Neddigul Dg. (Muntapum)	14 9 31	3 10 21	77 6 9
Negigul Dg. (Pillar)	13 14 50	3 2 17	77 14 13
NUGGUR (BEDNORE) Flag Staff	13 49 10	5 13 27	75 3 3
* Nundy Dg.	13 22 12.5	2 34 1	77 22 29
Nunjengode P.	12 7 9	3 33 43	76 42 47
Odea Dg.	12 36 55	2 19 20	77 57 10
Oosscotta (Eedgah)	13 4 21	2 28 13	77 48 17
Oossoor H. and P.	12 43 33	2 24 49	77 51 41
Ootramalloor Fort	12 36 55	0 29 32	79 46 58
Ootur Dg.	12 57 40	3 7 47	77 8 43
Oymunggul Fort	14 5 44	3 43 15	76 33 15
Patticondah P.	12 54 45	1 18 46	78 57 44
* Patticondah	13 10 25	1 36 23	78 40 7
* Paudree	13 19 41.3	0 34 8	79 42 22
* Paughur	14 6 19	2 58 34	77 17 56
* Paulamulla	11 41 39	2 31 0	77 45 30

TABLE—CONTINUED.

Names of Places.	Latitude.	Longitude from Madras Obser.	Longitude from Greenwich.
PEDNAIG Dg.	12° 57′ 33″ N.	1° 38′ 4″ W.	78° 38′ 26″ E.
PERCONDAH Tree	14 4 13	2 40 2	77 36 28
PENNAGRA Fort	12 7 45	2 20 58	77 55 32
* PERMACOIL H.	12 11 58	0 30 45	79 45 45
* Perambauk H.	12 53 7	0 3 9	80 13 21
* Pilloor H.	13 13 59	6 53 50	79 22 40
PONDICHERRY Flag Staff	11 55 56	0 24 48	79 51 42
* Ponnassmulla	12 8 47	2 36 27	77 40 3
* Poonauk H.	13 10 2	0 39 8	79 37 22
POONAMALLEE Flag Staff	13 2 37	0 8 16	80 8 14
PULLICATE Flag Staff	13 25 9	0 4 13 E.	80 20 43
RAMGHERRY Dg.	13 56 53	4 8 19 W.	76 8 11
RAVALNELLORE Dg.	11 58 0	1 19 32	78 56 58
RIOJEES CHOULTRY	12 52 25	0 29 54	79 46 36
* Runganelly H. and P.	13 39 55	3 25 23	76 51 7
* Rungaswamy H. and P.	13 2 3	3 16 56	76 59 34
RUNGYAN Dg.	13 55 21	4 19 31	75 56 59
RUNGYAN Dg.	13 54 14	4 9 30	76 7 0
RYACOTTAH Flag Staff	12 31 16	2 12 54	78 3 36
* RYMAN Dg.	13 21 17	2 14 37	78 1 53
SADRAS Flag Staff	12 31 34	0 4 59	80 11 31
ST. GEORGE (FT.) Church steeple	13 4 45	0 2 22 E.	80 18 52
SANKERRY Dg. Bungaloe on the top	11 28 49	2 23 40 W.	77 52 50
SATTIAGUL Fort	12 14 38	3 6 32	76 9 58
SATTIMUNGALUM Fort Bungaloe	11 30 17	3 0 15	77 16 15
SAUTGHUR Building on the top	12 57 49	1 30 28	78 46 2
* SAVEN Dg. Sta^n. near the Muntapum	12 55 10.24	2 57 40	77 18 50
SERAH FORT Flag Staff	13 44 39	3 20 29	76 56 1
SERINGAPATAM P.	12 25 29	3 34 38	76 41 52
SEVEN Ps. P. on the rock	12 36 56	0 3 21	80 13 9
Shâ Dg.	14 9 46	2 44 58	77 31 32
SHEEMOGA Fort	13 55 33	4 40 25	75 36 5
* Shennimulla	11 9 27	2 39 58	77 36 32
SHEVAGUNGA G. P.	13 10 9	3 1 51	77 14 39
SHEVERAM H. Choultry	12 46 17	0 22 45	79 53 45
SHOLANGHUR G. P.	13 5 20	0 49 49	79 26 41
SOOBRAMANEE H. old P. (G. Mountain)	12 39 44	4 34 11	75 42 19
SOOLAGHERRY Dg.	12 40 8	2 13 57	78 2 33
SOOLOOPGHERRY Dg.	12 4 34	1 12 59	79 3 31
STREE PERMATOOR P.	12 58 7	0 17 57	79 58 33
* Taddiandamole	12 13 3	4 38 52	75 37 38
* Tandray	13 8 5	0 10 46	80 5 44
TATTACUTTOO Dg.	12 24 5	1 39 42	78 36 48
TOLLACHERRY Fort (Flag Staff)	11 44 52	4 46 16	75 30 14
* Telloor H.	12 31 51	0 40 5	79 36 25
TENGRICOTTA Fort	12 0 44	1 51 14	78 25 16
* Thittamulla	11 20 49	2 53 49	77 22 41
TIAGAR	11 44 14	1 10 28	79 6 2

TABLE—CONTINUED.

Names of Places.	Latitude.	Longitude from Madras Obser.	Longitude from Greenwich.
Timmapoor Dg.	12° 24′ 14″ N.	1° 2′ 24″ W.	79° 14′ 8″ E.
Tirchunkode H. and P.	11 22 29	2 20 59	77 55 31
Tirekeara Fort	13 42 34	4 26 20	75 50 10
Terikitchcoonum H. and P.	12 36 37	0 11 17	80 5 13
* Tirtapully H.	13 2 25	2 21 55	77 54 35
Trinomallee H.	12 14 30	1 11 32	79 4 58
——— P.	12 13 53	1 10 46	79 5 44
Tippasoor Fort N. Face	13 8 36	0 22 22	79 54 8
* Trivandeporum	11 44 45	0 32 10	79 44 20
Trivilloor P.	13 8 37	0 20 19	79 56 11
Undar Ghaut (Peak)	13 20 32	5 10 45	75 5 45
Unganamulla Dg.	12 38 4	1 58 49	78 17 41
* Ungargooda	13 1 13	5 13 42	75 2 48
* Urrumbaucum H.	13 12 5	0 23 53	79 52 37
Vaipoor Dg.	12 8 44	1 25 24	78 51 6
Vandiwash H. and P.	12 32 7	0 38 49	79 37 41
——— Fort	12 30 32	0 38 47	79 37 43
Vaniambaddy	12 40 19	1 38 28	78 37 2
Veer Rajenderpett H. and P.	12 12 31	4 26 47	75 49 43
Vellore Dg.	12 54 59	1 5 45	79 10 45
VELLORE FORT G. P.	12 55 20	1 7 15	79 9 15
* Vellengcaud	12 20 41	0 18 47	79 57 13
Venkettygherry Fort	13 0 2	1 45 50	78 30 40
Verabud'r Dg.	12 23 20	2 8 41	78 7 49
Villanoor P.	11 54 44	0 29 35	79 46 55
Wallajabad Commands. Officer's ho.	12 47 56	0 25 25	79 51 5
Wallajapett Mosque	12 55 13	0 54 8	79 22 22
Wholy Honoor Fort	13 59 7	4 34 22	75 42 8
* Womootoor H.	12 4 55	3 22 1	76 54 29
* Woorachmulla	11 28 37	2 33 43	77 42 47
* Wooritty H.	12 22 41	0 34 16	79 42 14
Woos Dg.	12 18 30	5 09 48	75 06 42
Wurrelcondah H. and P.	13 38 12	2 28 23	75 48 07
Wuss Dg.	13 47 23	3 58	76 18 30
Yaelmatoor H.	11 12 06	2 30 12	77 46 18
Yaenikul Dg.	14 00 58	3 27 16	76 49 14
Yamagherry H. and P.	12 48 46	3 12 19	77 4 11
Yeggoondah Dg.	13 16 41	2 59 46	77 16 44
Yerracondah (Mysoor)	12 52 14 .26	1 58 25	78 18 05
Yerracondah (Ceded Districts)	13 54 59	2 36 05	77 40 25

ELEVATIONS *and* DEPRESSIONS, *contained Arcs, terrestrial Refrac tions, together with the heights above the level of sea, of all th principal Stations.*

1. Stations lying in the nearest direction between the two seas commencing with the S. end of the base near *St. Thomas's Mount* whose perpendicular height above the low water mark is 18.7 feet

Stations at	Stations Observed.	Apparent E^n & D^n	Cont. Arcs.	Refract.	Elevations above the Sea. Stations.	Heights
						feet.
S. end of the Base	Perambauk Hill	1° 46′ 25″ E.	1′ 21″	1/18	Perumbauk	272.9
Perumbauk	S. end of the Base	1 47 25 D.				
Perumbauk	Mullapode	0 06 18 E.	10 41	1/16	Mullapode	481.2
Mullapode	Perumbauk	0 15 40 D.				
Mullapode	Carangooly Hill	0 11 34 D.	23 51	1/16	Carangooly	434.3
Carangooly	Mullapode	0 09 20 D.				
Carangooly	Wooritty Hill ..	0 02 17 D.	15 39	1/16	Wooritty	552.7
Wooritty Hill ..	Carangooly Hill	0 10 25 D.				
Wooritty Hill ..	Permacoil Hill..	0 08 36 D.	11 14	1/22	Permacoil ...	484.5
Permacoil Hill..	Wooritty Hill ..	0 01 38 D.				
Permacoil Hill..	Maillacherry ..	0 07 27 E.	21 36	1/19	Maillacherry ..	1140.8
Maillacherry ..	Permacoil	0 26 47 D.				
Maillacherry ..	Karnatighur....	0 34 42 E.	25 27	1/10	Karnatighur....	3204.0
Karnatighur....	Maillacherry ..	0 57 03 D.				
Karnatighur....	Kylasghur	0 23 02 D.	15 44	1/24	Kylasghur	2766.2
Kylasghur	Karnatighur....	0 08 36 E.				
Kylasghur	Yerracondah ..	0 12 53 D.	46 33	1/17	Yerracondah ..	3396.9
Yerracondah ..	Kylasghur	0 28 13 D.				
Yerracondah ..	Savendroog	0 17 55 D.	57 50	1/11	Savendroog	4004.9
Savendroog	Yerracondah ..	0 29 50 D.				
Savendroog	Mullapunnabetta	0 31 10 D.	58 52	1/15	Mullapunnabetta	3406.7
Mullapunnabetta	Savendroog	0 19 41 D.				
Mullapunnabetta	Koondhully Hill	0 00 51 E.	34 14	1/16	Koondhully	4366.3
Koondhully Hill	Mullapunnabetta	0 30 36 D.				
Koondhully Hill	Bullamully	1 17 40 D.	40 53	1/17	Bullamully	774.5
Bullamully	Koondhully	0 31 46 E.				
Bullamully	Kudapoonabetta	0 25 08 D.	13 6	1/12	Kudapoonabetta	318.7
Kudapoonabetta	Bullamully	0 14 15 E.				
Kudapoonabetta	Eedgah Station	0 35 37 D.	2 49	1/7	Eedgah Station	146.7
Eedgah Station	Kudapoonabetta	0 33 29 E.				
Eedgah Station	Stat. on the Beach	0 58 53 D.	1 39		Stat. on the Beach	22.6
Stat. on the Beach	Eedgah Station	0 56 36 E.				
The station on the beach above the low-water mark by measurement.....						14.0
Difference or error.....						8.6

2. Stations not lying in the nearest direction between the two seas, and commencing from *Kylnsghur*.

Stations at	Stations Observed.	Apparent. Eⁿ & Dⁿ				Cont. Arcs.		Refract.	Elevation above the Sea.	
									Stations.	Heights.
										feet.
Yerracondah ..	Patticondah	0°	21′	29″	D	28′	6″	1/16	Patticondah	2942.7
Patticondah	Yerracondah ..	0	3	11	D.					
Patticondah	Bodeemulla	0	40	25	D.	24	53	1/16	Bodeemulla	1646.6
Bodeemulla	Patticondah	0	18	34	E					
Yerracondah ..	Rymandroog ..	0	0	39	D.	33	4	1/20	Rymandroog ..	4226.8
Rymandroog ..	Yerracondah ..	0	29	9	D.					
Rymandroog ..	Nundydroog ..	0	10	26	E.	18	54	1/19	Nundydroog ..	4856.8
Nundydroog ..	Rymandroog ..	0	27	19	D.					
Nundydroog ..	Devaroydroog ..	0	30	56	D.	27	40	1/17	Devaroydroog ..	3940.2
Devaroydroog ..	Nundydroog	0	6	35	E					
Yerracondah ..	Tirtapully	0	16	9	D.	25	4	1/24	Tirtapully	3182.9
Tirtapully Hill ..	Yerracondah ..	0	6	39	D					
Tirtapully Hill ..	Bonnairgottah ..	0	7	16	D.	22	49	1/21	Bonnairgottah ..	3305.1
Bonnairgottah ..	Tirtapully Hill ..	0	13	20	D.					
Bonnairgottah ..	S. end of the Base	0	25	38	D.	7	11	1/40	S. end of Base ..	3023.6
S. end of the Base	Bonnairgottah ..	0	18	49	E.					
Savendroog	Bandhullydroog	0	15	41	D.	42	59	1/17	Bundhullydroog	4254.5
Bundhully	Savendroog	0	22	17	D.					
Deorabetta	Ponnassmulla ..	0	17	18	E.	28	47	1/17	Ponnassmulla ..	4928.3
Ponnassmulla ..	Deorabetta	0	42	45	D.					
Ponnassmulla ..	Paulamulla	0	11	46	D.	27	40	1/19	Paulamulla	4958.8
Paulamulla	Ponnassmulla ..	0	13	1	D.					
Paulamulla	Woorachmulla ..	2	34	47	D.	13	18	1/27	Woorachmulla ..	1472
Woorachmulla ..	Paulamulla	2	22	42	E.					
Bonnairgottah ..	Deorabetta	0	0	0						
Deorabetta	Bonnairgottah ..	0	10	6	D.	11	35	1/16	Deorabetta	3408
Woorachmulla ..	Shennimulla	0	0	6	D.					
Shennimulla	Woorachmulla ..	0	17	58	D.	20	7	1/20	Shennimulla	1788.6
Shennimulla	N.W. end of Base	0	48	13	D.	9	21	1/14	N. W. end of Base	1060.3
N.W. end of the B	Shennimulla	0	40	15	E					
Shennimulla	Puchapolliam ..	0	48	53	D.	9	57	1/14	Puchapolliam ..	1010.4
Puchapolliam ..	Shennimulla	0	40	20	E.					
N.W. end of the B	S. E. end of Base	0	16	26	D.	5	19	1/9	S. E. end of Base	925.5
S.E. end of the B.	N.W. end of Base	0	12	16	E					
Bonnairgottah ..	Dodagoontah ..	0	18	10	D.	11	40	1/17	Dodagoontah ..	3037.9
Tirtapully Hill ..	Allasoor Hill ..	0	1	40	D.	17	16	1/35	Allasoor Hill ..	3380.6
Allasoor Hill ..	Tirtapully	0	14	38	D.					
Allasoor Hill ..	Kulkotah	0	6	17	D.	15	34	1/28	Kulkotah	3406.6
Kulkotah	Allasoor Hill ..	0	8	11	D.					
Kulkotah	Yerracondah ..	0	23	45	D.	29	54	1/16	Yerracondah ..	2848
Yerracondah ..	Kulkotah	0	2	30	D.					
Yerracondah ..	Bomasundrum ..	0	46	2	D.	11	9	1/16	Bomasundrum ..	2037.7
Bomasundrum ..	Yerracondah ..	0	36	19	E.					
Yerracondah ..	Paughur	0	6	9	D.	24	34	1/17	Paughur	3052.6
Paughur	Yerracondah ..	0	15	35	D.					
Savendroog	Cheetkul	0	26	33	D.	24	7	1/17	Cheetkul	3329.3

TABLE—CONTINUED.

Stations at	Stations Observed.	Apparent E^{a}. & D^{n}.	Cont. Arcs.	Refract.	Elevations above the Se	
					Stations.	Heig
						feet
Cheetkul Hill ..	Bailippee	0° 25′ 34″ D.	19′ 52″	1/31	Bailippee	2760
Bailippee	Cheetkul	0 6 56 E.				
Bundhully	Kumbetarene ..	0 3 26 E	36 56	1/18	Kumbetarine ..	5548
Kumbetarenemulla	Bundhully	0 36 23 D.				
Bundhully	Mysoor Hill....	0 29 27 D.	39 21	1/21	Mysoor Hill....	3446
Mysoor Hill....	Bundhully	0 6 13 D.				
Mysoor Hill	Bettatipoor	0 0 11 D.	34 14	1/17	Bettatipoor	4349
Bettatipoor	Mysoor Hill....	0 30 4 D.				
Mullapunnabetta	Bettatipoor Hill	0 5 6 E.	29 37	1/16	Bettatipoor	4347
Bettatipoor Hill	Mullapunnabetta	0 30 58 D.				
Mullapunnabetta	Bomanelly	0 18 52 D.	29 30	1/30	Bomanelly	3149
Bomanelly	Mullapunnabetta	0 8 42 D.				
Bomanelly	Daesauneegooda	0 0 6 E.	28 46	1/16	Daesauneegooda	3804
Daesauneegooda	Bomanelly	0 25 55 D.				
Daesauneegooda	Hannabetta	0 13 30 D.	25 54	1/17	Hannabetta	3711
Hannabetta	Daesauneegooda	0 9 27 D.				
Mullapunnabetta	Balroyndroog ..	0 7 3 D.	52 42	1/24	Balroyndroog ..	4998
Balroyndroog ..	Mullapunnabetta	0 41 16 D.				
Bettatipoor	Taddiandamole	0 8 15 E.	32 59	1/18	Taddiandamole	5681
Taddiandamole	Bettatipoor	0 37 30 D.				
Taddiandamole	Mount Dilli	1 56 5 D.	26 27	1/17	Mount Dilli	804
Kunduddakamully	Taddiandamole	1 17 19 E.	24 34	1/17	Kunduddakamully	1856
Kunduddakamully	Baekul	1 31 47 D.	11 33	1/16	Baekul	86
Baekul	Kunduddakamully	1 21 40 E.				
Bullamully	Kunnoor Hill ..	0 29 53 D.	11 48	1/16	Kunnoor	253
Kunnoor	Bullamully	0 19 35 E.				
Koondhully	Soobramanee ..	2 22 57 E.	4 32	1/17	Soobramanee ..	5583
Koondhully	Koondoor Hill..	0 25 49 D	15 54	1/21	Koondoor Hill..	3844
Koondoor Hill..	Koondhully	0 11 25 E.				
Meejar Hill	Kudapoonabetta	0 23 31 D.	9 52	1/17	Meejar Hill	651
Meejar Hill	Booggargooda ..	0 1 16 D.	3 59	1/23	Booggargooda ..	654
Booggargooda ..	Meejar Hill	0 2 23 D.				
Stat. on the Beech	Kooliebogooda	0 14 39 E.	6 5	1/4	Kooliebogooda	200
Kooliebogooda ..	Stat. on the Beach	0 17 55 D.				