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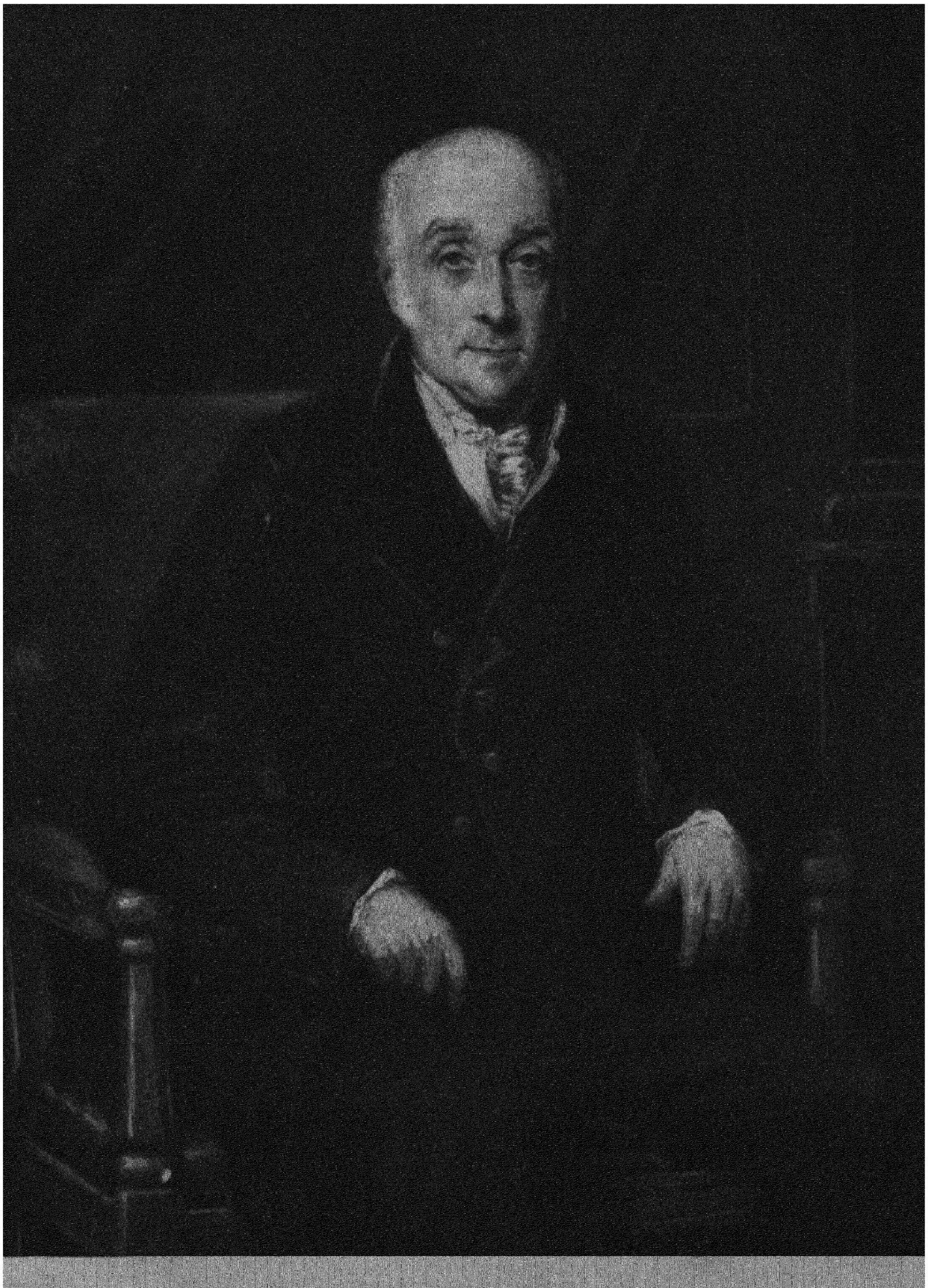
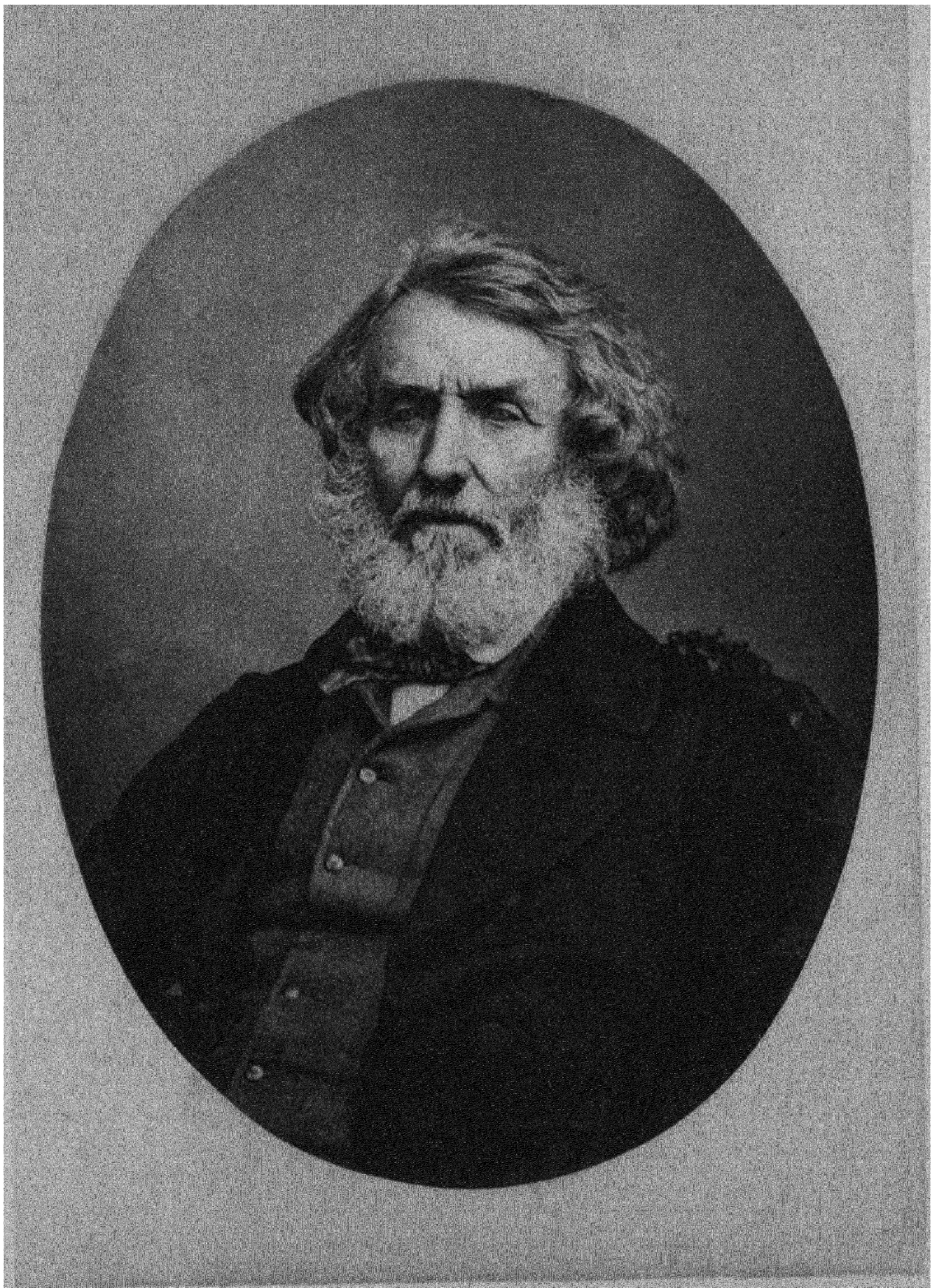


COLONEL W. LAMBTON, F.R.S.

Originator and first Superintendent of the Great Trigonometrical Survey.

1800—23

FROM AN ORIGINAL OIL PAINTING IN POSSESSION OF THE SURVEY OF INDIA.



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COLONEL SIR GEORGE EVEREST, C.B., F.R.S.,

Superintendent of the Great Trigonometrical Survey of India, 1823–1843,
and Surveyor-General of India, 1830–1843.

ENLARGED FROM A PHOTOGRAPH BY MESSRS MAULL AND POLYBLANK.

ACCOUNT OF THE OPERATIONS OF

THE GREAT TRIGONOMETRICAL SURVEY OF INDIA

VOLUME XVIII.

ASTRONOMICAL OBSERVATIONS FOR LATITUDE

MADE DURING THE PERIOD 1885 TO 1905

AND

THE DEDUCED VALUES

OF

THE DEFLECTIONS OF THE PLUMB-LINE.

PREPARED UNDER THE DIRECTIONS OF

LIEUT.-COLONEL S. G. BURRARD, R.E., F.R.S., SUPERINTENDENT TRIGONOMETRICAL SURVEYS.

PUBLISHED UNDER THE ORDERS OF

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PREFACE.

This volume—the eighteenth of the series—contains an account of the astronomical observations for latitude, which have been taken at stations of the principal triangulation of India during the last twenty years. The observations which were taken prior to 1885 have been already described in Volume XI of the *Account of the Operations of the Great Trigonometrical Survey of India,* and Volume XVIII may be regarded as the continuation of Volume XI.

In Part I of the present volume the methods of observing and computing are described: in Part II the values of latitude are deduced from the observations: in Part III the results of Part II are combined with those of Volume XI.

Part III thus contains complete classifications to date of all latitude observations taken in India, and of the resulting deflections of the plumb-line in the meridian.

In Appendix No. 5 are shown the deflections of the plumb-line *in the prime vertical* as deduced by Laplace's equation from azimuth observations. In the present volume there are therefore compiled the results of all determinations made in India of the direction of gravity with the exception of those few which emanate from the longitude operations and which have been described by Colonel George Strahan in Volume XV.

The standard of accuracy desirable in latitude observations.

The question has been raised of recent years whether astronomical latitudes are not observed with unnecessary accuracy. Differences of 6″ and 8″ between the astronomical and geodetic values of latitude are of frequent occurrence in all parts of India, and in discussions of deflections of the plumb-line the quantities involved are so large as to render the inclusion of decimals a superfluous refinement. On the other hand our astronomical latitudes are observed with so much care, that the probable error of a result seldom exceeds 0″·06. Would it not be better, it has been asked, to devote less time to one station and to increase the number of stations? Similar controversies over the accuracy necessary in triangulation and in levelling have taken place at intervals and will recur in the future.

There are two objections to lowering a standard of accuracy: the first is that we cannot foresee the purposes which our observed latitudes will be required to serve when the geodetic problems confronting our generation have been replaced by others: the second is that probable errors, though useful for purposes of comparison and combination, are not sufficiently reliable criteria to be accepted as absolute measures of accuracy.

When we say that the *probable* error of a latitude is 0″·05, we know that the *actual* error may be 0″·20 or more: when we calculate that the probable displacement of the terminal station of a chain of triangles is 10 feet, we cannot forget that the actual displacement may be 40 feet or more.

To make use of the law of probability in estimating the weight of a result is a course generally recognised: but to base the design of a geodetic operation upon this law would be incorrect unless we could prove that the operation was not liable to systematic errors or mistakes. Our triangulation, our levelling, our tidal, pendulum and astronomical observations have all in turn exhibited signs of systematic error; and our best observers have been liable to make mistakes. When therefore we prolong and multiply observations at any one station, and when we introduce different conditions into work, we have in view not a decrease of the probable error, but a cancelment of the evil effects of systematic errors and an elimination of all possibility of mistakes.

Let us suppose that we now consented to accept a lower standard of accuracy in triangulation and astronomical work; we should know that we were breaking the uniformity of the survey and we should commence to accumulate results which, though possibly of present use, might be found defective in the near future, when our knowledge of the form of the geoid, and of the variation of latitude, and of the constitution of the earth has advanced. And what should we gain in return for these disadvantages and risks? We are promised more latitude stations and a speedier and cheaper triangulation. It is doubtful however if these promises would be fulfilled. The time and trouble that an observer takes in getting his instrument and himself to an observing station in the field are so great, and the necessary preparations for work are so many, that when everything is once in working order at a field station it is the wisest and most economical course to repeat observations under different conditions and thus to guard against all possibility of grave error.

The triangulator by increasing the lengths of his rays, the areas of his polygons and the dimensions of his circuits, can provide a fundamental network of principal triangles as cheaply and rapidly as one of secondary. Where principal triangulation is slow and dear, there will secondary and tertiary triangulation be slow and dear also, and nothing will be gained by reducing the accuracy of the foundation. We are only concerned in this volume with astronomical work: I have introduced the subject of triangulation to show that we are not now discussing a narrow question which concerns latitude observations only, but that the accuracy of all geodetic operations is involved.

For the last 30 years a latitude observer has been expected to show at the end of a season's work a mean probable error of 0″·06, and it is considered undesirable to introduce a change now. Many of the probable errors of the results tabulated in this volume will be found to exceed $\pm$ 0″·06, but in every such case the circumstances were exceptional: at times observations have been unavoidably curtailed because of the unhealthiness of the district, at times through the failure of supplies, and at times on account of the persistence of clouds.

Many probable errors in the volume will be found *less* than $\pm$ 0″·05, and what is of more importance the continued efforts of Major Lenox Conyngham, Captain Tandy and Captain Cowie have largely tended of recent years to free our latitude results from the effects of constant error.

On the adopted value of latitude for the station of origin.

The deflection of the plumb-line in the meridian at any station is obtained from a comparison of the observed value of latitude with the value calculated from the triangulation. The latter value is liable to be in error, firstly, because the computations of the triangulation are based upon an assumed figure of the earth, and, secondly, because the position on the globe of the whole of the triangulation is dependent upon adopted values of the latitude and azimuth of the station of origin. The first difficulty can be temporarily surmounted by exhibiting deflections of the plumb-line on different spheroids: the second difficulty admits of no easy solution.

The latitude of Kaliánpur has been observed many times during the last century; throughout this period our knowledge of the places of the stars has been continually increasing, and our instruments have been repeatedly improved; our more recent observations of this latitude deserve therefore greater weight than those of our early predecessors.

In Chapter IV of this volume it is shown that the general mean of all observed results is 24° 7′ 10″·97, and this is the value that we should adopt for the latitude of Kaliánpur, if we were free now to make a determination. But we are not free: we cannot cut ourselves adrift from the past: this volume is one of a series, in which we have to preserve continuity. The work of our generation is but the link of a chain, and we have to see that our link is connected with that of our predecessors. In this volume I have therefore adopted Everest's original value for the latitude of Kaliánpur, viz.

24° 7′ 11″·26.

This value has been adopted because all the computations of geodetic latitude, that have been made in the preceding volumes of this series, and all the results that have been published in those volumes have been derived from Everest's original value. I do not contend that our successors will be bound for ever to continue this value, but *the time for change has not come yet.*

It is worthy of notice in this connection that within the last year the committee appointed in 1904 have recommended to the Government of India, that the old Indian value of longitude still employed upon our maps should be abandoned, and that a more correct value should be introduced.* The old value has however been used throughout our principal triangulation and we have had to consider what steps ought to be taken in consequence to maintain the trigonometrical survey abreast of the topographical: no immediate step has been rendered necessary, because for the present

* See the preface of Vol. XVII of this series, which contains a note on the values of longitude employed in Indian mapping.

the shift in longitude is to be confined to published maps and is not to be introduced into triangulation. This course is however recognised to be a tentative measure, and it may have to be supplemented shortly by more radical changes.

Though no great revision of data has been suggested until now, further revisions will be inevitable in the future, and so I take this opportunity of explaining the course which I think we ought to pursue.

Revisions of trigonometrical data.

We have known for years that errors pervade our geodetic and geographical data.

(i.) The longitudes of all stations of the triangulation are in error by about 2′ 27″;

(ii.) The latitudes of these stations are in error by about 6″;

(iii.) Superposed on the above errors are further considerable errors due to our adoption of Everest's spheroid;

(iv.) The Standard foot for India differs from that of England;

(v.) An artificial value was introduced for the fundamental azimuth of the triangulation (see Appendix No. 5 to this volume);

(vi.) The closing errors of the circuits of the triangulation were adjusted without consideration of the azimuthal errors revealed by Laplace's equations (See Appendix No. 5);

(vii.) The great triangulation of Burma has remained to this day in terms of the Sonákhoda Base-line and of an observed azimuth at Madhupur—terms that are different to those adopted for the triangulation of India;

(viii.) The closing errors of the levelling circuits have not yet been adjusted;

(ix.) The expansion of levelling will necessitate a reconsideration of our trigonometrical values of height.

A perusal of the above list will show the formidable tasks that face our small computing office: extensive recalculations and republications will assuredly be necessary.

On the *geodetic* side of the office the compilation of a volume dealing with the Levelling operations has lately been put in hand, and another volume which will contain details of the Burma triangulation is contemplated: further volumes to deal with the Pendulum, Magnetic, and Tidal operations are in prospect.

On the *geographic* side of the office a volume is being compiled in which the positions and heights of the observed peaks of the Himalayas are being recorded and classified; complete lists are also being prepared of all peaks observed in Tibet and Afghanistan; and the adjustment of the levelling errors will necessitate the withdrawal and republication of our numerous pamphlets on bench-marks.

Frequent revisions of data are undesirable*: it is better to continue with incorrect data than to introduce confusion by constant changes. When moreover several sources of error exist, an attempt should be made to eliminate all simultaneously and with this object in view postponements of intermediate revisions are often justifiable.

From the geodetic point of view the time is not yet ripe for revision: the effects of local attraction on our observed values of latitude, longitude and azimuth at Kaliánpur are still uncertain; the investigation of the movement of the pole is in its infancy, and no method of correcting observed astronomical results for periodical variations has as yet been devised. It would be premature to reject the spheroid of Everest, until a new spheroid has been definitely recommended by the International Geodetic Association. It would be premature to adjust the errors of the levelling circuits before the level net for India has been completed, and before the questionable line between Bombay and Madras has been re-observed; and it would be premature to publish new values of latitude, longitude, side and azimuth for the triangulation of Burma, when it is confidently expected that base-lines will be measured within a few years.

The *present* task in front of our computing office is rather *to make ready* for the inevitable revisions of geodetic work than to publish revised values immediately. It is important to make ready—to carry through all the preliminary steps, and to have a definite plan in view. It will throw undue work on our successors, if we fail to maintain,

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* See Chapter II of this volume. See also General Report of the Survey of India for 1903-04, page xxvii.

unpublished data both up to date and on one uniform system, and if the necessary preliminary steps to revision are not taken as soon as they become possible.

The results of our *geodetic* work have been published in a series of professional volumes of which this is the eighteenth. When the time comes for revising those results, we ought to devote a new and entire volume to the revision. The early volumes of this series have already attained an historic value, and it would be out of the question for us to cancel the works of our predecessors, or to publish revised editions of those works. Every geodetic survey has had its history, and has—especially if it were a pioneer—fallen into mistakes. It is not for us to obliterate all mention of those mistakes under the cover of new editions: the only safe course to pursue is to leave the published volumes unaltered, to recognise the mistakes committed, and to publish periodically a new volume of the series, in which the results of preceding volumes are brought up to date.

Such a volume would explain our reasons for abandoning the spheroid accepted in Volume II, for correcting the geodetic co-ordinates given in Volumes III, IV, IVA, V, VI, VII, VIII, XII, XIII and XIV, and for modifying the deflections of the plumb-line of Volumes IX, X, XI and XV. Just as *we* have to revise the results of the past, so will our results have to be revised in the future; and the periodical publication of occasional additional volumes of this series will do for the geodetic survey what periodical revisions of maps in the field do for the topographical survey.

But although we are not called upon to revise our geodetic data immediately, we must recognise that the adoption of a new value of longitude for our published maps may oblige us shortly to revise our geographical data. It will be no doubt troublesome at first to have geodetic and geographic data differing from one another, but we cannot expect the topographical survey to wait for the geodetic errors to be eliminated.

Our geographic results are published in series of synoptical volumes and levelling pamphlets, in which the positions and heights of stations in India are recorded: these volumes and pamphlets, containing as they do mere numerical data for surveyors, may be cancelled and revised over and over again. The change that has been now introduced in the longitude of maps may necessitate the early revision of all our synoptical volumes; the simultaneous reduction of the levelling net will render all our spirit levelling pamphlets obsolete.

The Earthquake of 1905.

In connection with the subject of revision the effects of earthquakes upon the positions of trigonometrical stations will have to be periodically considered. On April 4th 1905 Mussooree and Dehra Dún were severely shaken by the great earthquake, which wrecked Dharmsála and Kángra. The standard clock and the turret clock of the Survey office at Dehra Dún were stopped by the convulsion, and the office itself was damaged. It appeared possible to those of us who witnessed the catastrophe that the positions and heights of the surrounding stations of the Great Arc series of triangulation might have been affected, and steps were taken to ascertain the extent of the displacements.* Several horizontal angles of the principal triangles at the northern end of the Great Arc of India were re-observed; owing partly to the haze the revisionary observations were not of the highest order of accuracy, and we were consequently unable to discover whether horizontal movements of six inches or less had taken place or not: a comparison of the results however showed (1stly) that no relative horizontal displacement of 8 inches had probably occurred near Dehra Dún, and (2ndly) that no relative horizontal displacement of 12 inches could have occurred.

Our revisionary work was necessarily local, and we had to be content with determining the extent of relative displacement within the locality tested. It would not have been possible without great expense to discover whether there had been any general movement of the Himalayas.

There have been erected in India 3706 trigonometrical stations of the principal triangulation: in 1904 there were 3515 surviving. In spite of measures taken to ensure preservation the average rate of decrease has been of late about 4 stations per annum. The rivers of northern India by their constant changes of course have been very destructive; encroachments of the sea have washed stations away, the expansion of railways, canals and towns have necessitated the removal of others and movements of sand in the desert have caused a few to be buried. It is not possible to state the number of stations which have been displaced by earthquakes from their original positions, but seeing that severe earthquakes have only occurred of late years in certain sub-Himalayan regions and having regard to the recent reassuring observations round Dehra Dún, I do not think it probable that the number which have suffered greater disturbance than 6 inches can exceed 40: and an estimate of 40 errs on the side of pessimism.

* An account of the steps taken was included in a report on Geodesy submitted to the Board of Scientific Advice, in November 1905, and subsequently published by the Board.

After the great earthquake of 1897 we discovered horizontal displacements in Assam of 8 feet and more.* Mr. Oldham was of opinion that these were merely relative displacements in the small area tested and that the absolute displacement of the whole area would have been found to be considerable, if we had commenced our tests outside the disturbed region and worked inwards to the epicentre. But triangulation is a slow and costly operation, and it is not practicable to revise great lengths of it after every earthquake. The small local revisions carried out last summer to test the effects of the earthquake of 1905 were rendered possible by the fact that Dehra Dún is the head-quarters of the trigonometrical survey and observations can be taken in its vicinity without expense or difficulty. The damage, however, done at Dehra Dún by the earthquake was small compared to that at Dharmsála, and our proof that the stations round Dehra Dún have not been relatively displaced by six inches is no proof that those near Dharmsála have remained equally undisturbed. If moreover we apply Mr. Oldham's argument to the case of Dehra Dún, we shall have to consider that the whole region may possibly have moved, although the relative positions of local marks have remained unaltered.

From a topographical point of view a displacement of 6 inches may be disregarded, but one of 10 feet is liable to cause inconvenience and error. If we suppose for instance that of the two trigonometrical stations of Hátídhár and Lipiána which are situated in Kángra 16 miles apart, one has been displaced *towards* the other by 10 feet, then the line joining the two would no longer form a suitable base either for the observation of distant snow-peaks, or for a series of minor triangulation for Tibet, although the disturbance might not embarrass plane-tablers surveying the immediate locality. If the displacement had occurred in a direction *perpendicular* to the line joining the two stations, the accepted azimuth of this line would be in error by 25″, and this is an error that would soon begin to inconvenience triangulators.

The Shillong earthquake of 1897 rendered the positions of perhaps 15 stations uncertain, and the Dharmsála earthquake of 1905 has possibly affected the same number. When in the future these stations come to be utilised, it will be necessary for observers to take the precaution of measuring the angles of two or three of the original triangles by way of a preliminary test.

We have long since had to introduce such a precaution into levelling operations: the heights of bench-marks when erected on alluvium are liable to vary with age, and when a new line of levels is being started from an old bench-mark it is not safe to accept the original value of its height: it is always necessary to relevel to two or three of the old bench-marks in order to test for subsidence. Such a precaution has never hitherto been considered necessary in triangulation, because, although markstones may move vertically in the course of time, as a rule they maintain their horizontal positions. But there have been two severe earthquakes within eight years, and it is necessary now to recognise that in certain regions the positions of points will have to be accepted with a greater caution in the future than in the past.

The displacement of the stations of the principal triangulation is but one aspect of the general problem of change which a survey has to face. The forms and positions of topographical features are always undergoing change. In certain cases the changes are so rapid that it is hardly possible to make a consistent survey at all: the Indus, for instance, is constantly eroding its banks, washing away survey and boundary marks, and altering its course perhaps by a mile or more. If the whole river were to be surveyed in one month, the map could be rightly headed "The course of the river Indus in January 1905", but to survey different portions at different times, as in practice we have to do, is to give a course to the river, which it never actually pursued.

During the progress of the present survey of Sind, many recently surveyed sheets have been rendered obsolete almost before they have been published by the opening of a new system of canals. And these changes are going on everywhere, varying in character from those that are so local and marked as to be perceptible to the most casual observer, to those that are so wide-spread and gradual as to require lengthy revisions of triangulation to reveal them.

A line of spirit-levelling had been run in May 1904 from Dehra to Mussooree, and had given a difference of height of 4706 feet 10 inches. Owing to the earthquake this line of levels was revised in May 1905, when the difference of height was given as 4706 feet 4½ inches. It therefore appeared that the Mussooree range had subsided 5½ inches with regard to Dehra Dún.

When the revisionary results were first tabulated, it was perceived that the amount of the subsidence increased gradually as the levellers ascended the range. This gave rise to a suspicion that the lengths of the levelling staves may have been in error. During the first 6 miles, the ascent is 694 feet or 116 feet per mile, and in the last 12 miles it is 4013 feet, or 334 feet per mile. A levelling staff being 10 feet long, and the difference of height being 4707 feet, there were contained in the total rise 471 lengths of staff. If then the 10-foot staves had been 0·001 foot too long, our unit of measurement would have been slightly in error, our measured heights would all have been given too small and the deficiency accumulated at Mussooree would have been 0·471 of a foot or about 5½ inches.

Four different staves are however in daily use, and these are periodically compared in the field against a 10-foot steel standard and corrections for each deduced. An examination of the results of the comparisons showed that the apparent subsidence of Mussooree could not be attributed to errors in the adopted lengths of the four staves.

* The revisions in Assam were made with a small instrument and the displacements were measured to the nearest 2 feet only: *vide* Report on the Trigonometrical Results of the Earthquake in Assam, 1898, para 7.

The steel standard against which they were compared was then suspected, and this was subjected to rigorous tests under comparing microscopes at Dehra Dún. Its length, as determined, accorded with the value previously obtained, and it became clear that the observed change in the height of Mussooree above Dehra Dún between 1904 and 1905 could not be attributed to any error in the adopted length of the standard of reference.

During the process of levelling the level is always erected midway between two staves, and at each station the observer by reading the staves through the telescope deduces the *difference* in height between the two points on which the staves are standing. Under ordinary circumstances there is no reason to fear accumulation of error. But when the line followed is constantly rising, as between Dehra Dún and Mussooree, the ray from the telescope to the higher staff is always nearer the ground and more likely to be disturbed by radiation than the ray to the lower staff: this fact introduces an uncertainty, which continues to exist whether we work up or down the hill and which we endeavour to minimise by stopping work during the heat of the day.

We are not, it is true, discussing now the absolute value of the height of Mussooree: the levelling observations of both 1904 and 1905 were taken in the month of May under similar atmospheric conditions, and we are only attempting to account for the *difference* of 5½ inches which appeared between the value obtained in May 1904 and that of May 1905. Nevertheless it has to be recognised that an uncertainty does exist: it was the examination of this question that really revealed how little was known of the degree of accuracy of a line of levels on a steep slope. It is at times extremely difficult to obtain a definite numerical idea of the probable and possible errors which are accumulating in a lengthy survey operation, but a knowledge of these errors is essential before we can discuss the meaning of an actual discrepancy observed. In the levelling operations carried over the plains and peninsula of India, no error approaching 5½ inches in 18 miles has been met with.*

Owing to the doubts that were felt, the levelling operations between Dehra Dún and Mussooree were repeated for the third time in October 1905; the difference of height was now given as 4706 feet 5¼ inches. Although then there is some evidence in favour of the view, that the earthquake decreased the difference in height between Dehra Dún and Mussooree by 4 or 5 inches, I do not consider that we are justified in stating that such a decrease has been actually demonstrated.

Investigations of Himalayan Attraction.

Within the last five years attempts have been made at Dehra Dún to investigate the subject of Himalayan Attraction. In 1901 a paper was published in the Survey of India professional series on this subject, in which it was shown that the deflections of gravity from the vertical could be broadly classified by regions, and that though the deflection within any particular region might remain constant throughout a wide area, yet it might differ considerably from the mean deflection observed in a contiguous region. The regional classification led to the conclusion that a long chain of excessive density lay buried in the earth's crust between Balasore and Jodhpore.

In a subsequent paper prepared for the Royal Society I was able by the aid of Professor Helmert's graphical interpretation of the old Indian pendulum results to show that these latter confirmed the conclusions that had been previously arrived at from a consideration of deflections of the plumb-line only. Observations taken since 1902 have tended also to confirm the view that along the northern border of the Ganges valley the earth's crust is deficient in density, that the density increases towards the south, and that a buried chain of excessive density runs parallel to the Himalaya along the southern border of the Gangetic plains†.

It is perhaps advisable for me to explain why the subject of Himalayan attraction has received so little notice in this volume. These volumes are designed to record facts for the permanent use of geodesists: they are not intended to be contributions to contemporary discussion or to include speculations, which will be sooner or later rendered obsolete by new discoveries and advances. Contemporary discussion is necessary for the determination of programmes: without it work degenerates into routine, its aims get lost sight of, and the accumulation of observations rather than their meaning becomes the main object in view: but these volumes are intended for the classification of data and not for the record of arguments and hypotheses.

Nothing has tended more to further the progress of geodesy than the institution of an international association under which the several geodetic surveys of the world now co-operate. The geodetic survey of India has profited of late in many ways through its connection with the international association. We have been able to refer questions of difficulty to Professor Sir George Darwin, K.C.B., the representative of Great Britain, and we have derived very great benefit from the advice and help of Professor Helmert, the director of the association. The reports of the international conferences have been found useful and instructive guides.

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* The great error of 3 feet between Bombay and Madras *may* have been partly generated in the steep ascent of the Ghâts on the Bombay–Poona section, but the weight of the evidence is against this view.

† The term "excessive" is relative: it may hereafter be found that density is nowhere in *absolute* excess. The gradual increase in density from north to south has the appearance and effect of a hidden trough on the north and a hidden chain on the south. Philosophical Transactions of the Royal Society of London, Series A., Vol. 205, 1905. *On the Intensity and direction of the force of gravity in India.*

In the winter of 1905 Doctor Hecker who had been deputed by the Royal Geodetic Institute of Potsdam to observe the intensity of gravity over the great oceans, visited India in the course of his tour of the world, and joined Major Lenox Conyngham's pendulum party in camp in northern Bengal. For three days and nights the two observers worked together, and obtained independent values of the times of vibration with their respective pendulums. Their co-operation will enable Major Lenox Conyngham's results to be standardised in terms of the absolute value of gravity at Potsdam. Doctor Hecker afterwards visited Dehra Dún, where he took magnetic observations with his own instruments in the magnetic observatory of the survey office.

This volume was printed at the office of the trigonometrical survey in Dehra Dún under the supervision of Mr. J. Eccles, M.A., and of Lieut. C. M. Browne, D.S.O., R.E., who officiated for Mr. Eccles during the latter's absence on furlough: to both officers I am much indebted for their constant and valued assistance. Mr. Eccles was formerly one of the latitude observers, and he took an important part in the preparation of Vol. XI; I have derived great benefit from his experience.

The historical and descriptive chapters were compiled in the first instance from the records of the survey by Lieut. R. H. Phillimore, R.E., to whom my acknowledgments are due for the care he took to render the accounts accurate and complete.

The numerical data were abstracted and tabulated by Babu Kartar Singh and Babu Baldeo Behari Lal of the Astronomical party, and the printing was carried out under Babu Sarat Kumar Mukerji, to all of whom I express my obligations for the interest they have shown in the work.

The formulæ and results have been checked throughout by Babu Shivnath Saha, the head computer, by whom also I was very materially assisted in the calculations for Appendix No. 5.

The final proofs for the volume were scrutinised by Babu Ishan Chandra Dev, B.A. and Babu Ganga Prasad Mathur, who have introduced many improvements and detected in time not a few mistakes.

By the courtesy of the Rev. Osmond Fisher I have been able to publish as Appendix No. 1 his contribution on *Deflections of the plumb-line in India*: it is many years since Mr. Fisher first showed his interest in the geodetic work of India in his well-known book on mathematical geology, "*Physics of the earth's crust*", and I have been much gratified at being able to include in a volume of the survey a paper by this distinguished investigator.

Captain Cowie, who has carried out many investigations of the value of the micrometer screw of the zenith telescope with equal skill and patience, kindly wrote for me both the chapter and appendix that deal with the micrometer value: his determination of the periodic errors of the micrometer screw is in progress but is not yet complete. Captain Cowie also contributed Appendix No. 2 and initiated the system, under which the latitude results have been abstracted from the original records. Major Lenox Conyngham has kindly examined every proof, and the value of the volume has been much enhanced by his corrections, additions and suggestions.

DEHRA DÚN,
December 26th, 1905.

S. G. BURRARD.

ERRATA ET ADDENDA.

PAGE			
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(25)	„ 2 „ top	„ Final Co-latitude	„ Weighted Mean
(29)	„ 16 „ bottom	„ r_w and r_o	„ r_n and r_s respectively

APPENDICES.

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ASTRONOMICAL LATITUDES

PART I.

HISTORY.—DESCRIPTIONS OF THE INSTRUMENTS, OF THE SYSTEMS OF OBSERVING, AND OF THE METHODS OF REDUCING THE OBSERVATIONS.

CHAPTER I.

INTRODUCTORY.

1.

The observations described in Vol. XI.

The astronomical observations, which were taken in India prior to 1886, for the determination of the latitudes of a certain proportion of the stations of the Principal Triangulation, have been discussed in Vol. XI of the *Account of the Operations of the Great Trigonometrical Survey of India.* The observations for latitude, with which the present volume deals, were made in continuation of those described in Vol. XI. The present volume—the eighteenth—resumes the subject at the point, where Vol. XI left it, and carries the description and discussion of the observations down to 1905.

From the year 1872 to 1884 the determination of astronomical latitudes was in abeyance owing to the fact that both astronomical parties were engaged on the determination of differential longitudes by electro-telegraphic signals.

In 1884-85, as two officers were not available for longitude operations, Lieut.-Colonel Heaviside recommenced latitude work in northern India on the meridian of 80°: the observations taken during that season were the last with which Vol. XI dealt.

2.

The observations, which have been taken since Vol. XI was written.

The present volume treats of the latitude observations which were taken between November 1886 and March 1905; during that period latitude work suffered several interruptions, which are explained in the following table:—

Operations undertaken by the astronomical observers between 1885 and 1905.			
Seasons.*	Operations.	Observers.	Locale.
1885-86	Longitude	G. Strahan W. J. Heaviside S. G. Burrard	Punjab.
1886-87	Latitude	S. G. Burrard	Meridian of 80°, southwards from the point, where Heaviside closed in 1885.
1887-88	Longitude	G. Strahan W. J. Heaviside	South India.

* Owing to climatic conditions in India field work cannot be undertaken during the summer; as a rule observations begin annually in October and are continued through the winter till May. It is therefore convenient to refer to them by seasons and not by years. A season denotes the period during which the observers are at work in the field.

Operations undertaken by the astronomical observers between 1885 and 1905.—*contd.*

Seasons.	Operations.	Observers.	Locale.
1888-89	Latitude	J. Eccles	Meridian of 80°, southwards from the point, where Burrard closed in 1887.
1889-90	Longitude	S. G. Burrard G. P. Lenox Conyngham	Central India.
1890-91	Latitude	G. P. Lenox Conyngham	Meridian of 80°, from the point, where Eccles closed in 1889, to the coast line at Madras.
1891-92	Longitude	S. G. Burrard G. P. Lenox Conyngham	Eastern India.
1892-93	Latitude	S. G. Burrard	Meridian of 72° from latitude 23° to latitude 27°.
	Latitude	G. P. Lenox Conyngham	Parallel of 18° from west coast to Longitude 77°.
1893-94	Latitude	S. G. Burrard	Meridian of 72° from latitude 27° to latitude 31°
	Latitude	G. P. Lenox Conyngham	Parallel of 18° from longitude 77° to East Coast.
1894-95 1895-96	Longitude	S. G. Burrard G. P. Lenox Conyngham	Persia and Europe*
1896-97	Latitude	S. G. Burrard	Madras Observatory.
1897-98	Latitude	G. P. Lenox Conyngham	Group round Agra.
1898-99	Latitude and Azimuth	G. P. Lenox Conyngham	A great group round Kaliánpur.
	Latitude	E. A. Tandy	East Coast of India.
1899-1900	Latitude	G. P. Lenox Conyngham	Ganges Valley, Meridian of 78°.
	Latitude	E. A. Tandy	Meridian of 82°.
1900-01	Experiments with Jäderin Base apparatus	G. P. Lenox Conyngham	Dehra Dún.
	Latitude	H. McC. Cowie	Western India on Parallel of 23°.
1901-02	Latitude	H. McC. Cowie	Ganges Valley, Meridian of 88°.

* Volume XVII, *Account of the Operations of the Great Trigonometrical Survey of India*; also *Report on the recent determination of the Longitude of Madras* published at Calcutta in 1897.

Operations undertaken by the astronomical observers between 1885 and 1905.—*contd.*

Season.	Operations.	Observers.	Locale.
1902-03	Latitude	H. McC. Cowie	Ganges Valley, Meridian of 79°.
1903-04	Pendulum	G. P. Lenox Conyngham	Dehra Dún and Coast Stations.
	Latitude	H. McC. Cowie	Himalayas, Meridian of 77°.
	Latitude	H. Wood	Nepal.
1904-05	Pendulum	G. P. Lenox Conyngham	Ganges Valley, Meridian of 88°.
	Latitude	H. McC. Cowie	Lower Burma.

During the five seasons 1892-93, 1893-94, 1898-99, 1899-1900, and 1903-04 two astronomical observers were employed on latitude observations: during the nine seasons 1886-87, 1888-89, 1890-91, 1896-97, 1897-98, 1900-01, 1901-02, 1902-03, and 1904-05 one observer was so employed: throughout the six seasons 1885-86, 1887-88, 1889-90, 1891-92, 1894-95, and 1895-96 the latitude work remained in abeyance.

Season 1886-87.

Latitude Stations visited.—Sarey Khan (formerly known as Sarandi Pat), Lingmára, Sítápár, Bhímsain, Rájuli.

The operations carried out this season on the Jubbulpore Meridional Series formed part of Mr. Hennessey's scheme, under which latitude observations were to be taken along the meridian of 80° at stations half a degree apart from the Himalayas to the Madras Coast. In laying down this programme Mr. Hennessey halved the distance that had hitherto been considered desirable between latitude stations.

In 1884-85 Colonel Heaviside had commenced this series of observations in the north of India, and had worked southwards across the Ganges Valley: in 1886-87 Lieut. Burrard, R.E., crossed the Central Provinces from north to south and extended the series from the valley of the Nerbudda to that of the Godávari. Burrard observed with Strange's Zenith Sector No. 2, and adhered to the methods and procedure formulated by Colonels Herschel, Campbell and Heaviside. A full season's work was not completed owing to the recall in March of the observer to Dehra Dún, where a series of experiments had to be undertaken with the transit instruments for the purpose of investigating the cause of the large circuit errors that had appeared in the longitude work of the previous season.*

Season 1888-89.

Latitude Stations visited.—Díwai, Ankora, Burgpaili, Rángír, Bolíkonda, Niálamari, Dhúlipalla.

In 1888-89 Mr. J. Eccles, M.A., extended the series still further south across the rivers Godávari and Kistna into the Madras Presidency. He observed with Strange's Zenith Sector No. 2; whilst adhering generally to the methods of his predecessors, he increased the number of observations per station, and obtained very complete results.

* Volume XV, *Account of the Operations of the Great Trigonometrical Survey of India*, pp. 373 to 387; also *General Report on the Operations of the Survey of India Department* for 1889-90, pp. 6, 70-72, iii to xi.

Season 1890-91.

Latitude Stations visited.—St. Thomas's Mount, Madras Observatory, Gudali, Kistama, Darutippa, Ongole, Dánapa.

In 1890-91 Lieut. Lenox Conyngham, R.E., observed for latitude between the Kistna and the Madras Coast, and thus completed Mr. Hennessey's programme on the meridian of 80°.

During this season the Zenith Telescope was first used in India, and Talcott's method of observation was introduced (see Plates I to III). Lieut. Lenox Conyngham was the pioneer who initiated the new method of observation, and his work has formed a lasting foundation for the Talcott system in India.

Season 1892-93.

Latitude Stations visited.—Sonáda, Chaniána, Deesa, Oria (formerly called Gúru Sikkar), Samdari, Thob, Chamu, Jambo.

Rájpur, Dehra Dún Base-line East End, Colába, Mándvi, Dhauleshvar, Khánpisura, Kanheri, Nitali, Achola.

Captain Burrard commenced observations in Gujarát and worked northwards into the Rajputana desert. He employed Strange's Zenith Sector No. 1. This instrument had been used by Colonel Campbell in 1871-72, but its results had proved unsatisfactory, and it had been condemned. Campbell had found the curious fact that although the two zenith sectors were apparently alike, yet his, the No. 1, gave large differences between north and south stars, and measured all zenith distances in excess of the truth.* In 1892 Burrard obtained permission to give it a further trial: he pointed out that if it had been used as a zenith telescope, the (N—S) difference would never have been discovered†, and that even the new zenith telescope might exhibit a similar difference, if it were employed as a zenith sector. At three stations Burrard used the instrument both as a zenith sector and as a zenith telescope, and observed for latitude both by the sector and Talcott methods. His mean results by the two methods agreed very closely, but the sector exhibited the same (N—S) difference, even to the last decimal place, as it had done in Campbell's hands 22 years before. The accordance of Burrard's results by the sector and Talcott methods removed the stigma from the instrument and the latter has been frequently employed since, and has won the confidence of successive observers. In Appendix No. 3 of this volume is given an account of the investigation of the (N—S) difference.

During this season Burrard introduced a modification of Talcott's method of observation, in that he occasionally observed a single star by Talcott's method instead of a pair: this could only be done with stars situated within half a degree of the zenith, of which four or five were generally available at every station.

In 1892 Lieut. Lenox Conyngham commenced the season by observing for latitude with the zenith telescope at two stations near Dehra Dún; he then moved to Bombay, and worked from west to east along the parallel of 18° 30′. Lenox Conyngham made an investigation into the effects of temperature upon the value of the micrometer screw, but he was unable to trace any connection between the observed changes in the value and the observed changes of temperature.

Season 1893-94.

Latitude Stations visited.—Agra, Bithnok, Khirsar, Telu, Ládimsir, Mooltán, Dera Dín Panáh, Amritsar. Bolarum, Pirmulo, Vánákonda, Singáwáram, Parampúdi, Sánjib, Waltair.

Capt. Burrard, working with Zenith Sector No. 1, started in the Rajputana desert, and continued his series of the previous year northwards into the Punjab.

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* See Volume XI, *Account of the Operations of the Great Trigonometrical Survey of India*, Chapter I, page (14).

† *General Report of the Operations of the Survey of India Department* for 1892-93.

Lieut. Lenox Conyngham, working with the Zenith Telescope, resumed his work of the previous season on the parallel of 18° 30′ and extended his line of latitude stations eastwards to the east coast. Both observers experienced difficulties with their levels, and recommended the employment of two levels for observations by Talcott's method. The second level, which had always been used in Sector observations, was held to confer an advantage on the sector method over the Talcott.

Season 1896-97.

Latitude Station visited.—Madras Observatory.

The Madras Observatory was amongst the stations visited by Lenox Conyngham in 1890-91. It was an unfortunate coincidence that the first latitude observed in India with the new Zenith Telescope and by the Talcott method should have happened to be the latitude of an important astronomical observatory. Lenox Conyngham, moreover, had reported adversely upon his observations at Madras: he had, he wrote, constantly found his level unsteady, and he had been driven in consequence to design a wooden flooring for his tent. Being new to the instrument, he had been unable at Madras to locate the cause of the unsteadiness, and regarding his observations as experimental he had pushed on to his second station; the wooden flooring was then ready, and the unsteadiness of level disappeared.

In 1896 Mr. Michie Smith, the Director of the Madras Observatory, was about to complete a very important catalogue of stars, but was hindered by the uncertainty which surrounded the observed values of the latitude of the observatory. Lenox Conyngham, who was in England, strongly supported Mr. Michie Smith's proposal for a redetermination.

In the winter of 1896-97 Mr. Michie Smith and Major Burrard observed for latitude at Madras with both the Zenith Sector and Zenith Telescope. From a subsequent discussion of all results Mr. Michie Smith obtained a final value of 13° 4′ 8″·0.*

Season 1897-98.

Latitude Stations visited.—Agra Longitude station, Agra parade point, Agra-group north point, Agra-group east point, Agra-group west point, Agra-group south point.

In consequence of the simultaneous publication of the first volume of the Geodetic Survey of South Africa, and of a paper in the Philosophical Transactions of the Royal Society, entitled "India's Contributions to Geodesy", in which Sir David Gill and General Walker respectively recommended systems of "grouping" observed latitudes round a central station, it was considered advisable to introduce a series of "groups" into the Trigonometrical Survey of India; a similar system however had been initiated once before by Colonel Herschel, and had been abandoned after two years' trial.†

In 1897-98 Capt. Lenox Conyngham assisted by Lieut. Beazeley observed an experimental group of latitudes and azimuths round Agra; valuable experience of groups was gained, and the latitudes furnished interesting results: but the azimuths were not completed owing, firstly, to the delays caused by the observation of the Solar Eclipse, and, secondly, to the great expense of cutting trees, which would have been necessary, had the triangulation been perfected. One lesson learnt was that the vicinity of a great city was not a favourable locality for a "group".

On January 22nd, 1898, a total eclipse of the sun was visible in India, and many European and American astronomers visited this country. Capt. Lenox Conyngham was ordered to prepare a camp and observatories at Pulgaon in the Central Provinces for Mr. Newall and Capt. Hills, two of the observers selected by the Solar Eclipse Committee of the Royal and Royal Astronomical Societies. At the

* *Madras Meridian Circle Observations*, Vol. IX. General Catalogue, 1899, pages xviii to xxi.
† Volume XI, *Account of the Operations of the Great Trigonometrical Survey of India*, page (23).

same time Major Burrard, who was in charge of the Tidal and Levelling operations, was directed to build observatories and prepare a camp at Sahdol in Rewah for Mr. W. H. M. Christie, F.R.S., the Astronomer Royal, and for Professor H. H. Turner, F.R.S.*

In 1897-98 Lenox Conyngham increased the number of intersecting wires in the Zenith Telescope from one to three. The wires were separated by intervals of 1000 divisions of the micrometer; the object of the change was to obviate the necessity of traversing the single micrometer wire from end to end of the field when stars differing considerably in Zenith Distance were being observed. The exact distances between the several wires in terms of micrometer divisions were frequently measured.

Season 1898-99.

Latitude Stations visited.—Daiádhari, Bhaorása, Sironj Base-line N.E. End, Kaliánpur, Súrantál, Kámkhera, Losalli, Tinsia, Ahmadpur.
Vizagapatam Base-line N. End, Ráwal, Mal, Khundábolo, Cuttack, Patna Chandípur, Dariápur.

In 1898-99 Capt. Lenox Conyngham observed a very complete and a very important group of latitudes and azimuths round Kaliánpur. His observations for latitude were taken with Zenith Sector No. 1, and those for azimuth with Barrow's 24-inch theodolite No. 2. His results were discussed by Major Burrard in Professional Paper No. 5 on "*the Attraction of the Himalaya Mountains upon the plumb-line in India*" published at Dehra Dún in 1901.†

In this paper deflections of the plumb-line were classified by regions, and were shown to follow one general law on all Himalayan meridians. It was also contended that the attraction of the Himalayan mass was being compensated not only by deficiencies of matter underlying the mountains, but by regular variations in the density of the Earth's crust under the plains of Northern India; and that the explanation of observed anomalies was to be sought in the abnormal densities of the crust underlying the plains, surrounding the mountains, rather than in a deficiency of matter below the Himalayan mass itself.‡ In this paper the futility of "grouping" latitude stations around a centre was demonstrated.

In 1898-99 Lieut. E. A. Tandy observed for latitude at stations on the East Coast of India: the instrument used was the Zenith Telescope, to which a second level had now been fitted. Tandy introduced this year a system of balancing pairs, by means of which the positive and negative corrections on account of micrometer value were equalised in the aggregate. This system was an immense improvement on the old.

Season 1899-1900.

Latitude Stations visited.—Sarkára, Sirsa, Bánsgopál, Sankráo, Salímpur, Bostán, Chandaos. Amúa, Karía, Háthbena, Ramai, Patháídi, Dalea.

In 1899-1900 Lenox Conyngham observed for latitude with Zenith Sector No. 1 at stations in the Ganges Valley near the meridian of 78°. His object was to multiply stations in the vicinity of the Himalayas, and in those tracts where Himalayan attraction appeared to cease.

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* Report on "*the Total Solar Eclipse January, 22nd, 1898*" published under the direction of Major-General C. Strahan, R.E., Surveyor General of India, 1898.

† Also see Royal Astronomical Society, *Monthly Notices*, January 1902. *Report of the International Geodetic Conference*, Paris, 1900. Article on Mountain Masses and Latitude Determinations in "*Nature*", May 22nd 1902. Paper on the Figure of the Earth in the *Report of the British Association for the Advancement of Science*, Belfast, 1902, page 541. Papers on Deflections of the plumb-line in *Philosophical Magazine* for January and March 1904.

‡ The following extract is from an earlier paper by the same writer:—
"It is impossible of course to tell at *what* point on each meridian Himalayan attraction really ends, and when on the meridian of 78° we assume "its limit is at Noh, where gravity first coincides with the normal, the absence of deflection may have been merely brought about by a counter-attrac- "tion from the south. It may be that Himalayan attraction extends much further south, and that about Lat. 26° it is merely neutralized by the Vin- "dhyáchal and Sátpura ranges". *General Report of the Operations of the Survey of India Department*, for 1893-94, Latitude Operations, page xvi.

In 1899-1900 Tandy observed for latitude with the Zenith Telescope at six stations of the Biláspur Meridional Series. He also devoted much attention to questions concerning the accuracy of his levels; and took advantage of the two levels on his instrument to carry out a thorough investigation. He deduced a system of calibrating levels and invented an ingenious diagram, from which the true dislevelment for any position of the bubble, freed from errors due to deformations of tube, could be read off.*

Season 1900-01.

Latitude Stations visited.—Khankharia, Didáwa, Virária, Lúnki, Rojhra, Chánga, Khori, Alamkhán, Károthol, Akbar, Ranjítgarh.

In 1900-01 Lieut. H. M. Cowie observed for latitude with the Zenith Telescope at eleven stations of the Great Longitudinal Series in the Rajputana and Sind deserts, and thus completed the chain of observed latitudes, which stretches across India from Calcutta to Karachi.

Lieut. Cowie introduced this year into the calculations of final mean values a system of weights, which has been followed in subsequent seasons.

He also introduced a system by which the level corrections were in practice reduced to a minimum. This was an outcome of Tandy's investigations: Tandy was the first to show the serious effect of the errors arising from levels; Cowie took a step further, and showed the possibility of escaping from these errors in practice. The probable errors of Cowie's results this season were not only smaller than had been attained with the Zenith Telescope before, but were the smallest on record.

Season 1901-02.

Latitude Stations visited.—Madhupur, Charaldánga, Chanduria, Lohágara, Jalpaiguri, Siliguri, Kurseong, Senchal, Tonglu, Phallut.

In order to test the correctness of the views put forward in the professional paper on Himalayan attraction and to discover whether southerly deflections would prevail over the east of the Gangetic plains as they had been shown to do over the west and centre, Cowie was deputed in 1901-02 to observe a series of latitudes on the meridian of 88° from Calcutta to Darjeeling. He found that the zone of southerly deflection was even more marked here than in other parts of the Ganges Valley, and that it extended northwards until the Himalayas were visible. At Kurseong he discovered a larger deflection of the plumb-line, than had yet been met with in India.

During this season Cowie made a thorough investigation of the value of the micrometer of the Zenith Telescope, and carried out a calibration of the screw.†

Season 1902-03.

Latitude Stations visited.—Gúrmi, Majhár, Algi, Andhiári, Dargawa, Budhon, Saugor, Náharmau, Birond.

In October 1902 Lieut. Cowie was ordered to continue his tests of the previous season by working across the Gangetic plains over the supposed zone of southerly deflection along the meridian of 79°. He found as before that southerly deflections prevailed uninterruptedly throughout the zone. The instrument employed was the Zenith Telescope.

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* *See* Professional Paper—No. 4, "*Notes on the Calibration of Levels.*" 1900.

† *See Extracts from Narrative Reports of the Survey of India*, for 1901-02—Latitude Operations.

During the summer of 1903 Cowie determined the systematic variations in the value of the micrometer of the Zenith Telescope by means of the "G" microscope of the apparatus used for comparisons of standards of length.

Season 1903-04.

Latitude Stations visited.—Bahak, Bajamara, Lambatach, Kidarkanta, Kaulia, Mahadeo Pokra, Quetta.

Perhaps the most extraordinary feature of Himalayan attraction is the sudden increase in the deflections of the plumb-line in the submontane region. On the meridian of Calcutta the extreme range of the deflections over 200 miles of alluvial plain was 3″: but in the eleven minutes of latitude between Siliguri and Kurseong the deflections increased by 28″. A similar peculiarity exists at Dehra Dún, and Birond. These sudden increases were as little to be predicted from the laws of gravitation, as was the prevalence of southerly deflections over the plains south of the mountains. They indicate that the real distribution of mass in the submontane regions is very different from what it appears. Consequently in 1903 it was decided to investigate the deflections of gravity in the inner Himalayas, and Lieut. Cowie was ordered to extend the triangulation of the Great Arc of India northwards across the Mussooree range to the snows, and to observe for latitude at all convenient points.* His results were very remarkable, and showed that large deflections of 30″ continued to prevail within the heart of the Himalayas.

The natural difficulties of the Himalayan problem have been increased by the exclusion of observers on political grounds from Nepal, for Nepal is most favorably situated for geodetic work. In 1903 Captain H. Wood was received at Katmandu by the Nepal Durbar, and was allowed at the special request of Lord Curzon to observe at two stations in the vicinity. The immediate object of Wood's visit was to identify the peaks of Mount Everest and Gaurisankar, and to settle points of geographical interest which had been under discussion for 50 years. Wood was however well aware of the value attaching to geodetic observations in Nepal, and seized the opportunity of observing an astronomical latitude at two stations near Katmandu, the geodetic positions of which he fixed by observations to well-determined snow-peaks. The only instrument that he had with him was a 6-inch micrometer theodolite—an instrument that is not generally considered suitable for rigorous astronomical work: but his results have been given a place in this volume beside those obtained with larger instruments, both on account of the skill displayed in difficult circumstances by the observer and in view of the small present probability of any further geodetic work becoming possible in Nepal.

After leaving Nepal Captain Wood was employed in observing astronomical azimuths at longitude stations: at Quetta he observed for azimuth and latitude with a 12-inch micrometer theodolite.

Season 1904–05.

Latitude Stations visited.—Dehra Dún Haig Observatory, Nagarkhána†, Akyab, Prome, Moulmein.

In 1904 Captain Cowie accompanied the Tibet Frontier Mission to Lha-sa. Upon his return he observed the latitude of Dehra Dún, and of four longitude stations in Lower Burma.

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* A chart of Cowie's Himalayan triangulation is given at the end of this volume. A description of his work will be found in Appendix No. 2.
† Nagarkhána is six miles from Chittagong Longitude Station.

CHAPTER II.

THE INSTRUMENTS EMPLOYED AND THE METHODS OF OBSERVING.

1.

The Zenith Sectors. Description of the Instruments.

The construction of two zenith sectors, intended for the determination of Astronomical Latitudes, was sanctioned by the Secretary of State for India in 1861, and the task of designing them and superintending their manufacture was entrusted to Colonel A. Strange, F.R.S., who was at that time employed in preparing other instruments for the Great Trigonometrical Survey, and who was shortly afterwards appointed Inspector of Scientific Instruments to the India Office. The zenith sector is intended, as its name implies, for observing the meridional zenith distances of stars, not far distant from the zenith. Its distinguishing feature may be described as a construction which allows of its being turned on a vertical axis through 180° in azimuth between two observations of the same star about one culmination, a provision which admits of zero error being eliminated by treating the two observations as a pair to be combined together. It was not an instrument in common use, and but few had ever been constructed before Strange undertook the task. The chief points he had to keep in view were lightness and portability, so far as compatible with the desired power of the instrument, which was to be on a par with the highest class of field instruments, as distinguished from those of fixed observatories. Strange did not consider that any existing type of zenith sector—the best known being that by Sir G. Airy—would afford the desired portability; and he designed the new instruments on entirely novel lines. Their manufacture was entrusted to Messrs. Troughton and Simms, but was delayed in various ways, and the instruments were not completed for several years, No. 2 being sent out to India in 1869 and No. 1 in 1871. The experience gained in India in the use of No. 2 led to some modifications in No. 1. A detailed description of the zenith sectors is given in the second Chapter of Vol. XI of this series, and a drawing of one of them is appended to this volume as Plate IV.

2.

The Zenith Sectors. Method of observing.

The programme of work with a zenith sector at a latitude station was drawn up in accordance with the following rules:—

(i). From 70 to 100 stars were observed, 100 when possible.

(ii). Each star was observed once E. to W. and once W. to E.* In order that this might be done without confusion, a programme of stars was commenced on its first night with the first star E. to W., the second W. to E., and so on alternately: on the second night the first star was taken W. to E., the second E. to W., and so on.

(iii). Four or six nights were devoted to each station: four were considered sufficient, if there was a paucity of stars and no misses occurred; but six allowed of stars that had been missed being observed in their second direction E. to W. or W. to E.

(iv). When half the observations had been secured, the instrument was revolved through 180° in azimuth, *i.e.*, if the azimuthal stud had been originally placed north, it was brought round to south.

(v). If only 70 stars were observed, they were divided into two programmes of 35 each: during the first night the first programme was worked through, during the second the second programme, and during the third those stars of both programmes that had been missed, were observed: on the morning of the fourth day the instrument was reversed, and in the evening the first programme again worked through, those stars taken E. to W. on the first and third days being now taken W. to E., and *vice versâ*: on the fifth night the second programme was again taken up, the direction E. to W. and W. to E. being changed for each star from what it was on the second night: on the last night those stars of both programmes that had been missed during the fourth and fifth nights were observed.

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* "Observed W. to E." means that the first intersection of the star was made with the telescope west, and the second intersection with the telescope east.

(vi). If 100 stars were taken, they were divided into three programmes: each programme was worked through once with the azimuthal stud north, and once with it south: those stars observed E. to W. on the first occasion of each were taken W. to E. on the second, and *vice versâ*. As three programmes had to be got through in six nights, no spare nights were available for picking up misses, but by judicious interchanges of stars between the three a star missed from one programme could often be observed again in one of the other two.

(vii). The number of observations per station were not to exceed 200, and were not to be less than 140.*

The selection of stars for latitude observations was strictly regulated as follows:—

(i). All stars were taken from the latest authorised catalogue.

(ii). No star was considered sufficiently trustworthy for observation unless its north polar distance was shewn in that catalogue as determined by at least six observations.

(iii). No star was included that had not a proper motion in north polar distance assigned to it in the catalogue.

(iv). Double stars and stars of the 1st and 2nd magnitude were avoided.

(v). No star was included that had a greater zenith distance than 13°.

(vi). The number of north stars had to be the same as the number of south.

(vii). The mean zenith distance of all the north stars was not permitted to differ from the mean zenith distance of all the south by more than half a degree.

(viii). Stars that were 8° from the zenith or more were paired as nearly as possible.

(ix). The minimum difference in right ascension between two consecutive stars was six minutes.

(x). Two to four Nautical Almanac stars, equally distributed north and south of the zenith, were included to enable the chronometer error to be determined.

(xi). Two to four stars within 1° of the zenith were included to enable the collimation error in azimuth to be determined.

The programme of work for one night was made up as follows:—

(i). The zenith distances of about 36 zenith stars were measured, the stars being selected in accordance with the above rules, and each observed in both telescopic positions.

(ii). The time of transit of a circumpolar star, whose right ascension had been well-determined, was taken over two wires in each telescopic position: from this was deduced the deviation error of the instrument.

(iii). The transit-axis level was read before and after work in both telescopic positions.

(iv). The two thermometers outside the tent were read every 15 or 20 minutes.

(v). The barometer was read every hour, the mercury in the cistern being lowered and raised again to the zero pointer each time.

(vi). The microscope run was determined 12 or 15 times, the same 5′ space never being utilised twice; the high reading was always recorded *above* the low, whether read first or not.

(vii). It was considered of importance that the temperature of the interior of the observatory tent should not differ from that of the outside air by more than 1° or 2° Fahrenheit: the thermometer attached to the barometer was therefore occasionally glanced at, but its readings were not recorded.

(viii). The error of the chronometer and the collimation error of the telescope in azimuth were found nightly, but no special observations were needed for their determination, if in the selection of stars attention had been paid to rules (x) and (xi) given above.

3.

The Zenith Sectors. Specimen of Record and Reduction.

An extract from the original field records is given as a specimen of the form in which the zenith distance observations were entered and reduced. The first four columns call for no remarks: the next

** It will be found, as a rule, that all the observations taken on any one particular night will be burdened with some small constant error, running throughout; the more nights therefore that the observations are extended over, the better will be the final result.

five contain the readings obtained from the sectors by means of the index microscope and the four microscopes A, B, C, and D. The tenth column is the mean of the preceding four. The column headed "c′" gives the correction for the average run of the microscopes. The average run was obtained at each station by repeated observations: at Chaniána the mean value of the run was determined from the following observed equation:—

$$299 \cdot 429 \text{ divisions of mean microscope micrometer} = 300 \text{ seconds of arc,}$$

and the correction for run was

$$+\ 0'' \cdot 00190 \text{ per micrometric division.}$$

As a general rule the division of the limb *nearest* to a micrometer zero was intersected by the micrometer: if by any chance this rule was not adhered to, or if any doubt existed as to which division was nearest, a note was made on the record thus "Referred to 15′ division."

In the twelfth column m is the reading of the eye-piece micrometer, but to obviate the necessity for + and − signs 5000 divisions are added—in other words the zero line is put back half an inch, for 100 revolutions go to the inch, and there are 100 divisions in the screw-head.

The next four columns contain the readings of the two levels, which are named "a" and "b" their ends being named *n* and *s* for reference.

The column $M = \mu m$ is simply the reading m of the eye-piece micrometer reduced to seconds by multiplying by $\mu = 0'' \cdot 425456$, the value in seconds of one division of the micrometer.

Refraction was taken from Bessel's Tables. The collimation and deviation errors and the dislevelment of the transit axis were measured frequently during work.

Stars observed with the zenith sector have to be intersected in *both* positions of the instrument, and the two intersections cannot consequently be made on the meridian: it has been usual to make the first intersection 20 seconds before the star reaches the meridian, and the second intersection 20 seconds after its transit. The interval of 20 seconds was estimated by means of the known intervals of the vertical wires from the centre wire. The *observed* zenith distance has therefore always received a correction on account of the extra-meridional position of the star at the time of intersection, due in the first place to the observations having of necessity been made off the centre wire, and in the second to the centre wire not having coincided with the meridian owing to imperfect adjustment of the instrument.

There were four causes which prevented stars being intersected *on* the meridian: they were (i) Intentional intersection off the centre. (ii) Collimation error. (iii) Inclination of the transit axis. (iv) Deviation error. The collimation and deviation errors and the inclination of the transit axis were always determined and entered on the record.

In the case of both intentional intersection off the centre and of collimation error the zenith distance of a star was measured on a small circle parallel to the meridian: in the case of dislevelment of the transit axis the measurement was made on a great circle cutting the meridian in the north-and-south diameter of the horizon: in the case of deviation error the measurement was made on a great circle cutting the meridian at the nadir and zenith.

Intentional intersection off the centre and collimation error have been treated together: the corrections to zenith distances depending on these two causes have been computed from the formula, $\frac{15^2}{2} \cdot (k^s + c^s)^2 \tan \delta \sin 1''$, δ being the star's declination, c the collimation error in time and k the estimated interval in time that the intersection was made from the centre wire. Zenith distances of north stars have been decreased and those of south stars increased by this expression.

If at the time of observation of a zenith distance (ζ) the transit axis was inclined to the horizon at an angle b'', the distance as observed has been, if the star were north, decreased by $\frac{b^2}{2} \cdot \frac{\cos(\Delta + \zeta) \cos \zeta}{\sin \Delta} \sin 1''$, and if the star were south, increased by $\frac{b^2}{2} \cdot \frac{\cos(\Delta - \zeta) \cos \zeta}{\sin \Delta} \sin 1''$, Δ being the North Polar Distance of the star.

If at the time of observation the deviation error of the instrument from the meridian was a'', the observed zenith distances of north stars have been decreased by $\frac{a^2}{2} \cdot \frac{\sin(\Delta + \zeta) \sin \zeta}{\sin \Delta} \sin 1''$, and those of south stars decreased by $\frac{a^2}{2} \cdot \frac{\sin(\Delta - \zeta) \sin \zeta}{\sin \Delta} \sin 1''$.

Record and Reduction of Zenith Distance Observations at Chaniána Station taken with Zenith Sector No. 1 by Captain Burrard.

Astronomical date and position of Azimuthal Stud	Reference No. of Observation	Position of Telescope East or West	Star's No. in Greenwich Catalogue of 1880	Circle Readings: Index	Circle Readings: Microscopes A	B	C	D	Mean c	Correction for Microscope Runs c′	Telescope Micrometer Reading 5000 + m	Level Readings a: North end n	a: South end s	b: North end n	b: South end s	Thermometer No. 3 by Newman	Barometer No. 1247 by Adie	Chronometer Times of Intersection
				° ′	″	″	″	″	″	″	•	d	d	d	d			
								Transit axis	Level									
									div.		div.							
						Tel	escope E.	East End	18	West	End 42							
								Level	Reversed									
						Tel	escope E.	East End	35	West	End 27							
						Tele	scope W.	East End	15	West	End 47							
								Level	Reversed									
						Tele	scope W.	East End	32	West	End 32							
					51 (H)	Cephei	Telescop	e W.	wire	v	6h 46m 42s	Obs	ervatio	ns for	Azim	uth		
							Telescop	e E.	wire	ii	6 49 10							
					λ Ursæ	Minoris	Telescop	e E.	wire	ii	7 33 49							
							Telescop	e W.	wire	iv	7 35 1							

Astronomical date and position of Azimuthal Stud	Reference No. of Observation	Position of Telescope East or West	Star's No. in Greenwich Catalogue of 1880	Index ° ′	A ″	B ″	C ″	D ″	Mean c ″
	35	W	1206	356 39	37·9	48·5	48·8	54·1	47·33
		E		3 24	49·7	60·7	57·8	67·0	58·80
28th February 1893	36	E	1227	359 48	57·1	67·8	66·4	71·4	65·68
		W		0 12	59·5	71·8	66·9	71·4	67·40
	37	E	1266	0 59	48·6	59·9	58·2	64·0	57·68
		W		359 5	14·8	25·0	21·1	27·7	22·15
	38	W	1297	351 58	60·3	72·5	71·2	77·3	70·33
		E		8 3	30·1	43·2	39·7	49·0	40·50
	39	E	1327	5 21	7·4	18·8	16·8	25·7	17·18
		W		354 40	57·6	70·4	65·4	72·2	66·40
	40	W	1343	2 55	50·5	61·5	60·3	70·0	60·58
		E		357 3	27·2	39·3	34·9	40·0	35·35
Azimuthal Stud South.	41	E	1373	1 45	40·5	51·8	49·0	56·5	49·45
		W		358 17	23·7	34·5	28·3	35·3	30·45
	42	E	1397	354 9	44·9	57·3	53·4	60·2	53·95
		W		5 53	57·7	69·2	64·5	72·2	65·90
	43	W	1416	3 10	42·3	54·1	52·2	61·9	52·63
		E		356 49	13·1	26·1	21·0	26·9	21·78
	44	W	1417	3 10	42·3	54·1	52·2	61·9	52·63
		E		356 49	13·1	26·1	21·0	26·9	21·78
	45	E	1459	3 44	32·3	43·3	40·1	48·3	41·00
		W		356 17	48·0	60·0	55·6	60·0	55·90

Reference No. of Observation	Position of Telescope	Correction c′ ″	Telescope Micrometer Reading	a: North end n (d)	a: South end s (d)	b: North end n (d)	b: South end s (d)	Thermometer No. 3 by Newman	Barometer No. 1247 by Adie	Chronometer Times of Intersection
35	W	− ·03	4794·8	29·0	41·3	50·9	56·4			
	E	− ·00	4825·0	41·8	28·7	56·0	51·5		Mercl. ins.	
36	E	− ·10	4962·0	40·9	29·8	56·1	51·7	°	29·10 Aner.	
	W	− ·22	5001·5	29·1	41·9	51·5	56·7	72·4	29·25	h m s
37	E	− ·00	4760·9	41·8	29·5	57·8	51·1			7 16 54
	W	+ ·04	4771·0	30·0	41·8	52·1	56·9			7 17 37
38	W	− ·10	4856·8	30·0	41·8	52·0	57·4			
	E	− ·15	5035·0	42·2	30·1	57·5	52·4	70·7		
39	E	+ ·14	4962·9	42·1	30·8	57·9	52·5			
	W	+ ·12	4974·3	31·2	41·9	53·0	57·9			
40	W	+ ·11	5167·3	30·1	43·0	52·1	58·8			
	E	− ·16	5176·2	42·0	31·1	58·5	52·3			
41	E	+ ·10	4897·0	42·5	30·5	58·8	52·1			
	W	+ ·29	4919·7	31·2	41·8	53·2	57·9			Referred to 15′ division
42	E	− ·01	4844·0	41·8	31·1	57·9	52·7			
	W	− ·10	4884·5	30·8	42·0	52·8	57·8			
43	W	+ ·10	5113·9	31·1	41·4	53·3	57·1			
	E	− ·08	5138·2	42·0	30·8	58·1	52·1			
44	W	+ ·10	5125·1	31·1	41·4	53·3	57·1			
	E	− ·08	5134·0	42·0	30·8	58·1	52·1			
45	E	− ·04	4934·2	43·0	29·6	59·2	51·2			
	W	+ ·24	4985·8	31·2	41·4	52·9	57·7	73·8		Referred to 20′ division

Record and Reduction of Zenith Distance Observations at Chaniána Station taken with Zenith Sector No. 1 by Captain Burrard.

Reference No. of Observation	Position of Telescope East or West	$M = \mu m$ $\mu = 0''\cdot425456$	Circle Reading $+ c' +$ reduced Micrometer Reading M $= N$	Zero error $z = \frac{1}{2}(N_E + N_W) - 180°$	Instrumental Zenith Distance $Z = \frac{1}{2}(N_E - N_W)$	Level a. 1 division = 1″·08365 Diff. $s - n = S$	For inclination of Axis towards North $S_W + S_E$	For zero error $S_W - S_E$	Correction in Arc $= -\frac{a}{4}(S_W + S_E)$ $a = 1''\cdot08365$	Level b. 1 division = 0″·92984 Diff. $s - n = S$	For inclination of Axis towards North $S_W + S_E$	For zero error $S_W - S_E$	Correction in Arc $= -\frac{b}{4}(S_W + S_E)$ $b = 0''\cdot92984$
		″	° ′ ″	″	° ′ ″	d	d	d	″	d	d	d	″
35	W	− 87·30	356 38 20·00	+ 62·17	+3 22 42·17	+12·3	− 0·8	+25·4	+0·21	+ 5·5	+ 1·0	+10·0	−0·23
	E	− 74·46	3 23 44·34			−13·1				− 4·5			
36	E	− 16·17	359 48 49·41	+ 58·62	−0 12 9·21	−11·1	+ 1·7	+23·9	−0·44	− 4·4	+ 0·8	+ 9·6	−0·19
	W	+ 0·64	0 13 7·82			+12·8				+ 5·2			
37	E	−101·72	0 58 15·96	+ 60·36	+0 57 15·60	−12·3	− 0·5	+24·1	+0·13	− 6·7	− 1·9	+11·5	+0·44
	W	− 97·43	359 3 44·76			+11·8				+ 4·8			
38	W	− 60·93	351 58 9·30	+ 62·27	+8 2 52·97	+11·8	− 0·3	+23·9	+0·08	+ 5·4	+ 0·3	+10·5	−0·07
	E	+ 14·89	8 3 55·24			−12·1				− 5·1			
39	E	− 15·78	5 21 1·54	+ 58·56	+5 20 2·98	−11·3	− 0·6	+22·0	+0·16	− 5·4	− 0·5	+10·3	+0·12
	W	− 10·94	354 40 55·58			+10·7				+ 4·9			
40	W	+ 71·19	2 57 11·88	+ 61·02	−2 56 10·86	+12·9	+ 2·0	+23·8	−0·52	+ 6·7	+ 0·5	+12·9	−0·12
	E	+ 74·97	357 4 50·16			−10·9				− 6·2			
41	E	− 43·83	1 45 5·72	+ 61·15	+1 44 4·58	−12·0	− 1·4	+22·6	+0·36	− 6·7	− 2·0	+11·4	+0·47
	W	− 34·17	358 16 56·57			+10·6				+ 4·7			
42	E	− 66·38	354 8 47·56	+ 62·11	−5 52 14·55	−10·7	+ 0·5	+21·9	−0·13	− 5·2	− 0·2	+10·2	+0·05
	W	− 49·14	5 53 16·66			+11·2				+ 5·0			
43	W	+ 48·46	3 11 41·19	+ 60·85	−3 10 40·34	+10·3	− 0·9	+21·5	+0·23	+ 3·8	− 2·2	+ 9·8	+0·52
	E	+ 58·81	356 50 20·51			−11·2				− 6·0			
44	W	+ 53·23	3 11 45·96	+ 62·34	+3 10 43·62	+10·3	− 0·9	+21·5	+0·23	+ 3·8	− 2·2	+ 9·8	+0·52
	E	+ 57·02	356 50 18·72			−11·2				− 6·0			
45	E	− 27·99	3 44 12·97	+ 61·29	+3 43 11·68	−13·4	− 3·2	+23·6	+0·83	− 8·0	− 3·2	+12·8	+0·75
	W	− 6·05	356 17 49·61			+10·2				+ 4·8			

4.

The Zenith Telescope. Description of the Instrument.

A zenith telescope was first used in India in 1890: it is a simple instrument and weighs but one-tenth of what a zenith sector does. So far the Survey of India has only purchased one zenith telescope proper and that was constructed by Troughton and Simms. The zenith sectors have however been used as zenith telescopes, and though they are unnecessarily heavy being encumbered with a vertical arc, they have proved suitable for observations after Talcott's method.

The distinctive feature of the Talcott method is that instead of the meridian zenith distance of a star being measured by means of a graduated limb, the difference between the meridian zenith distances of two stars on opposite sides of the zenith is measured by means of a micrometer. Thus if λ denotes the latitude of the station, ζ_n, ζ_s the zenith distances of the stars, one north and the other south of the zenith, and δ_n, δ_s their declinations, we have

$$\lambda - \zeta_s = \delta_s$$

$$\lambda + \zeta_n = \delta_n$$

and therefore $$\lambda = \frac{\delta_s + \delta_n}{2} + \frac{\zeta_s - \zeta_n}{2}$$

The zenith telescope is designed for the measurement of the quantity $(\zeta_s - \zeta_n)$.

Three plates illustrating the zenith telescope made by Troughton and Simms for the Survey of India are given in this volume. The telescope, the aperture of which is $2\frac{1}{2}$ inches and focal length 30, is fixed at one end of a short horizontal axis, and is counterpoised at the other. The horizontal axis is fixed to a vertical axis, about 14 inches high; the latter is of steel and is supported by a tripod. The tripod rests on three levelling screws and is fitted with an azimuthal setting circle. The latter is provided with two stops which can be clamped 180° apart, so that the telescope can be brought into the meridian in both positions without reference to the limb of the circle. The telescope carries a setting circle and two sensitive levels.* The reticule consists of the ordinary five transit wires and three transverse wires moved by a micrometer screw of long range, by which an angle of 40′ may be measured in zenith distance.†

When first used in India the zenith telescope was erected on a wooden stand, which was supported by a masonry foundation. The stand was however found to be affected by variations in humidity and temperature which rendered it unsteady and made frequent readjustments of the level necessary. This was troublesome and the stand has now been discarded in favour of an isolated brick pillar (see Plates II and III.)

5.

The Zenith Telescope. Adjustments and Constants.

The permanent adjustments are four in number, namely:—

(i). Stellar focus.
(ii). Horizontality of the horizontal wire.
(iii). Collimation of the central vertical wire.
(iv). The zero of the setting circle.

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* The second level was added in 1898.
† Originally there was but one transverse wire: the other two were added in 1897.

In this instrument special attention has to be paid to the focus; the observer has to make sure that the adjustment is satisfactory before he begins regular work, for any subsequent change alters the angular value of a revolution of the micrometer.

There are three horizontal wires, A, B, and C, A being that which lies towards the smaller numbers of the micrometer comb. These wires will seldom be truly parallel, so that all cannot be made horizontal. The central one B is adjusted and the inclination of the others to it determined.

The adjustment for collimation in azimuth has usually been made by Gauss's method with two small theodolites as collimators. The small remaining collimation error was determined nightly from star observations.

The values of the following instrumental constants were determined frequently :—

(i). The equatorial intervals of the vertical wires.
(ii). The divisions of the head of the eye-piece micrometer.
(iii). The divisions of the scales attached to the levels.

The diaphragm carries five vertical wires known respectively as i, ii, iii, iv and v, and so numbered that in the position telescope east a zenith star transits the wires in the order i to v; whilst in the position telescope west, wire v is the first wire reached and wire i the last. In both telescopic positions wire iii is the centre wire, from which the intervals of all the others are measured. Wire i is that nearest to the comb.

The micrometer screw. The determination of the value of a division of the eye-piece micrometer is one of the most important and at the same time one of the most difficult operations connected with the zenith telescope. Various methods have been tried, and the following is the procedure now adopted by this survey.

The quality of the screw is first examined by observations of slow-moving stars near the pole. These may be made either with the micrometer in its normal position, the star being at elongation, or with the micrometer turned through a right angle so that a star at culmination is moving parallel to the screw. The latter plan is the more convenient and there is less danger of error owing to imperfect knowledge of the refraction; but in the zenith telescope no simple means of revolving the micrometer through a right angle are provided. The elongation method has the advantage that, if any movement of the telescope in altitude takes place during the observation, it is noticed and can be measured by the level, whereas if a movement in azimuth takes place, while a star is being observed at culmination, the observer is rarely aware of it and cannot measure it. The instrument, however, if erected on a suitable pillar, is not liable to movements in azimuth so that the advantage alluded to is more theoretical than real. The method of observing is similar to that for determining the wire intervals, except that in an examination of the screw the star is caused to transit the same wire again and again, the wire being advanced by a suitable number of turns of the micrometer after each transit.

Micrometer screws are liable to two principal defects, the one being a continuous increase in value from one end to the other, and the second an irregularity with a period of one revolution. To detect the first, it is best to select stars about 10° from the pole and to observe transits from one end of the field to the other giving the micrometer 2 or 3 revolutions at a time; for the second very close circumpolars are required and the wire should be moved forward by a few divisions only. For both kinds of observation it is convenient to have an electric chronograph for recording the transits.

It has been considered advisable to determine the mean value of one division under the conditions which obtain during the latitude observations. For this purpose measurements of the differences of declination of well known stars are made, either on extra nights devoted to this purpose at each station, or at any convenient times during work each night. It generally happens that during a night's work there are unavoidable intervals between pairs of stars, and it is frequently possible to find two stars lying near each other both in declination and right ascension which may be observed for micrometer value. The observation is precisely similar to one for latitude except that a semi-revolution in azimuth is not given to the instrument. Stars selected for the purpose are about 15′ to 30′ apart in declination; if less, the deduced value of the micrometer becomes largely affected by an error of observation; if more, parts of the screw are brought into play outside those ordinarily in use.

A list of stars for Talcott observations will almost always include some "double pairs," *i.e.*, two stars of northern and one of southern aspect, or *vice versâ*, on the same setting. It is quite legitimate to use the observations of the couple that have the same aspect for a deduction of the micrometer value.

It is also possible and permissible to deduce the final value of the micrometer from the results of the latitude observations themselves, and this was formerly done; but the method just described is preferred for the following reasons:—

(1) It is generally possible to observe the same couples of stars at several consecutive stations by which means a satisfactory watch is kept on any variation in the value of the micrometer.

(2) When two stars are observed, one after the other, without the telescope having been moved in the mean time, the level correction is generally so small as to be negligible.

(3) As the two stars are not only at the same altitude, but also close together in the heavens, there is little probability of there being any difference in the atmospheric conditions under which they are observed.

(4) If there is any systematic error in the declinations given in the catalogue it will affect the places of stars which lie close together equally so that the difference between the two will be free from its effect.

As a rule four to six couples have been observed each night.

6.

The Zenith Telescope. Method of Observing.

The observer prepares a programme of stars in pairs: for any pair the interval of right ascension is not greater than 15 minutes nor less than 1 minute, and the difference of zenith distance does not exceed 40′. In former years the stars were chosen from Greenwich Catalogues only, but of late the International Catalogue of fundamental stars by Professor Newcomb has been largely used: the name of the catalogue is entered against each star on the record of observation.

An observation may be described as follows: the recorder calls out the mean zenith distance: the observer sets to this with the setting-circle vernier and clamps the level firmly, swings the telescope towards the north till the bubbles of the levels float, and clamps the telescope; then with the tangent screw of the telescope, he carefully brings the bubbles to the centres of their runs.

He now seats himself, and having been informed of the position of the star, places the wire in the proper part of the field. One minute before transit, the recorder gives warning and the observer prepares to make the intersection. As soon as the star enters the field, the observer approximately intersects and calls out to the recorder the name of the wire he is using, and the reading of the position of wire B on the comb, *e.g.*, "wire C four thousand eight hundred." To view wire B he will generally have to traverse the eye-piece. Bringing the eye-piece back so that the star may be in the centre of the field he completes his intersection, placing the wire exactly on the star as it crosses the central vertical wire, the last motion of the micrometer head being always in the screwing up direction; having done this he at once reads the micrometer head, estimating the nearest tenth of a division, and standing up reads both ends of the bubbles. This completes the observation of the first star.

He now releases the azimuth clamp and revolves the instrument through 180° bringing the clamp block up against the other stop without jerk or jar. After allowing sufficient time for the levels to come to rest, the observer examines them, and if the readings have changed by more than about two divisions he brings the bubbles back to their original positions by means of the tangent screw, which moves the telescope as a whole.*

The second star traverses the field on the opposite side of the centre of the comb, and at the same distance from it, so the observer has no difficulty in placing the wire in position. The observation is the same as in the case of the first star.

The level is read with as little delay as possible after the intersection has been made; if the bubble is observed to be moving when the reading is being taken the fact is recorded and the observation rejected.

The thermometers both inside and outside the observatory and the barometers are frequently read during work. The transit-axis level readings are recorded at the commencement and end of work for both positions of the telescope.

The programme always includes several stars from one or other of the almanacs; their times of transit are noted, so that the chronometer error and rate may be deduced.

Two or more circumpolar stars are observed for deviation error each night, one at least in each position of the telescope.

Lastly, one or more stars are observed for collimation error. For this purpose a star whose zenith distance is less than 1° is used. The observation consists in timing it over one of the vertical wires which it reaches before wire iii, and again timing it over the same vertical wire after reversal of the instrument.

At every station the wire intervals A to B and B to C are measured in terms of the micrometer. The intervals are required not only on the central vertical wire, but on each of the vertical wires so that if a star be intersected by A or C after passing wire iii the proper correction to reduce to B may be known.

These measurements can be best made in the day time. The telescope is pointed towards the northern sky, and the observer intersects with each of the moveable wires any convenient little speck or mark on each of the vertical wires in turn, recording in every case the reading of wire B. Several times during the season observations are made for determining the deviation of wire B from true horizontality.

The normal number of nights of observation at each station is six, and of programmes three, each programme being worked through twice over. These three programmes in the aggregate cover the dark hours, each consisting of 4 hours' work. Each programme contains about 20 pairs of stars.

It frequently happens that two stars of northern aspect occur in connection with one of southern, or *vice versâ*, and these "double pairs" may be observed with advantage; a double pair does not yield so good a result as two independent pairs, but is better than a single pair. The method of weighting the result of such observations is explained hereafter; more than two stars on one side of the zenith should not be combined with one on the other side; but if a number of stars occur some north and some south, which can all be observed on one setting, it is a good plan to observe them without touching the level. The number of stars of each aspect are made as nearly equal as possible.

Two stars can be occasionally found which though both passing on one side of the zenith, are well placed for observation with the zenith telescope. Provided that their mean zenith distance is less than half a degree, Talcott's method can be applied to them in principle.

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* To use the tangent screw before observing the second star is slightly objectionable, as it may alter the strains in the telescope tube and produce flexure, or change such flexure as existed during the observation of the first star. There is less danger in doing this however than in allowing the level correction to be large.

One star only can be occasionally observed instead of the usual pair. As an example we may consider a star of zenith distance 0° 20′: the telescope is set to 0° 0′ exactly; the star is intersected in one telescopic position; and the instrument is revolved 180° in azimuth and the star again intersected in the other telescopic position. The two intersections and the revolving of the telescope in azimuth are carried out during the transit of the star across the field of view; a star takes 40 seconds to transit the field, and 35 seconds is ample for the observation. The star in these cases is not intersected exactly on the meridian, and a small correction has to be applied to the zenith distance on this account.

A glance at the fundamental formula will show that if the zenith distance of the south star of a pair is greater than that of the north the difference between them, as measured with the micrometer screw, is to be added to the mean of the declinations to find the latitude, and if less subtracted. In order therefore to cancel any error introduced by a faulty value of the micrometer the sum of the positive differences has to be made equal to the sum of the negative.

The use of double pairs, however, introduces a complication, for each result receives a fractional weight (the weight of an ordinary independent pair being unity). When the first rough draft of the programme is made, the extent and sign of the difference of zenith distance for each pair and its weight are entered; the algebraical sum of the weighted differences is then taken out, and if there is a considerable preponderance in either direction it is eliminated by the substitution of alternative stars. It is not as a rule difficult to bring about an approximate balance; though there may have to be some sacrifice of convenience, or even a reduction in the number of stars observed. It is useless to make the balance exact at this stage, for the accidental missing of a few stars, or the interference of clouds may disturb it; when the first part of the computations has been finished it is generally possible to secure a balance by the arbitrary rejection of one or two observations, if an approximate balance was designed at the outset. The difficulty of obtaining a thoroughly trustworthy value of the micrometer is so great, that it is important to arrange for the cancelment of errors arising from this source.

As there is a possibility of the existence of a personal error depending on the position of the telescope, it is desirable that every pair of stars be observed twice, once E. to W.* and once W. to E.

7.

The Zenith Telescope. Record and Reduction.

The computations may be divided into three principal parts :—

(i) North polar distance of every star, and the mean of each pair.
(ii) Difference of zenith distance of the stars of each pair.
(iii) The final co-latitude.

(i) *North polar distances.* The authorities consulted for the places of the stars are the following :—Nautical Almanac, Berliner Astronomisches Jahrbuch, Connaissance des Temps, Greenwich catalogue for 1880, Newcomb's International Catalogue of fundamental stars.

For the computation of the apparent places Turner's edition of Stone's tables has been employed in recent years.

(ii) *Differences of zenith distance.* Let ζ_n and ζ_s be the true zenith distances of the north and south stars respectively, and let

ζ_0 be the zenith distance to which the telescope is set,
M_0 the reading of the centre of the micrometer comb, *viz.*, 5,000[d],

* Observed E. to W. means that the first star of a pair was observed with the Telescope East, and the second with the Telescope West.

M_n and M_s the micrometer readings of the stars,

m the value of 1 div. of the micrometer,

b the value of 1 div. of the level,

R the reading of the right-hand end of the bubble,

L the reading of the left-hand end of the bubble,

l_n and l_s the level corrections $= \frac{R - L}{2} b$,

r_n and r_s the refraction corrections.

Two cases occur: in the first the micrometer reading increases with the zenith distance: in the second it decreases as the latter increases.

Case I.

The micrometer reading increases with the zenith distance if the south star is observed telescope east and the north star is observed telescope west.

$$\zeta_n = \zeta_0 - (M_0 - M_n)\, m + l_n + r_n$$

$$\zeta_s = \zeta_0 - (M_0 - M_s)\, m + l_s + r_s$$

The fundamental formula is

$$\text{co-latitude} = \phi = \frac{\Delta_n + \Delta_s}{2} + \frac{\zeta_n - \zeta_s}{2};$$

$$\therefore \phi = \frac{\Delta_n + \Delta_s}{2} + (M_n - M_s)\frac{m}{2} + \tfrac{1}{2}(l_n - l_s) + \tfrac{1}{2}(r_n - r_s).$$

Case II.

The micrometer reading decreases as the zenith distance increases if the south star is observed telescope west and the north star is observed telescope east.

$$\zeta_n = \zeta_0 + (M_0 - M_n)\, m - l_n + r_n$$

$$\zeta_s = \zeta_0 + (M_0 - M_s)\, m - l_s + r_s$$

$$\therefore \phi = \frac{\Delta_n + \Delta_s}{2} + (M_s - M_n)\frac{m}{2} + \tfrac{1}{2}(l_s - l_n) + \tfrac{1}{2}(r_n - r_s).$$

In case I the north star is observed in the position telescope west, and in case II the south star is observed in that position; hence in both cases

$$\phi = \tfrac{1}{2}(\Delta_n + \Delta_s) + (M_w - M_e)\frac{m}{2} + \tfrac{1}{2}(l_w - l_e) + \tfrac{1}{2}(r_n - r_s);$$

since the refraction increases with the zenith distance, $(r_n - r_s)$ has the same sign as $(\zeta_n' - \zeta_s)$ and therefore the same as $(M_w - M_e)$.

Then as

$$\tfrac{1}{2}(l_w - l_e) = \tfrac{1}{2}\left(\frac{R_w - L_w}{2} - \frac{R_e - L_e}{2}\right)b$$

$$= \frac{b}{4}\left\{(R - L)_w - (R - L)_e\right\},$$

so $\frac{\zeta_n - \zeta_s}{2}$, *i.e.*, half the difference of zenith distance,

$$= D = (M_w - M_e)\frac{m}{2} + \frac{b}{4}\left\{(R - L)_w - (R - L)_e\right\} + \tfrac{1}{2}(r_n - r_s).$$

In this formula it is assumed that there are no errors of adjustment and that each star is intersected as it crosses the central vertical wire. The corrections when these conditions are not fulfilled remain to be considered.

There are four sources of error:—

(1) Intersection off the meridian.

(2) Collimation.

(3) Dislevelment of transit axis.

(4) Deviation in azimuth.

The first and second are of the same nature. They cause the zenith distance to be measured on a small circle parallel to the meridian, instead of on the meridian itself.

Let k^s be the distance (in equatorial seconds of time) from the centre wire at which the star is intersected, c^s the collimation error:—

then the correction to an observed zenith distance is

$$\pm \tfrac{1}{2}\, 15^2 (k^s + c^s)^2 \cot \Delta \sin 1''.$$

The upper sign applies to south and the lower to north stars. It is clear from this formula that it would not be correct to treat k and c separately; if this were done a term $= 15^2\, kc \cot \Delta \sin 1''$ would be omitted, which might be appreciable.

An inclination of the transit axis causes the zenith distance to be measured on a great circle passing through the north and south points of the horizon and inclined to the meridian at an angle equal to the dislevelment.

Let b be the inclination to the horizon in seconds of arc; then whichever end of the axis is the higher, the correction to the zenith distance of a star is

$$\pm \frac{b^2}{2} \cdot \frac{\cos\phi \cos\zeta}{\sin\Delta} \sin 1''.$$

The upper sign is applicable to south stars and the lower to north.

A deviation in azimuth causes zenith distances to be measured on a great circle passing through the zenith and inclined to the meridian at an angle equal to the deviation.

Let a be the deviation in seconds of arc; then the correction to a zenith distance is

$$-\frac{a^2}{2} \cdot \frac{\sin \phi \sin \zeta}{\sin \Delta} \sin 1''.$$

The sign of the correction is independent of the star's aspect.

The following table shows the smallest values of $(k + c)$, b and a which render corrections appreciable, *i.e.*, greater than $0''\cdot005$:—

	Co-latitude 75°			Co-latitude 60°	
$\zeta = 0°$	$k + c = 8^s$ $b = 88''$ $a =$ Infinity		$\zeta = 0°$	$k + c = 6^s$ $b = 60''$ $a =$ Infinity	
	Star N.	Star S.		Star N.	Star S.
$\zeta = 25°$	$k + c = 5^s$ $b = 82''$ $a = 62''$	10^s $93''$ $71''$	$\zeta = 25°$	$k + c = 4^s$ $b = 51''$ $a = 57''$	14^s $67''$ $75''$

This table shows that it is not difficult to keep the errors of adjustment small enough to render corrections inappreciable. It is not possible altogether to avoid intersections off the meridian, especially if the weather is cloudy, but they are resorted to as seldom as possible.

Various methods of computing the correction for refraction have been employed at different times but none have been found so satisfactory as that of computing the refraction for each star and taking the difference. The computation is effected by means of Bessel's Tables, published as a preface to the Greenwich seven-year catalogue for 1860.

(iii) *The final co-latitude.* When the co-latitude by each pair of stars has been computed, the combination of the individual values has still to be made. The method of combining the results has been different in different years. Sometimes arbitrary weights have been assigned and sometimes they have been derived from a discussion of the season's work.

Clearly all the mean results have not the same weight; those obtained from the components of double pairs have less weight than that from an independent pair; some pairs may only have been observed once, others twice or more often.

The proper increase in weight on account of a second observation depends upon the relative accuracy of the sum of two N. P. D's and of an observed difference of zenith distance. This could have been determined for each series of observations from an analysis of the results, but as such investigations* are laborious, and as their effects on the final co-latitude are usually inappreciable the following method was adopted except where a series possessed exceptional features:

If η, the probable error of the mean of two declinations, be $\pm 0''\cdot20$; and e, the probable error of observation in a single determination of latitude, be $\pm 0''\cdot30$, and if n be the number of observations,

then $$\text{weight} = w = \frac{1}{\eta^2 + \frac{e^2}{n}}.$$

* Consult U. S. Coast and Geodetic Survey, 67th Annual Report, (1897-98) Appendix No. 7, p. 358. Chauvenet's Astronomy, Vol. II, p. 350. Doolittle's Astronomy, p. 508.

As the normal number of observations is two, w has been made unity for that value of n.

Whence if $n = 1$, $w = 0\cdot7$,

2	1·0
3	1·2
4	1·3
5	1·4
6	1·5.

The case of a double pair has next to be examined.

Every value of the co-latitude may be considered to be made up of two parts, one for each star; we may therefore put $c = p + q$.

In the case of a double pair we have a second value

$$c' = p + q'$$

The mean of these two is

$$\frac{c + c'}{2} = p + \frac{q}{2} + \frac{q'}{2}$$

We may consider the probable errors of p, q and q' to be each equal to e,

then $(p.\,e.)^2$ of $\dfrac{c + c'}{2} = e^2 + \left(\dfrac{e}{2}\right)^2 + \left(\dfrac{e}{2}\right)^2$

$$= \frac{6}{4} e^2$$

Also $(p.\,e.)^2$ of the result of a single pair $= 2e^2$.

Thus if w be the weight of the result of a single pair, and w'' the weight of the mean result of a double pair

$$\frac{w''}{w} = \frac{2e^2}{\frac{6}{4}e^2} = \frac{4}{3}.$$

Therefore w', the weight of the result of one component of the double pair $= \dfrac{2}{3} w$.

Hence if $w = 1$, $w' = 0{\cdot}66$ or $0{\cdot}7$ nearly.

If a double pair be observed once only the result by each component has a weight of 0·7 on account of its belonging to a double pair, and of 0·7 on account of having been observed only once: on the whole therefore its weight is $0{\cdot}7 \times 0{\cdot}7 = 0{\cdot}5$.

The balancing of the positive and negative micrometer differences is undertaken after the weights have been assigned. If the sums of the weighted differences are not equal they are rendered so by the rejection of a few observations. Those are selected for rejection in which the micrometer difference is large and the weight small.

Endeavours have been made to keep the difference between the sums so small that no error to which the micrometer value could reasonably be supposed liable, would have an appreciable effect on the mean co-latitude. Thus if in the value of one revolution there be an uncertainty of $0''{\cdot}05$ (an excessive estimate) and if d be the difference between the sums, expressed in revolutions, and ΣP the sum of the weights, then $\dfrac{\frac{1}{2} d \times 0{\cdot}05}{\Sigma P}$ should not exceed $0''{\cdot}005$.

The final value of the co-latitude is equal to the sum of all the weighted means divided by ΣP.

If v be the difference between the final co-latitude and an individual mean value and n the number of individual values, the probable error corresponding to the unit of weight is $\cdot 6745\sqrt{\frac{\Sigma(Pvv)}{n-1}}$, and that of the final co-latitude $\cdot 6745\sqrt{\frac{\Sigma(Pvv)}{(n-1)\Sigma P}}$.

Record and Reduction of Talcott Observations for Latitude at Rojhra H.S.,

Astronomical Date	Reference No. of Observation	Position of Telescope E or W	Star: No. and Catalogue	Star: N or S	Micrometer (1 Division = 0″·691198 = m): Reading	Wire used	Corrections for interval and wire	Difference = $M_w - M_e$ = μ	Levels (No. 6. 1 Division = 0″·91623; No. 9. 1 Division = 0″·90445 } = b): R	L	R + L = length of bubble	l	Distance of Star from the Meridian	Barometer and Thermometer
19th December 1900	83	E	468 Newcomb	N	5366·5	B	− 0·2	+ 5366·3	35·7	64·9	100·6	− 29·2	III + 5	Barometer *in.* 29·52; Thermometer Inside 55°·8
									22·3	55·4	77·7	− 33·1		„ Outside 54·0
		W	479	S	4431·3	A	− 998·2	+ 3433·1	35·4	66·0	101·4	− 30·6		
								− 1933·2	21·6	56·3	77·9	− 34·7		
	85	E	475	N	6387·8	B		+ 6387·8	35·9	65·0	100·9	− 29·1		
									22·5	55·3	77·8	− 32·8		
		W	479	S	4431·3	A	− 998·2	+ 3433·1	35·4	66·0	101·4	− 30·6		
								− 2954·7	21·6	56·3	77·9	− 34·7		
	89	W	484	N	4935·4	B		+ 4935·4	34·7	67·0	101·7	− 32·3		
									20·3	57·5	77·8	− 37·2		
		E	1311 Gr. (1880)	S	4488·2	B	− 0·6	+ 4487·6	35·2	66·7	101·9	− 31·5	IV	
								+ 447·8	20·8	57·2	78·0	− 36·4		
		E	495 Newcomb	S	*h m s* 7 40 45·6	II	Collimation							
		W			7 41 15·8	II								
	93	W	498	N	4158·7	B	+ 0·5	+ 4159·2	35·4	66·7	102·1	− 31·3	II	
									20·8	57·1	77·9	− 36·3		
		E	511	S	5236·0	B		+ 5236·0	35·2	67·2	102·4	− 32·0		
								− 1076·8	20·8	57·3	78·1	− 36·5		
Transit axis			Level		Tel. W.		Screw E	E. end	7·0	W. end	2·5			
							„ W	„	3·5	„	6·0			
					Tel. E.		„ E	„	6·4	„	3·2			
							„ W	„	3·0	„	6·6			

taken with Troughton and Simms' Zenith Telescope by Captain Cowie.

Reference No.	Difference of Zenith Distance: Micrometer $\frac{1}{2}\mu \times m$		Refraction (same sign as μ)	Level: Level	Level: $\frac{b}{4}(l_w - l_e)$	Int. off Meridian / Collimation	T. A Level	Deviation	Total = D		Δ_1 / Δ_2 / $\Delta_1 + \Delta_2$ / $\frac{\Delta_1 + \Delta_2}{2}$			Co-latitude $= \frac{\Delta_1 + \Delta_2}{2} + D$		
	′	″	″		″	″	″	″	′	″	°	′	″	°	′	″
83				6	− 0.32	− 0.01					48	56	37.47			
				9	− 0.36						81	30	47 13			
											130	27	24 60			
	−11	8.11	−0.20		− 0.34	− 0.01			− 11	8 66	65	13	42 30	65	2	33.64
85				6	− 0.34						49	8	22.74			
				9	− 0 43						81	30	47.13			
											130	39	9.87			
	−17	1.14	−0.30		− 0.39				− 17	1 83	65	19	34 94			33 11
89				6	− 0.18						57	53	49 29			
				9	− 0 18	− 0.04					72	6	8 12			
											129	59	57.41			
	+ 2	34 76	+0.04		− 0 18	− 0.02			+ 2	34 60	64	59	58 71			33.31
93				6	+ 0 16	− 0 07					56	29	40 43			
				9	+ 0 05						73	56	51 95			
											130	17	32.38			
	− 6	12.14	−0.10		+ 0.11	− 0.03			− 6	12 16	65	8	46 19			34.03

8.

Latitude Observations with Theodolites.

Station Kaulia. Captain Wood observed for latitude on three nights. On each night 8 to 12 observations were taken of both a north and south star at transit. The chronometer error was obtained each night from observations of east and west stars near the prime vertical. The instrument used was a six-inch theodolite by Troughton and Simms: it was erected on a wooden stand, and its limbs were read by two micrometers, of which one division represented 10″.

Station Mahadeo Pokra. The same instrument and methods were employed as at Kaulia. The observations were however limited to two nights.

Quetta Telegraph Office Station. Circum-meridian observations for latitude were taken on four nights. Eleven pairs of stars were observed. The chronometer rates were determined from the observed transits of high and low stars.

The corrections for refraction were computed from Bessel's Refraction Tables.

The reduction to the meridian was computed by the formula:—

$$\delta\zeta'' = -\,2\sin^2\frac{\delta P}{2}\cdot\frac{\cos\lambda\sin\Delta}{\sin\zeta}\operatorname{cosec}1'' + 2\sin^4\frac{\delta P}{2}\left(\frac{\cos\lambda\sin\Delta}{\sin\zeta}\right)^2\cdot\cot\zeta\operatorname{cosec}1''$$

where ζ is the zenith distance of the star, Δ its north polar distance, δP the interval in time before or after transit and λ the latitude of the station. The second term is not required when the zenith distance exceeds 40° and the interval of time from transit is under 5 minutes.

CHAPTER III.

THE ANGULAR VALUE OF A REVOLUTION OF THE MICROMETER SCREW OF THE ZENITH TELESCOPE.

1.

Methods of Determination.

The following methods have been employed to determine the angular value of a revolution of the micrometer screw :—

(1). The observation of transits of circumpolar stars at elongation was the first plan adopted.

(2). Then the several values for latitude given by the individual observations were discussed and utilized to provide a value.

(3). Finally the measurement of the known difference of declination of stars of nearly the same right ascension was found to give the most satisfactory results.

The first method is discussed in Chauvenet's "*Spherical and Practical Astronomy*" and in Doolittle's "*Practical Astronomy as applied to Geodesy and Navigation.*" It was tried in India in 1890-91 when the zenith telescope was first being employed, but the micrometer value obtained was not used in the reduction of the latitude observations.

When the second method is being employed the observations for latitude have to be reduced with the aid of a preliminary and assumed value for the micrometer. Each observed pair of stars then gives an equation of the form

$$\phi + \delta\phi = \tfrac{1}{2}(\Delta_1 + \Delta_2) + \tfrac{1}{2}(M_w - M_e)(\mu + \delta\mu) + \tfrac{1}{2}(l_w - l_e) + \tfrac{1}{2}(r_w - r_e)$$

where μ is the preliminary micrometer value,

$\delta\mu$ the correction to μ, which is to be deduced,

ϕ the co-latitude resulting from the use of the value μ,

$\delta\phi$ the correction to ϕ following on the correction $\delta\mu$.

From a series of equations of this form $\delta\mu$ and $\delta\phi$ can be determined. This method was utilized prior to 1896.

When the third method is being adopted, the procedure is as follows :—

Two stars, differing in right ascension by from 1^m to 20^m and in declination by from 15′ to 30′, are selected. The telescope is placed in the meridian and set to the mean zenith distance of the stars, and the bubble of the level brought to the centre of its run. As each star transits the meridian it is intersected with the micrometer thread. The difference of N. P. D's of the two stars corrected for refraction and for change of level during the observation is thus given in terms of the micrometer; and the value in seconds of arc of one revolution of the micrometer screw can now be deduced by means of the formula

$$M - m = \delta\Delta - \delta r - \tfrac{1}{2}\{(R - L) - (R' - L')\}$$

where

$M - m$ is the difference of micrometer readings,
$\delta\Delta$ the difference of N. P. D's of the two stars,
δr the difference of refraction for the two stars,
R and L the level readings corresponding to the micrometer reading M,
R′ and L′ the level readings corresponding to the reading m.

This method was first employed by Captain Burrard in 1894 and has been utilized generally since 1896.

2.

Values of the Micrometer Screw.

The following table gives the several values of a revolution of the micrometer of the zenith telescope, which have been adopted at various times in the reduction of the observations:

Micrometer value used in the various seasons.

Season	Value for one Revolution of the micrometer	Method of determination
	″	
1890 – 91	69·345	From a discussion of the latitude results.
92 – 93	69·345	Value of season 1890-91 adopted.
93 – 94	69·355	From a discussion of the latitude results.
97 – 98	69·3338	From the measurements of known differences of declination.
98 – 99	69·197*	,, ,, ,, ,,
1899 – 1900	69·1260	,, ,, ,, ,,
1900 – 01	69·1198	,, ,, ,, ,,
01 – 02	69·1270	,, ,, ,, ,,
02 – 03	69·2200	,, ,, ,, ,,
03 – 04	69·205	,, ,, ,, ,,
1904 – 05	69·2252	,, ,, ,, ,,

The large change of value which occurred between the seasons 1897-98 and 1898-99 was due to a change in the object glass. At the conclusion of the former season, the object glass, which had shown signs of a fungus growth on part of its surface, was sent to Calcutta to be cleaned and polished, and in this operation the curvatures of the surfaces of the lenses underwent slight changes, which were accompanied by an alteration in the focal length.

The change of value between the seasons 1901-02 and 1902-03 was due to the fact that, at the commencement of the latter the zero of the micrometer was altered in order to bring into play a portion of the screw, in which the variations of pitch were believed to be of a uniform nature.

* In 1898-99 Lieut. Tandy calibrated the micrometer screw and represented his results graphically; his corrections were thus taken from a diagram.

3.

Determination of the wire intervals BA and BC.

In the zenith telescope the travelling frame of the micrometer is fitted with three parallel wires separated by intervals of nearly 10 revolutions. These are designated A, B and C, the wire moving over the lower readings being A, and that over the higher being C. When a star is being observed, the wire lying nearest to it is used for the intersection. The reading taken from the micrometer, however, is that of the reference wire B, and to deduce the true micrometer reading at which the star has been intersected it is necessary to apply to the recorded position of B the value of the interval between B and the actual wire used in the intersection.

When the wire A has been used, the corrected micrometer reading becomes Reading of B *minus* value of interval AB.

When wire C has been used the corrected micrometer reading is Reading of B *plus* value of interval BC.

The values of the intervals AB and BC have been determined as follows:—

A speck of dust or a well defined irregularity on the central meridional wire, about the centre of the field, was selected. The speck was intersected by wires A, B and C in turn and a micrometer reading taken at each intersection. The differences between the respective readings were measures of the intervals AB and BC.

The several measures of these intervals, determined at different times and used in the reduction of the latitude observations are given in the following table:—

Season	Number of revolutions of the micrometer in	
	AB	BC
1890 - 91, 92 - 93, 93 - 94	The micrometer was not fitted with the auxiliary wires A and C until 1897.	
97 - 98	9·794	9·946
1899 - 1900	9·971	9·969
1900 - 01	9·9818	9·9603
01 - 02	...	9·9690
02 - 03	9·9599	9·9854
03 - 04	9·9668	9·9871
1904 - 05	9·9661	9·9845

The auxiliary wire A failed at the commencement of the field season 1901-02 and in consequence, two wires only were in use during that year. Both wires were renewed before the following season.

CHAPTER IV.

AN EXPLANATION OF THE TABLES GIVEN IN PARTS II AND III OF THIS VOLUME.

1.

Arrangement of Parts II and III.

Part II of this volume deals with astronomical latitudes, Part III with deflections of the plumb-line. In Part II have been given all the details of the latitude observations taken between 1885 and 1905: in Part III the latitude results of Part II have been combined and classified with those obtained prior to 1885, and which have already been published in Volume XI. The lists of Part III are therefore complete to date. As the latitude stations of Volume XI were numbered from 1 to 111, the numbering of those in this volume was made to commence from 112.

2.

Contents of Part II.

Part II consists of three main divisions :—

(i). Alphabetical List of Latitude Stations.
(ii). Descriptions of Latitude Stations.
(iii). Abstracts and Summaries of Observations and Results.

Of these the third alone requires any explanation. In order to reduce the number of forms and tables the abstract and summary for each station have been printed together and not separately as was done in Vol. XI. In the present volume each abstract of observations is followed immediately by its summary.

In the abstract the co-latitude by each star, when the sector method was employed, and by each pair, when the Talcott method was employed, is given for each day of observation.

The column "Position of Telescope during observation" takes the same form whether the observations have been made with the zenith sectors or the zenith telescope: with both instruments each observation is composed of two parts, one with the telescope to the east of the vertical axis, the other with the telescope to the west: in the case of the zenith sector each star observed is intersected twice, once with the telescope east, and once with the telescope west: in the case of the zenith telescope one star of each Talcott pair is intersected with the telescope east, and the other with the telescope west. The column headed "Position of telescope during observation" is intended to show whether the intersection with telescope east preceded or followed the intersection with telescope west. If it preceded, the letters E, W will be found entered in the column: if it followed, the letters W, E will be recorded.

The tripod of a zenith sector or zenith telescope can be erected on its stand in two positions, either of which is suitable for observation. The two positions are 180° apart in azimuth. Some observers have always noted on their records the position of the tripod during observation, and consequently for some stations the abstract form will be found to contain a column headed "Position of Azimuthal Stud." This stud, by which the azimuthal adjustment was effected, could be placed either due north or due south of the vertical axis: though its position has been recorded, it is believed to be without significance. No effect on results has ever been found to ensue from a change in this position.

The sector and Talcott methods of observation have already been explained in Chapter II, and the system of weighting has been described: the meanings of the several columns in the abstract form will be found to follow directly from the explanations and descriptions of the methods and systems.

In the summary, which follows each abstract, the geodetic value of latitude is compared with the astronomical.

3.

Geodetic Values of Latitude.

The astronomical values of latitude are derived directly from observations of the stars: the geodetic values are computed from the triangulation. Differences between astronomical and geodetic values are regarded as measures of the deflection of the plumb-line. The geodetic values are however known to be incorrect, and their errors affect directly the deduced deflections of the plumb-line. The magnitudes of these errors cannot at present be precisely determined: they are due to two causes, *viz.*, (1.) to the adoption of an erroneous value of latitude for Kaliánpur, the origin of the triangulation, (2.) to the adoption of an erroneous figure of the earth in the calculations of the triangulation.

The adoption of an erroneous value of latitude for the station of origin has the effect of producing a constant error in every geodetic latitude and in every deduced deflection of the plumb-line. The actual error of observation in the latitude of Kaliánpur may be small, the error due to local attraction there may be large.

The adoption of an erroneous figure of the earth has the effect of rendering all differences of latitude as calculated through the triangulation from Kaliánpur incorrect, the greater the difference the greater being its error.

The fundamental value of latitude originally adopted for Kaliánpur in the geodetic calculations extending over the whole of India was 24° 7′ 11″·26. This was Colonel Everest's value and was deduced by him with the aid of the star-catalogues then available.

Date of observation	No. of stars	No. of observations	As deduced by Everest	As deduced from Everest's observations by Cole in 1890 from modern star catalogues
			° ′ ″	° ′ ″
1824–25	17	388	24 7 11·8370	24 7 10·76
1839–40	36	1811	11·0928	10·92
1840–41	52	1529	11·3175	11·18
Everest's weighted mean ...			24° 7′ 11″·26	

In 1901 Major Burrard deduced a new value for the latitude of Kaliánpur as follows:*—

Date	Observer	Value
		° ′ ″ ″
1824-25	Geo. Everest	24 7 10·76 ± 0·13
1839-40	Andrew Waugh	10·92 ± 0·08
1840-41	Geo. Everest and T. Renny-Tailyour ...	11·18 ± 0·07
February 1865	W. M. Campbell	11·44 ± 0·07
November 1865	W. M. Campbell	10·90 ± 0·07
1898-99	G. Lenox Conyngham	10·59 ± 0·08
	Mean ...	24° 7′ 10″·97

This later value has been utilised in recent investigations and discussions, and deserves a greater weight than Everest's value. But it has been considered advisable to adhere in this volume to Everest's value. This volume is one of a series, and the preservation of uniformity throughout the series is a desideratum. These volumes are published more for purposes of reference and record than as contributions to contemporary discussion, and it would only lead to confusion if the results of each successive volume were based on newly derived fundamental values. So long as observations are being increased and improved, the final mean values will be ever liable to correction.

The variation of latitude is a recent discovery; but little is as yet known of it, and it is not possible at present to apply any correction for it to observed latitudes, or to reduce the latter to one epoch. When so much uncertainty continues to prevail, and when the attainment of finality is nowhere in sight, it is safer in continuous records of observations and computations to adopt one value and adhere to it, than to introduce constant changes. The value of latitude that has been adopted for Kaliánpur in the geodetic calculations of this volume is therefore

$$24^\circ\ 7'\ 11''\cdot 26$$

Similar arguments apply to the figure to be adopted for the earth. It is known that the major axis of Everest's spheroid is too small, and that the ellipticity of Clarke's is too great, and it is possible now to obtain a figure that approximates more nearly to the truth than either. But the subject is not closed, great investigations are even now in progress, and it would lead to chaos if in every new volume of this series the adopted figure of the earth was changed. Everest's constants have therefore been retained in the geodetic calculations of this volume, *viz*:—

$$\text{Semi Major Axis} = a = 20{,}922{,}932 \text{ feet}$$

$$\text{Semi Minor Axis} = b = 20{,}853{,}375 \text{ ,,}$$

$$\text{Ellipticity} = c = \frac{1}{300\cdot 80}$$

$$e^2 = 0\cdot 0066378$$

$$1 - e^2 = 0\cdot 9933622.$$

* See Professional Paper—No. 5, "*The Attraction of the Himalaya Mountains on the Plumb-line in India*," 1901.

4.

Contents of Part III.

In Part III the final results of Part II are classified with those of Vol. XI. The latitude stations of Vol. XI were numbered from 1 to 111, and those of this volume have been numbered from 112 to 239.

Part III consists of three divisions:

(i). An alphabetical list of stations, in which the details and dates of observation are given.

(ii). An alphabetical list in which the astronomical values of latitude are compared with the geodetic.

(iii). The differences between the astronomical and geodetic values are re-arranged and grouped by regions.

ASTRONOMICAL LATITUDES

PART II.

DETAILS AND RESULTS.

ASTRONOMICAL LATITUDES.

ALPHABETICAL LIST

OF

STATIONS.

ASTRONOMICAL LATITUDES.

ABBREVIATIONS EMPLOYED TO DENOTE INSTRUMENTS AND OBSERVERS.

INSTRUMENTS.

Z. T.—Troughton and Simms' Zenith Telescope.

Z. S. No. 1.—Strange's Zenith Sector No. 1.

Z. S. No. 2.—Strange's Zenith Sector No. 2.

T. S. 12 No. 2.—Troughton and Simms' 12-inch Theodolite No. 2.

T. S. 6 No. 1100.—Troughton and Simms' 6-inch Theodolite No. 1100.

OBSERVERS.

S. G. B.——S. G. Burrard.

J. E.——J. Eccles.

G. P. L. C.——G. P. Lenox Conyngham.

G. A. B.——G. A. Beazeley.

E. A. T.——E. A. Tandy.

H. W.——H. Wood.

H. M. C.——H. M. Cowie.

Stations 1 to 111 will be found in Vol. XI.

Reference Number	Name of Station		Geodetic Elements			Details relating to Astronomical Observations				
			Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Year	Observer	No. of Stars	No. of Observations
			° ′	° ′	Feet					
112	Achola		18 15	77 2	2274	Z. T.	1893	G. P. L. C.	75	69
113	Agra-group east point		27 9	78 9	550	,,	1898	G. A. B.	39	39
114	Agra-group north point		27 14	78 4	550	,,	,,	,,	43	37
115	Agra-group south point		27 6	78 3	550	,,	,,	,,	43	47
116	Agra-group west point		27 10	77 59	550	,,	,,	,,	44	40
117	Agra Longitude station	1st visit	27 10	78 3	550	Z. S. No. 1	1893	S. G. B.	65	77
		2nd ,,	,,	,,	,,	Z. T.	1898	G. P. L. C. & G. A. B.	61	140
118	Agra parade point		27 9	78 4	550	,,	,,	,,	53	66
119	Ahmadpur		23 36	77 43	1713	Z. S. No. 1	1899	G. P. L. C.	58	70
120	Akbar		30 54	73 20	641	Z. T.	1901	H. M. C.	45	50
121	Akyab		20 8	92 56	20	,,	1905	,,	34	39
122	Alamkhán		24 50	68 46	67	,,	1901	,,	101	108
123	Algi		25 30	78 24	854	,,	1902	,,	60	109
124	Amritsar		31 38	74 55	770	Z. S. No. 1	1894	S. G. B.	32	88
125	Amúa		24 0	80 32	2113	Z. T.	1899	E. A. T.	102	110
126	Andhiári		24 41	78 16	1330	,,	1902	H. M. C.	66	103

Reference Number	Name of Station	Geodetic Elements: Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Details relating to Astronomical Observations: Instrument	Year	Observer	No. of Stars	No. of Observations
		° ′	° ′	Feet					
127	Ankora	19 25	79 39	1463	Z. S. No. 2	1889	J. E.	71	212
128	Bahak	30 45	78 16	9715	Z. T.	1903	H. M. C.	34	36
129	Bajamara	30 46	77 56	9681	„	„	„	34	32
130	Bánsgopál	28 33	78 34	677	Z. S. No. 1	1899	G. P. L. C.	83	108
131	Bhaorása	24 8	78 3	1387	„	1898	„	74	75
132	Bhímsain	20 58	79 49	1490	Z. S. No. 2	1887	S. G. B.	68	134
133	Birond	29 15	79 45	6967	Z. T.	1903	H. M. C.	31	51
134	Bithnok	27 53	72 42	774	Z. S. No. 1	1893	S. G. B.	72	85
135	Bolarum	17 30	78 34	1971	Z. T.	„	G. P. L. C.	78	84
136	Bolíkonda	17 43	79 50	1363	Z. S. No. 2	1889	J. E.	74	204
137	Bostán	28 31	77 33	758	Z. S. No. 1	1900	G. P. L. C.	85	106
138	Budhon	24 5	78 34	1867	Z. T.	1902-03	H. M. C.	62	127
139	Burgpaili	18 54	79 44	983	Z. S. No. 2	1889	J. E.	71	211
140	Chamu	26 40	72 38	1065	Z. S. No. 1	1892	S. G. B.	39	62
141	Chandaos	28 5	77 54	699	„	1900	G. P. L. C.	80	92
142	Chandípur	21 27	87 5	53	Z. T.	1899	E. A. T.	85	95
143	Chanduria	25 44	88 25	160	„	1901-02	H. M. C.	75	74

Reference Number	Name of Station	Geodetic Elements			Details relating to Astronomical Observations				
		Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Year	Observer	No. of Stars	No. of Observations
		° ′	° ′	Feet					
144	Chánga	24 59	69 54	349	Z. T.	1900-01	H. M. C.	105	115
145	Chaniána	24 7	72 35	953	Z. S. No. 1	1893	S. G. B.	36 32	46* 57†
146	Charaldánga	24 53	88 26	149	Z. T.	1901	H. M. C.	90	100
147	Colába	18 54	72 51	75	"	1892	G. P. L. C.	70	74
148	Cuttack	20 29	85 54	133	"	1899	E. A. T.	108	124
149	Daiádhari	24 38	77 42	1867	Z. S. No. 1	1898	G. P. L. C.	74	80
150	Dalea	22 20	82 4	1622	Z. T.	1900	E. A. T.	53	54
151	Dánapa	15 56	80 0	150	"	1891	G. P. L. C.	81	172
152	Dargawa	24 37	79 4	1152	"	1903	H. M. C.	50	188
153	Dariápur	21 47	87 55	63	"	1899	E. A. T.	93	106
154	Darutippa	15 1	79 57	195	"	1891	G. P. L. C.	117	121
155	Deesa	24 15	72 14	443	Z. S. No. 1	1893	S. G. B.	33 5	74* 14†
156	Dehra Dún Base-line East End	30 17	78 1	1958	Z. T.	1892	G. P. L. C.	33	36
157	Dehra Dún Haig Observatory	30 19	78 6	2240	"	1904-05	H. M. C.	29	49
158	Dera Dín Panáh	30 34	70 59	490	Z. S. No. 1	1894	S. G. B.	40	52
159	Dhauleshvar	18 26	74 12	2939	Z. T.	1892-93	G. P. L. C.	101	102
160	Dhúlipalla	16 26	80 8	245	Z. S. No. 2	1889	J. E.	57	210

* By Talcott method. † By sector method.

Reference Number	Name of Station	Geodetic Elements			Details relating to Astronomical Observations				
		Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Year	Observer	No. of Stars	No. of Observations
		° ′	° ′	Feet					
161	Didáwa	24 51	71 21	212	Z. T.	1900	H. M. C.	116	111
162	Díwai	19 50	79 35	967	Z. S. No. 2	1888-89	J. E.	74	204
163	Gudali	14 1	80 4	292	Z. T.	1891	G. P. L. C.	86	170
164	Gúrmi	26 36	78 33	575	,,	1902	H. M. C.	46	94
...	Gúru Sikkar (*see* Oria)	...	...	...	...	...	...	...	...
165	Háthbena	19 52	82 4	2600	,,	1900	E. A. T.	66	70
166	Jalpaiguri	26 31	88 47	280	,,	1902	H. M. C.	41	83
167	Jambo	27 16	72 34	772	Z. S. No. 1	1892	S. G. B.	40	58
168	Kaliánpur 6th visit*	24 7	77 42	1765	,,	1899	G. P. L. C.	79	87
169	Kámkhera	24 0	77 46	1780	,,	1899	,,	67	84
170	Kanheri	18 30	75 46	2610	Z. T.	1893	,,	108	103
171	Karía	19 12	82 10	2014	,,	1900	E. A. T.	100	104
172	Károthol	24 54	67 56	260	,,	1901	H. M. C.	90	100
173	Kaulia	27 49	85 17	7051	T.S. 6-inch theodolite	1903	H. W.	4	21
174	Khankharia	24 37	71 56	362	Z. T.	1900	H. M. C.	92	93
175	Khánpisura 2nd visit†	18 46	74 49	2751	,,	1893	G. P. L. C.	103	110
176	Khirsar	28 30	72 42	603	Z. S. No. 1	1893	S. G. B.	74	93

* For the 1st five visits *see* No. 42, Vol. XI. † For the 1st visit *see* No. 52, Vol. XI.

Reference Number	Name of Station	Geodetic Elements						Details relating to Astronomical Observations				
		Latitude North		Longitude East of Greenwich		Height above Mean Sea Level	Instrument	Year	Observer	No. of Stars	No. of Observations
		°	′	°	′	Feet					
177	Khori	25	1	69	6	63	Z. T.	1901	H. M. C.	98	118
178	Khundábolo	19	51	85	1	3115	„	1899	E. A. T.	94	110
179	Kidarkanta	31	1	78	13	12509	„	1903	H. M. C.	34	36
180	Kistama	14	27	79	48	458	„	1891	G. P. L. C.	86	164
181	Kurseong	26	52	88	18	4428	„	1902	H. M. C.	35	57
182	Ládimsir	29	22	72	2	468	Z. S. No. 1	1894	S. G. B.	86	108
183	Lambatach	31	1	77	57	10474	Z. T.	1903	H. M. C.	39	43
184	Lingmára	21	43	80	11	1400	Z. S. No. 2	1887	S. G. B.	66	182
185	Lohágara	26	2	88	24	205	Z. T.	1902	H. M. C.	58	64
186	Losalli	24	6	77	36	1749	Z. S. No. 1	1899	G. P. L. C.	65	77
187	Lúnki	24	58	70	42	588	Z. T.	1900	H. M. C.	69	39
188	Madhupur	23	57	88	32	92	„	1901	„	80	91
189	Madras Observatory	13	4	80	17	54	Z. S. No. 2	1896-97	S. G. B.	43	101
190	Mahadeo Pokra	27	42	85	34	7095	T.S. 6-inch theodolite	1903	H. W.	3	15
191	Majhár	26	6	78	31	1028	Z. T.	1902	H. M. C.	67	104
192	Mal	18	47	84	33	483	„	1899	E. A. T.	87	102
193	Mándvi	18	38	73	35	4121	„	1892	G. P. L. C.	93	99

Reference Number	Name of Station	Geodetic Elements: Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Details relating to Astronomical Observations: Instrument	Year	Observer	No. of Stars	No. of Observations
		° ′	° ′	Feet					
194	Mooltán	30 11	71 29	420	Z. S. No. 1	1894	S. G. B.	62	75
195	Moulmein	16 30	97 40	90	Z. T.	1905	H. M. C.	49	52
196	Nagarkhána	22 23	91 51	290	"	"	"	42	41
197	Náharmau	23 30	78 52	1940	"	1903	"	40	121
198	Niálamari	17 2	79 46	1144	Z. S. No. 2	1889	J. E.	72	211
199	Nitali	18 17	76 19	2289	Z. T.	1893	G. P. L. C.	115	118
200	Ongole	15 30	80 5	250	"	1891	G. P. L. C.	84	167
201	Oria	24 38	72 48	4200	Z. S. No. 1	1893	S. G. B.	34 33	84* 66†
202	Parampúdi	17 13	81 15	684	Z. T.	1894	G. P. L. C.	72	73
203	Patháídi	21 49	82 19	879	"	1900	E. A. T.	62	61
204	Patna	21 47	87 14	80	"	1899	"	85	126
205	Phallut	27 13	88 3	11815	"	1902	H. M. C.	23	14
206	Pirmulo	17 53	78 38	2093	"	1893-94	G. P. L. C.	84	89
207	Prome	18 49	95 15	100	"	1905	H. M. C.	31	39
208	Quetta	30 12	67 3	5500	T.S. 12-inch theodolite	1904	H. W.	22	42
209	Rájpur	30 24	78 8	3500	Z. T.	1892	G. P. L. C.	18	19
210	Rájuli	20 13	79 47	1070	Z. S. No. 2	1887	S. G. B.	84	174

* By Talcott method. † By Sector method.

Reference Number	Name of Station	Geodetic Elements: Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Details relating to Astronomical Observations: Instrument	Year	Observer	No of Stars	No of Observations
		° ′	° ′	Feet					
211	Ramai	20 57	82 11	1313	Z. T.	1900	E. A. T.	52	60
212	Rámgír	18 35	79 34	1772	Z. S. No. 2	1889	J. E.	69	208
213	Ranjítgarh	32 35	74 40	900	Z. T.	1901	H. M. C.	27	27
214	Ráwal	18 32	83 36	874	,,	1898-99	E. A. T.	85	87
215	Rojhra	24 57	70 17	518	,,	1900	H. M. C.	113	127
216	Salímpur	27 47	78 33	645	Z. S. No. 1	1900	G. P. L. C.	68	90
217	Samdari	25 49	72 37	600	,,	1893	S. G. B.	42	72
218	Sánjib	17 31	82 44	2142	Z. T.	1894	G. P. L. C.	69	78
219	Sankráo	28 2	78 35	670	Z. S. No. 1	1900	,,	67	121
...	Sarandi Pat (*see* Sarey Khan)	...	...	...	...	...	...	...	...
220	Sarey Khan	22 13	80 5	1409	Z. S. No. 2	1886	S. G. B.	52	183
221	Sarkára	29 16	78 35	761	Z. S. No. 1	1899	G. P. L. C.	70	84
222	Saugor	23 50	78 49	2033	Z. T.	1903	H. M. C.	33	102
223	Senchal	26 59	88 20	8600	,,	1902	,,	19	20
224	Siliguri	26 42	88 27	401	,,	1902	,,	33	42
225	Singáwáram	17 45	80 59	714	,,	1894	G. P. L. C.	69	83
226	Sironj Base-line N.E. End	24 9	77 53	1481	Z. S. No. 1	1898-99	,,	82	90

Reference Number	Name of Station	Geodetic Elements: Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Details relating to Astronomical Observations: Instrument	Year	Observer	No. of Stars	No. of Observations
		° ′	° ′	Feet					
227	Sirsa	28 55	78 35	739	Z. S. No. 1	1899	G. P. L. C.	74	86
228	Sítápár	21 25	80 22	1237	Z. S. No. 2	1887	S. G. B.	65	166
229	Sonáda	23 7	72 48	250	Z. S. No. 1	1893	,,	47	77
230	St. Thomas's Mount	13 0	80 14	250	Z. T.	1890	G. P. L. C.	78	123
231	Súrantál	24 14	77 43	1802	Z. S. No. 1	1899	,,	72	81
232	Telu	28 56	72 17	470	,,	1893-94	S. G. B.	68	77
233	Thob	26 3	72 25	856	,,	1892	,,	39	65
234	Tinsia	24 6	77 21	1776	,,	1899	G. P. L. C.	60	70
235	Tonglu	27 2	88 8	10073	Z. T.	1902	H. M. C.	21	17
236	Vánákonda	17 36	79 25	1664	,,	1894	G. P. L. C.	78	85
237	Virária	24 57	71 5	460	,,	1900	H. M. C.	95	102
238	Vizagapatam Base-line N. End	18 1	83 16	181	,,	1898	E. A. T.	100	100
239	Waltair	17 43	83 22	200	,,	1894	G. P. L. C.	85	102

ASTRONOMICAL LATITUDES.

DESCRIPTIONS OF STATIONS.

With a few exceptions the stations at which latitudes have been observed are Principal Stations of the Indian Triangulation and are fully described in other volumes of the *Account of the Operations of the Great Trigonometrical Survey of India*; in such cases the serial number and the series of the triangulation in which the station occurs are given with an abbreviated description. Whenever the latitude observer has indicated the character of the surrounding country his remarks are added followed by his initials.

Latitude stations 1 to 111 will be found described in Vol. XI.

112. Achola Hill Station (No. IV of the Bombay Longitudinal Series, volume XII of the *Account of the Operations of the Great Trigonometrical Survey of India*) is situated in the lands of the village of Achola, táluk Udgír, district Bidar, Nizam's territory. It is on a small knoll about $\frac{1}{4}$ of a mile N.W. of Achola. The knoll is about 150 feet in height and is capped with laterite. Nearly due N. of the station is a *dargah* in front of which stands a *dipmál* $2\frac{1}{2}$ feet square, the centres of these are distant 14·5 and 21·2 feet respectively from the station.

The directions and distances of the circumjacent villages are:—Talegaon N.E., miles 2; Vallándi S.W. and W., miles $1\frac{3}{4}$; Daunhiparga S.S.E., miles $2\frac{1}{4}$; and Chaunhiparga N.N.W., miles 3. The station consists of a perforated pillar of masonry having two marks.

[The Astronomical Station is coincident with the Trigonometrical Station. It is situated on the top of an isolated hill some 200 feet high, capped with laterite. A few similar hills are to be seen here and there on the horizon, but they are unimportant and there seems no reason to anticipate any local attraction.—G. P. L. C.]

Geodetic Latitude of the Astronomical Station = 18° 14′ 18″·12

113. Agra-group east point was fixed by special triangulation and is situated in a field about half a mile to the N.N.W. of Mahuakhera and about $5\frac{1}{4}$ miles E. by S. of the Agra Telegraph Office. It consists of a brick pillar 3 feet in diameter, sunk flush with the ground and bearing a circle and dot.

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 27° 9′ 21″·00

114. Agra-group north point was fixed by special triangulation and is marked by a circle and dot on a brick pillar 3 feet in diameter, built on a small sandy mound some 6 feet high. This mound is situated about 170 yards east of the road which runs in a northerly direction from the Judge's Court of Agra to Poia Ferry on the Jumna. It is about 70 yards from a garden known as Radha Bágh, close to the gate of which is the 6th milestone from Agra.

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 27° 14′ 14″·10

115. Agra-group south point was fixed by special triangulation and consists of a pillar 3 feet in diameter built flush with the surface of the ground. It is situated about 10 feet to the west of the path leading over the Delhi-Agra Canal by a small brick bridge to the village of Patti Pachgaon. The village is about $5\frac{1}{4}$ miles south of the Agra Telegraph Office and about $1\frac{1}{2}$ miles east of the Gw[illegible]

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 27° 5′ 38″·51

116. Agra-group west point was fixed by special triangulation and is situated about 5 miles west of Agra Telegraph Office. It lies to the north of and about 150 yards distant from the Fatehpur Síkri road, on a small mound in the open fields, and consists of a brick pillar 3 feet in diameter, which projects some 9 inches above the ground and is marked with a circle and dot.

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 27° 9′ 45″·86

117. Agra Longitude Station (*vide* volume IX of the *Account of the Operations &c.*) is situated in the enclosure of the Telegraph Office, 233 feet due south of the Telegraph Office station.

[The Latitude Station is coincident with the Longitude Station.—S. G. B.]

Geodetic Latitude of the Latitude Station = 27° 9′ 39″·93

118. Agra parade point was fixed by special triangulation and is situated on the S.E. end of a mound which is the site of the grand stand of the race-course on the garrison parade ground. It consists of a brick pillar 3 feet in diameter, sunk flush with the surface of the ground and marked with a circle and dot.

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 27° 8′ 57″·47

119. Ahmadpur Hill Station (No. II of the Great Arc Meridional Series—Section 18° to 24°, volume VI of the *Account of the Operations &c.*) is situated on an artificial mound of very ancient date. It is on an isolated hill near the village of Ahmadpur, district Bhilsa of the Gwalior territories. A Hindu temple stands on the same mound to the W.

The pillar is solid, 3·75 feet in diameter and built of stones and earth; it contains two marks, the upper 5·38 feet above the lower, which is on a stone at the ground level. A platform 17 feet square surrounds the central pillar from which it is isolated by an annulus 3 inches wide. The large town of Bhilsa lies about 10 miles S.E.

[The station is 1,715 feet above mean sea-level and situated on a conspicuous hill of almost solid rock, which rises to a height of over 200 feet out of the low plain to the south of the Kaliánpur plateau. The ascent from the east is easy but on the other sides somewhat precipitous; there are many similar hills at intervals on every side but none so large. The nearest is a small one about 2 miles to the south-east. The plain between Kámkhera and Ahmadpur is about 1,430 feet above mean sea-level. The Latitude pillar is situated in the prime vertical of the Trigonometrical Station, and 51 feet east of it.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 23° 36′ 20″·88

120. Akbar Platform Station (No. XIX of the Jogi-Tíla Meridional Series, volume IV of the *Account of the Operations &c.*) is situated on a mound in the tahsil of Gugera, pargana Fattipur, district Montgomery, and about a distance of $\frac{1}{4}$ mile to the north of the dâk bungalow and encamping ground.

The pillar is solid, and raised about 3 feet above the surface of mound.

[The Latitude pillar is 210 feet W. of and 0·9 foot N. of the Trigonometrical Station which is on a mound some 80 feet high above the ground level. It is about $\frac{1}{2}$ mile S.S.W. of the village of Akbar and $\frac{1}{2}$ mile E.N.E. from the old fort of the same name. Akbar village is about 13 miles N. of Gambar Station N.W.R. There is no apparent local cause for deflection of the plumb-line.—H. M. C.]

Geodetic Latitude of the Trigonometrical Station	=	30° 53′ 43″·26
Reduction to Astronomical Station	=	+ 0 ·01
Geodetic Latitude of the Astronomical Station	=	30 53 43 ·27

121. Akyab Longitude Station (*vide* volume X of the *Account of the Operations &c.*) is on the

meridian of the Telegraph Office station, 50·1 feet north of it, and about 20 feet west of the centre of the main building.

[The Latitude pillar is 24 feet 2 inches west of the Longitude Station, and 7 inches south of same. The Instrument stood upon a masonry pillar of the usual pattern. The Longitude Station and the Telegraph Office station (*vide* volume X of the *Account of the Operations &c*) are in good condition. The marble slab and pillar referred to in Vol. X. p. (8) were not found in 1905.—H. M. C.]

Geodetic Latitude of the Longitude Station	=	20° 8′ 12″·87
Reduction to Latitude Station	=	− 0 ·01
Geodetic Latitude of the Latitude Station	=	20 8 12 ·86

122. Alamkhán Tower Station (No. XCV of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated in the Hyderabad collectorate of Sind. Alamkhán Sigari village is distant about 0·15 mile.

The pillar is 32 feet high, and carries eight mark-stones as follows:—One at level of foundation, the others 2, 8, 14, 20, 26, 31 and 32 feet respectively above it.

[The Latitude pillar is 40 feet E. of the Trigonometrical Station. There is no apparent cause for any deflection of the plumb-line. The Trigonometrical Station is in good order.—H. M. C.]

Geodetic Latitude of the Astronomical Station = 24° 49′ 31″·23

123. Algi Hill Station (No. VIII of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated on a hill about 3 miles north of the hill fort and large village of Dinara: in the Gwalior State. The station is marked on the rock *in situ* around which a platform has been built.

The distances and directions of surrounding villages are:—Khirk 1·2 miles, N.N.W; Algi 1·1 miles, S.W; and Guraira Ráj Orchha 0·5 mile, due S.

[The Latitude pillar is 802 feet east of the Trigonometrical Station and the azimuth of the former from the latter measured from north by east is 90° 1′ 3″. The Trigonometrical Station is on a narrow ridge running approximately N. and S., the Latitude pillar being on the flat at the foot of the slope. Considering its amount and distribution, the mass of the ridge can produce no appreciable deflection of the plumb-line in the meridian.—H. M. C.]

Geodetic Latitude of the Trigonometrical Station	=	25° 29′ 46″·20
Reduction to Astronomical Station	=	− 0 ·01
Geodetic Latitude of the Astronomical Station	=	25 29 46 ·19

124. Amritsar Longitude Station (*vide* volume XV of the *Account of the Operations &c.*) is situated in the compound of the Government Telegraph Office, and about 20 feet to the west of the main building.

[The Latitude Station is coincident with the Longitude Station. Himalayas visible to N.E. Marked northerly attraction to be expected here.—S. G. B.]

Geodetic Latitude of the Latitude Station = 31° 37′ 58″·72

125. Amúa Hill Station (No. XVII of the Calcutta Longitudinal Series, volume VI of the *Account of the Operations &c.*) is situated in the Maihar district, and stands on the southernmost extremity of the Kaimúr range. The encamping ground of Siwaganj, on the high road from Mirzapur to Jubbulpore, is distant about 3 miles to the N. The station is marked by the centre of a circle engraved on a stone which is fixed on the surface of the platform, and placed perpendicularly over a similar stone at the base.

[The station is about 4 miles east of Jukehi station on the E. I. Railway. It is on the southern edge of a long range which stretches on indefinitely in a N. E. direction, at a uniform height of nearly 1,000 feet above the surrounding plain, the only other feature likely to effect local attraction perceptibly is another similar range N. W. of, and similar and parallel to the one on which the station is. The combined effect of these two might account for a deviation of the plumb-line of 4″ N. E.—E.A.T.]

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 23° 59′ 56″·24

126. Andhiári Hill Station (No. IV of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated on the highest point of the sandstone range of that name, and about 100 yards north of a remarkable cave: in the Gwalior state. The distances and directions of

the surrounding villages are:—Sirsod 0·4 mile, N. by W.; Jamursa 2·1 miles, S.E.; and Larheri 2 miles, S.W. The station consists of a solid pillar with a mark-stone at its upper surface.

[The Latitude pillar is 1080 feet east of the Trigonometrical Station, the azimuth of the former from the latter measured from north by east is 89° 57′ 40″.

The Trigonometrical Station is on a narrow ridge and the only possible situation in the prime vertical for the latitude pillar was on the flat ground at the foot of the slope. The ridge however runs approximately north and south and is not capable of influencing the plumb-line by any appreciable amount in the meridian, though it may be expected to produce a deflection of not more than 1″ west in the prime vertical.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	24° 41′ 6″·77
Reduction to Astronomical Station	=	+ 0 ·01
Geodetic Latitude of the Astronomical Station	=	24 41 6 ·78

127. Ankora (or Rebálemba) Hill Station (No. XXXV of the Jabalpur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated on the highest part of a very conspicuous hill; pargana Sirpur, tahsíl Chěnnúr in the territory of the Nizam of Hyderabad.

The station consists of a solid pillar having a mark-stone at its upper surface. The small village of Ankora lies at the foot of the hill 2 miles W., and the town of Sirpur about 5 miles N.

[The Latitude pillar is built on the Trigonometrical Station which is situated on the top of a hill 1500 feet high, the south and west sides of which are very precipitous but which slopes more gradually on the north-east side. The hill and the surrounding country are covered with a moderately thick tree jungle. Due north lies the valley of the Wardha river, a level stretch and due south there are no hills for 15 or 20 miles. On the east at a considerable distance there is a fairly high range of hills running N. and S. and from it a low spur runs out, terminating in two hills similar to Ankora and distant from it S.S.E. about 1 and 2 miles respectively. They are nearly as high as Ankora but not very massive. There is also a low range of hills about 5 miles off running from a little S. of W. up to N.W. Whatever local attraction there is will probably be south.—J. E.]

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 19° 24′ 34″·75

128. Bahak Hill Station was fixed by special triangulation and is on the highest point of the hill of the same name in the lands of the village Kaprole, Patti Mungar Santi (Tehri-Garhwál) on the watershed of the Bhágirathi and Jumna rivers, about 2¼ miles E.N.E. of Tehliank village on the Burni stream, a tributary of the latter, and 5½ miles N.W. of Gula village on a stream which flows into the former between Gula and Thara villages.

The point is marked by the usual circle and dot inscribed on a stone. Over this lower mark is built a circular masonry pillar 2 feet 5 inches high and 3 feet in diameter carrying at the centre of its upper surface an upper mark vertically above the lower. Surrounding this pillar, but isolated from it, is a masonry platform 14 feet square and built to a level 3 inches higher than the top of the pillar.

The station is easily approached from the south from Chajoola village or from the west from Kaprole. There is a site for a small camp a short distance west of and below the station, but the nearest good water is over 2 miles in the same direction.

[The Latitude pillar is 5 feet 11 inches south and 24 feet 3½ inches east of the Trigonometrical Station.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	30° 45′ 5″·28
Reduction to Astronomical Station	=	− 0 ·06
Geodetic Latitude of the Astronomical Station	=	30 45 5 ·22

129. Bajamara Hill Station was fixed by special triangulation and is on the top of the peak locally known as Bajamara, on the watershed between the Tons and Jumna valleys. The station is not identical with Bájámárá h.s. of Synoptical Vol. VII, which is 170 feet lower and about a mile to the west. A cairn of stones and a pole, possibly a triangulation signal, was found on the upper, but no such mark was found on the lower peak.

It is marked in the usual way by a circle and dot on a large stone found about 1 foot below the surface of the ground. Over this is built a circular masonry pillar 1½ feet high and 3 feet in diameter, carrying at its centre, on the upper surface, a second similar mark vertically over the lower. It lies in the lands of the village Khatt Kailana, District Dehra Dún, and is about 100 yards from the Chakráta-Mandali road which runs round the southern and eastern faces of the hill. The station is 2 miles from

Deoban Forest Bungalow and 3½ miles from Mandali Forest Bungalow. There is no good camping ground near the station and good water is to be found only at a considerable distance.

[The Latitude pillar is 12 feet 6¼ inches north and 46 feet 10 inches west of the Trigonometrical Station.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	30° 45′ 56″·07
Reduction to Astronomical Station	=	+ 0 ·13
Geodetic Latitude of the Astronomical Station	=	30 45 56 ·20

130. Bánsgopál Tower Station (No. XXXV of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated on a sandy mound (7 or 8 feet in height) distant 500 yards west of the temple of Bánsgopál, a place of Hindu pilgrimage: tahsíl and pargana Sambhal, district Moradabad.

The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 18·8 feet high: it has a mark-stone at a little below ground level, and another at summit. The distances and directions of surrounding places are:—Sambhal town 3 miles, N.E.; Turrano Sarai 1·8 miles, E. by S.; Gandhipura village 1 mile, N. by E.; Busla village 1·7 miles, W. by S.; and Bahádurpur Sarai 1·1 miles, S.W. by S.

[The Astronomical Station was situated 2429·7 feet west of the Trigonometrical Station. The azimuth of the latter from the former was 270° 1′ 20″ so that the Latitude pillar was 0·94 of a foot north of the prime vertical of the Trigonometrical Station.—G.P.L.C.]

Geodetic Latitude of the Trigonometrical Station	=	28° 33′ 28″·07
Reduction to Astronomical Station	=	+ 0 ·01
Geodetic Latitude of the Astronomical Station	=	28 33 28 ·08

131. Bhaorása Hill Station [No. (V) of the Great Arc Meridional Series, Section 24° to 30°, volume IV of the *Account of the Operations &c.*] is situated on the highest point of a small rolling hillock of sandstone, which rises very gently from the general level of the plain to the south and west but falls more abruptly to the north and east. The Betwa river runs by the eastern end of the hill at a distance of about 1½ miles from the station. The height of the station above mean sea-level is 1,387 feet, but under 100 feet above the general level of the plain. The station lies in pargana Bhaorása of the Gwalior territories. The circumjacent villages, with their distances and directions are:—Bherkheri about 2 miles, N.W.; Kiria about 2 miles, N.E.; Salitra about 2 miles, S.S.W.; and Sarkandi about 2 miles, W.

The station consists of a solid masonry pillar, about 11 feet high and 3½ feet in diameter. It has a mark-stone at top, another at bottom, and a third between them.

[The Astronomical Station is situated 46 feet 3 inches from the Trigonometrical Station on an azimuth of 269° 17′. Before leaving the station a protecting pillar of the form of a square truncated pyramid, 3 feet 6 inches in height, was built over the Trigonometrical Station and a cairn of stones was heaped over all. The Latitude pillar was not protected.—G.P.L.C.]

Geodetic Latitude of the Trigonometrical Station	=	24° 8′ 3″·73
Reduction to Astronomical Station	=	+ 0 ·01
Geodetic Latitude of the Astronomical Station	=	24 8 3 ·74

132. Bhímsain Hill Station (No. XXVI of the Jabalpur Meridional Series, volume VI of the *Account of the Operations &c.*) is on the boundary line between the tahsíls of Bhandára and Sákoli in the Bhandára district of the Central Provinces. The villages of Manglee and Bandarjiri are 3 miles to the east. It lies in the lands of the village of Kotúrli.

The pillar is solid and contains two marks, the distance between which has not been measured; the height of the pillar is 6·67 feet.

[The Astronomical Station, which was built over the mark-stone of the Trigonometrical Station, is situated on the highest part of a conspicuous range of hills and slightly south of the centre of gravity of the mass. The direction of the range is east and west, but the northern slopes are more gradual than the southern; 2 miles N.E. is a small range 400 feet high, and 3 miles long: 7 miles to the N.W. is a rather larger range but of no great importance. The northern horizon is broken by hills here and there but their small height and great distance render them barely visible. The only mountains to be seen towards the south are a small cluster some 12 miles off lying in a south-westerly direction. All the hills mentioned above are of but small significance and their effects should be very slight. A more likely source of local attraction than any neighbouring mountains is the uniform slope of the ground downwards from north to south, though this also should exercise no great effect on the astronomical latitude: the level of the ground at Eetau, 12 miles south of Bhímsain, is from 75 to 100 feet lower than that at Bhandára, 12 miles to the north, and the descent throughout is gradual. Taking the above facts into consideration, one may say that Bhímsain was a station well-suited for astronomical observations (as far as any station in the Central Provinces can be well-suited); a small local attraction say of 1″, is expected here to the north.—S.G.B.]

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 20° 57′ 35″·96

133. Birond Hill Station (No. VIII of the North-East Longitudinal Series, volume VII of the *Account of the Operations &c.*) is situated in pargana Diánirao, thána Haldwáni of the Kumaun district and stands on the southern range of the Sub-Himalaya mountains. The village of Birond is distant about 2½ miles to the N.N.E.

The pillar is solid. It has a mark-stone at top, and a mark engraved on the rock *in sitú*.

[The Astronomical Station coincides with the Trigonometrical Station. Immediately to north and south of the station, the ground falls rapidly to deep valleys, the bottoms of which are probably about 3000 feet above mean sea-level. The ridge including Birond peak runs, generally speaking, east and west. The station appears to be somewhat south of the centre of mass of the hill and a slight local disturbance to the north may be expected.—H.M.C.]

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 29° 15′ 14″·15

134. Bithnok Hill Station (No. XXXVIII of the Jodhpore Meridional Series, volume IVA of the *Account of the Operations &c.*) is situated on the highest sand-hill of a range running N. and S., locally called Gajath Thal, a few hundred yards south of a cart-track from Bithnok to Bagu village. The station is in the lands of that village in pargana Magra of the Bickaneer territories. The pillar is solid, surrounded by a platform of sand and stones. No mention is made of a mark-stone having been placed at the surface of the pillar. The azimuths and distances of the circumjacent villages are:—Bangarsar (approximately) 141°, miles 9 nearly; Bithnok 275°, miles 5·22; and Mandal 323°, miles 10 nearly.

[The Astronomical Station is coincident with the Trigonometrical Station. Perfectly flat sandy desert: plumb-line unaffected by hills.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 27° 53′ 22″·03

135. Bolarum Longitude Station (*vide* volume XV Appendix p. (8) of the *Account of the Operations &c.*) is 16·394 feet west, and 24·17 feet south of the old Longitude Station, which is in the compound of the Public Works Office, and 221·63 feet north of Bolarum P. W. D. Office station. Bolarum is the cantonment for a portion of the garrison of Hyderabad, the capital of the Nizam.

[The Latitude Station is identical with the new Longitude Station. To the north of Bolarum the general level of the country is higher than to the south, so that there may perhaps be some deviation of the plumb-line in the former direction, there is nothing in the immediate surroundings of the station to lead one expect any deviation.—G.P.L.C.]

Geodetic Latitude of the Latitude Station = 17° 30′ 13″·41

136. Bolíkonda Hill Station (No. XI of the Bider Longitudinal Series, volume VI of the *Account of the Operations &c.*) is in táluk Warangal, Sar-táluk Khamamet of the Nizam's territories. The hill is sacred to Rámáswámi, a Hindu deity whose image is carved in relief in stone and placed with its stone attendants in a rude enclosure. The top of the hill is fortified and would afford a safe refuge to small bands of robbers: rain water in sufficient quantity to form a plentiful supply accumulates in a natural cistern in the rock within the walls. An annual fair is held on the hill top in honour of the god.

The station consists of a solid pillar of masonry having two marks, one in its upper surface and the other 6·00 feet below it. The azimuths and distances of the circumjacent villages are:—Inkúrti 353°. 56′, miles 2·70; Bolíkonda (deserted) 278° 13′, miles 1·21; Tumapoili 235° 36′, miles 2·10.

[The Latitude pillar is built on the Trigonometrical Station situated on the top of a very steep rocky hill some 1,500 feet high. To the north there is an inextensive isolated hill 1,200 or 1,400 feet high and distant a mile and there is a similar hill at the same distance to the south. There is a smaller hill distant 2 miles to the north and two small ones about 2 miles N.W., but as the station is not quite over the centre of gravity of the hill on which it stands, the local attraction should be insignificant.—J.E.]

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 17° 42′ 35″·82

137. Bostán Tower Station (No. XXXVIII of the Great Arc Meridional Series, Section 24° to 30°, volume IV of the *Account of the Operations &c.*) is built on the high bank which bounds the bed of the river Jumna to the east in pargana Dádri of the Bulandshahr district. The adjacent villages are—Garabpur 3·9 miles, N.W., and Dádri 3·5 miles, N.E.

The station consists of a perforated pillar of masonry 50 feet high, having a mark-stone on the ground floor.

[The Latitude pillar was situated 722 feet east of the Trigonometrical Station. The azimuth of the latter from the former was 90° 0′ 35″, so that the latitudes of the two may be considered identical.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 28° 30′ 59″·64

138. Budhon Hill Station (No. III of the Calcutta Longitudinal Series, volume VI of the *Account of the Operations &c.*) is situated immediately above the village of that name, thána Barodia, tahsíl Kurai, pargana Banda, district Saugor. The station consists of a solid masonry pillar having three mark-stones, the two upper respectively 9 and 4 feet above the lowest. The distances and directions of surrounding villages are:—Jáman Kheri 1·5 miles, N.W.; Burruho 1·5 miles, N.; Dubri 1·3 miles, E.N.E.; Khirea 1·1 miles, E.S.E.; and Kanera 2 miles, due S.

[The Latitude pillar is 51 feet east of the Trigonometrical Station on the flat-topped hill immediately north of Budhon village near the northern edge of the top. Both to north and south the country is covered with jungle and anomalies of refraction are not to be expected. The immediate locality shows a deficiency of matter to the north and west to which one might attribute deflections of less than 0″·5 in amount to the south and east.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 24° 5′ 8″·41

139. Burgpaili (or Rájula Ghúta) Hill Station (No. XLI of the Jabalpur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated about 2·5 miles E. of the village of Burgpaili; pargana and tahsíl Chĕnnúr of the Hyderabad States.

The station consists of a solid, masonry pillar 4·5 feet high having two marks, the distance between which is not known.

[The Latitude pillar is built on the Trigonometrical Station situated on a low narrow hill about 600 feet high. To the north there is nothing but the smallest of hills between the station and Ankora. In the immediate vicinity 1 mile to the S.W. there is a small hill about the same size as that on which the station is situated. Due south, distant 8 or 10 miles, there is a fair-sized conical hill and in the distance, 20 or 30 miles off, the very considerable range in which Ramgir is situated. The attraction should be small and to the south.—J.E.].

The Astronomical Station is coincident with the Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 18° 54′ 7″·20

140. Chamu Hill Station (No. XVII of the Jodhpore Meridional Series, volume IVA of the *Account of the Operations &c.*) lies within the boundary of Chamu in táluk Ketu of the Jodhpur territories about a mile in a direction 42° E. of N. from it.

The pillar, which is solid and 3 feet high, has been sunk so that its surface is level with the ground and has been built on a circular foundation 6 feet in diameter and 1 foot in thickness, resting on wooden piles. It contains two marks one at the surface and the other at the bottom of the pillar. Barnán village lies about 4 miles N.W.

[The Astronomical Station is coincident with the Trigonometrical Station of Chamu. It is situated on a small sand-hill in the midst of an immense plain: with the exception of a few sand-hills and small rocky hills here and there at wide intervals, there is nothing of a mountainous nature to be seen. No apparent cause exists for any deflection of the plumb-line.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 26° 39′ 52″·74

141. Chandaos Tower Station (No. XXXVI of the Great Arc Meridional Series—Section 24° to 30°; volume IV of the *Account of the Operations &c.*) is built on a high bank of accumulated sand about 400 yards from the village of that name in pargana Khair of the Aligarh district. The adjacent villages are—Umri 5·9 miles, S.W., and Elampur 2·4 miles, N.W.

The station consists of a perforated pillar of masonry, 40 feet high and having a mark-stone on the ground floor.

[The Astronomical Station is 1,272 feet east of the Trigonometrical Station and is not more than four inches out of the prime vertical, the latitudes of the two points may therefore be considered identical.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 28° 5′ 1″·59

142. Chandípur Tower Station (No. XXII of the East Coast Series, volume VI of the *Account of the Operations &c.*) which was on a sand-hill near the sea coast, about 6 miles E.S.E. of Balasore, was reported by Lieut. E. A. Tandy R.E. in 1898 to have entirely disappeared. There are no traces left of the station except broken pieces of masonry.

[The Latitude pillar was erected on the sand-cliff 151 feet to the west of the assumed station. The cliff is about 34 feet high and has a slope of about 60°, and its foot is just lapped by the sea at high water. The pillar is about 24 feet back from the face of the cliff. Except for the effect of the Bay of Bengal to the S.E., no local attraction is to be anticipated. There is a levelling bench-mark 50 yards south of the Latitude pillar marked G. T. S. B. M.—E.A.T.]

The Latitude of the Astronomical Station is assumed to be the same as that of the old Trigonometrical Station.

Geodetic Latitude of the Astronomical Station = 21° 26′ 36″·99

143. Chanduria (Chendoria) Tower Station (No. XXXVIII of the Calcutta Meridional Series, volume VIII of the *Account of the Operations &c.*) is situated adout 300 yards N. of the nearest portion of the scattered village of this name, $4\frac{1}{4}$ miles E. of Lochan village near the intersection of the roads from Ráiganj and Dinajpur; thána Pirganj, pargana Khára, district Dinajpur. The station consists of a solid tower of sun-dried bricks, enclosing a central pillar of masonry 20·75 feet in height and is marked in the usual manner. The azimuths and perambulated distances of the circumjacent villages are:—Brijgaon 316° 31′, mile 0·77; Karnai 226° 28′, miles 1·24; Málancha 158° 41′, miles 1·07; and Mahádebpur 116° 11′, mile 0·63.

[The Latitude pillar is 45 feet east of the Trigonometrical Station. There is no reason to suppose any local influences disturbing the direction of the plumb-line. Half the Trigonometrical pillar remains standing, protected by an earthen mound. The "half way" mark is in good preservation. The latter was covered by a small pillar 2 feet square in section and about 2 feet high. The whole was then covered by earth.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 25° 44′ 27″·47

144. Chánga Hill Station (No. LXXX of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated on a sand-hill bearing that name in that portion of the Thar, or Little-desert, appertaining to Bhúj. The town of Chelar lies to the east at a distance of about $3\frac{1}{2}$ miles. The pillar is solid, and 3 feet high. Mark-stones were embedded at top and bottom, and 2 feet above the latter.

[Though the Trigonometrical Station is described in Synoptical Volume III as having entirely disappeared, a portion of the original pillar, 2 feet in height, was found some 3 feet below the surface of the sand. The Latitude pillar is built over the Trigonometrical Station. There is no reason to suppose any deflection of the plumb-line.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 24° 58′ 47″·00

145. Chaniána Hill Station [No. III (Siniána) of the Abu Meridional Series, volume XIV of the *Account of the Operations &c.*] is situated in the lands of the village Chaniána, pargana and state Pálanpur. The station consists of a platform, enclosing a solid, circular and isolated pillar of masonry: there are two marks, one engraved on the rock *in sitú* and the other 3 feet above it in the upper surface of the pillar. The directions and distances of the circumjacent villages are:—Chaniána N.W. by W., mile 1; Gola N. by W., miles 2; Vansol E. by N., miles 2; Dhota S., miles $2\frac{1}{4}$; and Varvádia S.W., miles 2.

[The Astronomical Station at Chaniána is built on the prime vertical of the Trigonometrical Station of Chaniána, and about 400 yards east of the latter. It is on the summit of a conspicuous sand heap. The southern horizon is broken by no hills: a few small conical heaps of rock lie S.E. and S.W. but the whole land to the south is flat. The Aravalli range commences 5 miles N.E., Mount Abu is 30 miles north, and Jairáj hill 20 miles N.W. The Aravallis are considerable hills and northerly attraction is to be expected.—S.G.B.]

Geodetic Latitude of the Astronomical Station 24° 6′ 36″·64

146. Charaldánga Tower Station (No. XXVII of the Calcutta Meridional Series, volume VIII of the *Account of the Operations &c.*) is situated in thána Gumashtapur, pargana Paltapur, district Malda. It is on the Barind, in the middle of a patch of thick thorny jungle, about $6\frac{1}{2}$ miles E. by N. of the large village of Bangabári on the left bank of the Mahánada river and $5\frac{1}{2}$ miles N.W. of Chotipur on the high road from Godagári to Dinajpur. The station consists of a square solid tower of sun-dried bricks, enclosing a central pillar of masonry. The azimuths and perambulated distances of the circumjacent villages are:—Charaldánga 67° 10′, mile 0·30; Rámkandar 119° 51′, mile 0·64; Básudebpur 193° 18′, mile 0·37; and Sujanagar or Magrakandar 267° 52′, mile 0·44.

[The Latitude pillar is 220·8 feet east of the Trigonometrical Station and in the true prime vertical of the same. The surrounding country is undulating, covered with patches of thorn jungle. To the west there is a lowlying bit of ground of considerable extent. There is however no apparent cause of any appreciable local disturbance of the direction of the plumb-line. The lower mark of the Trigonometrical Station is in satisfactory preservation, though the tower itself has fallen and now forms an earthen mound some 14 feet high.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 24° 52′ 43″·95

147. Colába Latitude Station is 7 feet west and 9 inches south of the Bombay Longitude Station (*vide* volume IX of the *Account of the Operations &c.*). The Longitude Station is situated in the compound of the Colába Observatory, 55 feet north, and 53 feet east of Colába s., a secondary station of the Bombay Longitudinal Series.

[The Latitude Station consists of a circular masonry pillar 3 feet in diameter and 2 feet 6 inches in height.—G P.L.C.]

Geodetic Latitude of the Longitude Station	=	18° 53′ 49″·49
Reduction to Latitude Station	=	− 0 ·01
Geodetic Latitude of the Latitude Station	=	18 53 49 ·48

148. Cuttack or Barabati Hill Station (No. XXXV of the East Coast Series, volume VI of the *Account of the Operations &c.*) is situated on a mound or bastion in the old ruined fort of Cuttack. The station is marked by a stone embedded in the surface of a paka platform.

[The Astronomical Station is on a large mound or hillock in the old fort and within 100 yards of Cuttack Club. There are a few small hills 12 miles to the north, and some more considerable ones 10 to 50 miles in the same direction; the whole of these might account for a northerly attraction of 1″. The sea is 50 miles distant to the S.E. The Latitude was observed from the Trigonometrical Station.—E A T]

Geodetic Latitude of the Astronomical Station = 20° 29′ 0″·68

149. Daiádhari Hill Station (No. II of the Great Arc Meridional Series, Section 24° to 30°, volume IV of the *Account of the Operations &c.*) is situated on a low detached hill in the Gwalior territory. The adjacent places, with their distances and directions are:—Sadhora, a town and railway station, about 4 miles, S.W.; and the large village and railway station of Puchar about 6½ miles, S.E. In 1898 the pillar of the Trigonometrical Station was found to have been destroyed; it had been dug out and the mark-stones removed or displaced. The well surrounding the pillar was however intact and it was assumed that the centre of this well would define with sufficient exactness the position of the old mark. A mark-stone was consequently placed at the bottom of the well and adjusted centrally and then a paka pillar 3 feet 6 inches in diameter was built to the level of the surface of the platform, making it 5 feet high, and a second mark-stone was placed on the top of the pillar in the normal of the lower one.

[The station stands on the highest point on an unimportant isolated hill about 100 feet above the surrounding plain. The top is fairly level and about 50 yards wide by 150 long, the direction of the length being north and south. The station is at the northern edge. Similar small hills are scattered over the country at intervals, the nearest being about 1½ miles from the station. The Astronomical Station consists of the usual circular pillar suitable for the zenith sector, and is situated 58 feet 6 inches west and 2 feet 4 inches north of the Trigonometrical Station —G P.L.C.]

Geodetic Latitude of the Trigonometrical Station	=	24° 38′ 17″·57
Reduction to Astronomical Station	=	+ 0 ·02
Geodetic Latitude of the Astronomical Station	=	24 38 17 ·59

150. Dalea Hill Station (No. XII of the Biláspur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated in the lands of Ámbáli, pargana Kenda, district Biláspur of the Central Provinces. It is on a small isolated peak, locally so named, which overlooks the plains and is separated from the great mass of hills to the north by a distance of about 10 miles. The station consists of a solid pillar of masonry, having two marks, one in the upper surface and the other 4 feet below it on the rock *in sitú*. The azimuths and estimated distances of the circumjacent villages are:—Nawágaon 175° 54′, miles 1·75; Billíban 227° 9′, miles 2; and Ámbáli 321° 48′, miles 2.

[Dalea is on a steep pointed hill rising 600 or 700 feet above the plain. It is amongst the southernmost of the masses of hills which stretch all across the country to the north. A local attraction of about 5″ N.W. might be expected. The Astronomical Station was coincident with the Trigonometrical Station.—E.A.T.]

Geodetic Latitude of the Astronomical Station = 22° 19′ 33″·62

151. Dánapa Hill Station (No. XIV of the Madras Meridional and Coast Series, volume XIII of the *Account of the Operations &c.*) is situated in the lands of the village Gōrĕpád, táluk Narsaraōpet, district Kistna. It is on a range of hills lying nearly N. and S. and about 1½ miles W. of the high

road from Madras to Hyderabad. The station is not on the highest peak of the hill, that being taken up by a place of worship. The station consists of a solid pillar of masonry having two marks, one engraved on the rock *in sitú* and the other 1 foot above it. The directions and distances of the circumjacent villages are:—Kappĕrapád E., miles $1\frac{3}{4}$; Vaidana N.E., miles $2\frac{3}{4}$; Kukutlapalle N., miles 2; Gŏrĕpád W. by S., miles $2\frac{1}{2}$; and the place of worship on the summit of the hill is N. by W. at a distance of about 150 to 200 yards.

[The Astronomical Station is built in the prime vertical of the Trigonometrical Station, 1 mile and 44 yards to the east of it. It is about a mile to the west of the village of Kapurpad through which the main road runs. A number of rather high hills belt the horizon on every side but in such a way as not to cause deviation of the plumb-line in the meridian.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 15° 56′ 0″·14

152. Dargawa Hill Station (No. II of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated in the lands of Dargawa village; pargana Baldeogarh of the Orchha or Tehri State. It is on steep rocky ridge running nearly north and south, at the northern foot of which is the village Dargawa 0·4 mile from the station. The distances and directions of other surrounding villages are:—Parra 0·3 mile, N.W.; Rasoi 1 mile, N.N.W.; Bhadaura 1·4 miles, S.S.W.; and Magarkhera 1·6 miles, E.S.E. The station is marked on the rock *in sitú*.

[The Astronomical Station is built in the prime vertical of the Trigonometrical Station and 1369 feet east of it. The Trigonometrical Station is on a steep rocky ridge rising abruptly 500 feet above the surrounding plain, the Latitude pillar being at the foot of the slope. The local masses are not capable of producing any deflection of the plumb-line of appreciable amount. The small attraction that may exist should be to the S.W.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 24° 37′ 13″·21

153. Dariápur Tower Station (No. VIII of the East Coast Series, volume VI of the *Account of the Operations &c.*) is situated on an elevated sand-ridge about 300 yards from the village of Dariápur-Bamaria which bears 137° 30′, in pargana Bálijora, district Midnapore. The road from Contai to Kedgri passes about 3 miles to the west of the station, and the Rasalpur ferry is about 3·25 miles N.W. The bearings and distances of the surrounding villages are:—Partábpur 50° 0′, mile 0·6; and Gopínáthpur 340° 0′, mile 0·3. A temple, which stands on the same ridge as the station, bears 251° 40′ and is distant 0·4 of a mile. The station consists of a solid pillar of masonry, having a mark-stone at the bottom.

[The Astronomical Station is on the sea dyke 200 yards east of Dariápur inspection bungalow. The coast of the Bay of Bengal lies 2 miles S.E. and 3 miles S. Beyond the vicinity of the sea there is no fact likely to cause local attraction. The Latitude pillar is to the east of the Trigonometrical Station 28 feet from it, and in the prime vertical. There seems absolutely no shadow of doubt as to the identity of the Trigonometrical Station, but the pillar is white-washed, and there is no mark on the top and it is not the right height. Its height is 13 feet from bottom mark.—E.A.T.]

Geodetic Latitude of the Astronomical Station = 21° 47′ 27″·95

154. Darutippa (also called Mangalapápĕmtippa) Station (No. XXV of the Madras Meridional and Coast Series, volume XIII of the *Account of the Operations &c.*) is situated in the lands of the village of Chalamchĕrla, táluk Kandukur, district Nellore. It is about $4\frac{1}{2}$ miles S. by E. of the village of Gudlúr, and $6\frac{1}{2}$ miles W.S.W. of Tĕttu on the road from Madras to Ongole. The directions and distances of the circumjacent villages are:—Pĕddavaram S.W. by S., miles $1\frac{1}{2}$; Chalamchĕrla S.E., miles 3; Ammavaripálĕm W. by N., miles $1\frac{1}{4}$; and Potlúr N.E. by N., miles 3.

[The Astronomical Station is built in the prime vertical of the Trigonometrical Station, 1430 yards to the west of it and about $\frac{1}{2}$ a mile to the east of the village Ammavaripálĕm which lies close to a large tank. The surrounding country is very flat and no deviation is to be anticipated. The Trigonometrical Station had fallen into very bad repair in 1891.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 15° 0′ 36″·47

155. Deesa Longitude Station (*vide* volume IX of the *Account of the Operations &c.*) is situated in the compound of the Telegraph Office. It is 89 feet S. and 56 feet W. of Deesa Telegraph Office s., a secondary station of the Abu Meridional Series.

[The Latitude Station at Deesa is coincident with the Longitude Station and 20 feet from the eastern corner of the new Telegraph Office. The Aravalli Hills lie 40 miles east: Mount Abu is 20 miles north-east, and a few isolated rocky hills protrude here and there: otherwise the whole country is a flat desert.—S.G.B.]

Geodetic Latitude of the Latitude Station = 24° 15′ 29″·35

156. Dehra Dún Base-line East End Station [No. (IX) of the Great Arc Meridional Series, Section 24° to 30°, volume IV of the *Account of the Operations &c.*] is situated on the extremity of one of the spurs of the Gháti or Siwalik range of hills in the district of Dehra Dún. The nearest village is Mohabawála, about a mile to the south-east. The Ásan river winds round the foot of the spur, and one branch of it takes its rise in a ravine about 100 yards to the westward of the station. For its protection and to facilitate identification, a tower was built over the masonry platform with sides parallel or perpendicular to the line of the base, and with an arched passage 5 feet wide and 6 feet high, to allow of access to the mark-stones, should the base be remeasured at any future time. The mark in the stone on the summit of the tower is 8·71 feet above Colonel Everest's upper mark, and consequently 1967·78 feet above the mean sea-level of Karachi harbour.

[The Astronomical Station consists of a circular masonry pillar 3 feet in diameter, and 2 feet 6 inches in height. Its upper surface is level with the ground. It is situated on the prime vertical of the Base-line station and 22 feet $3\frac{1}{2}$ inches to the west of it. The Siwalik hills rise immediately to the south of this station and probably tend to reduce the effect of the attraction of the Himalaya.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 30° 17′ 7″·35

157. Dehra Dún Longitude Station (*vide* volume XV of the *Account of the Operations &c.*) is situated in the north-eastern portion of the Survey of India Office compound, 33 feet $6\frac{1}{2}$ inches north of the Haig Observatory, 43 feet 6 inches from the northern boundary wall measured on the ray to the Mussooree eastern meridian mark, and 628 feet 9 inches due east of the smaller Photo-heliograph Observatory called Dehra Dome Observatory T. S. (new) in Synoptical Volume II.

Dehra Dún (Haig Observatory) Latitude Station is 66 feet 5 inches east of the Haig Observatory. It is 39 feet $11\frac{1}{2}$ inches south and 89 feet 8 inches east of the Dehra Dún Longitude Station.

Geodetic Latitude of the Longitude Station	=	30° 19′ 29″·13
Reduction to Latitude Station	=	− 0 ·40
Geodetic Latitude of the Latitude Station	=	30 · 19 28 ·73

158. Dera Dín Panáh Platform Station (No. CXII of the Great Indus Series, volume III of the *Account of the Operations &c.*) is situated on the top of the N.W. bastion of the old kacha fort so called; thána Dera Dín Panáh, tahsíl Adúkot, district Muzaffargarh. The pillar, 6 feet deep, was countersunk into the bastion, and a mark-stone placed at its upper surface.

[The Astronomical Station was 300 feet due west of the Trigonometrical Station. The Suleimán Mountains are visible all along the horizon from N.W. to S.W. Slight northerly attraction is to be expected.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 30° 34′ 1″·87

159. Dhauleshvar Hill Station (No. XXVII of the Bombay Longitudinal Series, volume XII of the *Account of the Operations &c.*) is situated on the roof of the temple of this name on a range of hills running E. and W.: it is about $2\frac{1}{4}$ miles E.N.E. of the Borghát, and on the high road from the town of Jejuri to the railway station of Uruli on the G. I. P. line. The station is on the boundary of the villages of Dalimb and Amla of tálukas Purandhar and Bhimthadi, district Poona. The directions and distances of the circumjacent villages are:—Dalimb N.N.W., miles $1\frac{1}{2}$; Valti W. by N., miles $3\frac{1}{4}$; Vaghapur S.W., miles $3\frac{1}{4}$; Amla S. by E., miles $1\frac{3}{8}$; and Malsiras E.S.E., miles $4\frac{3}{4}$.

[The Astronomical Station was built in the prime vertical about 25 feet to the west of the Trigonometrical Station. The hill is the highest point of a range which runs almost exactly east and west. The valley to the north is about 1100 feet below the station; while that to the south is only some 600 feet below, and besides this there are other hills to the south and none of any consequence to the north; so that it appears probable that there may be some deviation of the plumb-line to the south.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 18° 25′ 41″·64

160. Dhúlipalla Station (No. VII of the Madras Meridional and Coast Series, volume XIII of the *Account of the Operations &c.*) is situated in the lands of the village of Dhúlipalla, táluk Sattĕnapalle, district Kistna. It is on high ground in the midst of fields and lies about $4\frac{3}{4}$ miles N.W. by W. of the táluk town of Sattĕnapalle on the high road from Hyderabad to Guntúr, and the same distance N.N.W. of the large village of Mandala. The directions and distances of the circumjacent villages are:—Bhrugubanda N. by E., miles $1\frac{1}{3}$; Dhúlipalla S. by W., miles $1\frac{1}{4}$; Makkapád

N.W., miles $2\frac{1}{4}$; Rĕddigúdĕm W. by N., miles $2\frac{1}{2}$; and Tŏndapi S.W. by S., miles $3\frac{1}{4}$. The station consists of a platform of stones and earth enclosing a solid, circular and isolated pillar of masonry in which are three mark-stones, one embedded in the soil and two others at 3 and 5 feet above it.

[The Latitude pillar is built on the Trigonometrical Station. The surrounding country consists of a series of undulations. There is a range of hills, running S.W. to N.E. and terminating at a distance of 15 miles. The nearest point is about 8 miles off. There is another range running in the same direction–bearing S.E. from the station at a distance of 12 miles and there is a small isolated hill due south 15 or 20 miles off. There is probably a little northern attraction.—J.E.]

Geodetic Latitude of the Astronomical Station = 16° 25′ 56″·75

161. Didáwa Hill Station (No. LXII of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated on a sand-hill in the Thar or Little-desert, and distant from the hamlet of Didáwa $\frac{3}{4}$ of a mile. It is in the Jodhpore territories.

[The Astronomical Station is directly over the Trigonometrical Station of the same name. The nearest village is Bidabav, $1\frac{1}{2}$ miles to N.E. The country is rugged in appearance—the sand-hills being steep and much eroded by water. There are no grounds for expecting a deflection of the plumb-line from local causes. The Trigonometrical pillar had entirely disappeared, the bottom mark and foundation being found with difficulty.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 24° 51′ 19″·36

162. Díwai Hill Station (No. XXXIII of the Jabalpur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated in the lands of the village of Pomúrna; pargana Ghátkúl, tahsíl Múl, district Chánda. The village of Kauarji lies about 4 miles W. by N. The station consists of a solid pillar of masonry having two marks.

[The Latitude pillar is built on the Trigonometrical Station which is on the top of a hill some 900 feet high. The hill is so thickly covered with a dense bamboo jungle that it is difficult to see the features of the surrounding country. It is certain that there are no hills of any extent either to the north or south and as far as can be judged, the small hills are about equally distributed so that no local attraction need be expected.—J.E.]

Geodetic Latitude of the Astronomical Station = 19° 49′ 32″·57

163. Gudali Hill Station (No. XXXVIII of the Madras Meridional and Coast Series, volume XIII of the *Account of the Operations &c.*) is situated in the lands of the village of Gudali, táluk Gudur, district Nellore. It is on an isolated rocky hill lying about $\frac{1}{2}$ a mile from the left bank of the Swarnamukhi river and immediately N. of the village of Gudali; about one mile S.W. of the high road from Dugarazpatanam. The directions and distances of the circumjacent villages are:—Kota N.E. by E., miles $2\frac{1}{2}$; Kurrugŏnda W., miles 4; Kasipuram S.E., miles $1\frac{3}{4}$; Razupálĕm W. by N., mile $\frac{1}{2}$; and Tinnelapúdi E.S.E., miles $1\frac{3}{4}$. The station consists of a platform of stones and earth enclosing a solid, circular and isolated pillar of masonry, having two marks, one engraved on the rock *in sitú* and the other 6 feet above it.

[The Astronomical Station coincides with the Trigonometrical Station and is situated on the highest point of a hill some 300 feet higher than the surrounding country. This highest point is not over the centre of the mass of the hill but to the north-west of it, so that a slight deviation to the south may possibly exist. The surrounding country is flat or gently undulating for miles so that no other source of deviation is apparent.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 14° 1′ 9″·45

164. Gúrmi Tower Station (No. XVII of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated on a bastion at a northern angle of the mud fort attached to the village of Gúrmi which lies between the Sánichri hills and the Chambal river: in the Gwalior State. The distances and directions of the surrounding villages are:—Silauli 1·6 miles, N.W. by W.; Kalyánpura 1·6 miles, S.W. by W.; and Gopálpura 1·4 miles, E. by S.

[The Latitude pillar is 920 feet due west of the Trigonometrical Station. The Trigonometrical Station originally consisted of a tower, with upper and lower marks, on the northern bastion of the mud fort in Gúrmi village. Both tower and bastion have been destroyed by the action of the weather—the tower completely so—so that in time the lower mark became exposed. The short pilaster like stone on which this mark had been cut, originally buried with its longer axis vertical, had, as the bastion crumbled away, fallen to one side. It was however re-erected by a Patwari about 1898. It is evident, however, that if the tower had been in the centre of the bastion, the error in the present position of the stone cannot be more than 1 foot in any direction. Local disturbances of the plumb-line either in meridian or in prime vertical are not to be expected.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 26° 36′ 3″·63

165. Háthbena Hill Station (No. XLIII of the Biláspur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated in the lands of the village of Kotgaon, pargana Ráigarh of the Jaipur State. It is on a long, high, isolated hill lying east and west. The directions and estimated distances of the circumjacent villages are:—Kotgaon E., about 2·5 miles; the town of Ráigarh N.E., about 3·75 miles; Birsári village S.E., about 3 miles; and the deserted village of Háthbena N.W., about 2 miles. The boundary between Jaipur and Bastar passes about 4 or 5 miles to the west of the station. The station consists of a solid pillar of masonry having two marks, one on the upper surface and the other engraved on the rock *in sitú*.

[The Astronomical Station coincides with the Trigonometrical Station. It is on the highest of a small group of low hills and is about 500 feet above the surrounding plain. There is no apparent reason to expect any particular local attraction.—E.A.T.]

Geodetic Latitude of the Astronomical Station = 19° 51′ 42″·34

166. Jalpaiguri Station (a secondary station of the Assam Longitudinal Series), is situated on the roof of the Deputy Magistrate's kachahri, a paka building on a piece of land between the Tista and Kulla rivers. The mark is 36 feet 4 inches, 26 feet 6 inches, 33 feet 6 inches and 22 feet 3 inches distant respectively from N.W., S.W., N.E. and S.E. corners of the roof.

[The Latitude Station is 86·5 feet east of the Longitude Station (*vide* volume X of the *Account of the Operations &c.*) and 228 feet north of the Trigonometrical Station. The station consists of an isolated pillar of masonry, 3 feet in diameter, the top of which is flush with the ground surface. The Trigonometrical Station is in perfect preservation.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	26°	31′	15″	·13
Reduction to Latitude Station	=		+	2	·26
Geodetic Latitude of the Latitude Station	=	26	31	17	·39

167. Jambo Hill Station (No. XXVI of the Jodhpore Meridional Series, volume IVA of the *Account of the Operations &c.*) is situated in the lands of the village of Naneo, pargana Phalodi of the Jodhpur territories. It is distant 2·4 miles from the village of Jambo, on a long sand-ridge which runs in a N.E. and S.W. direction. The azimuths and distances of the circumjacent places are:—Phalodi town 45°, miles 13·75; Sawanti village 76° 30′, miles 3; and Báp village of the Jaisalmer territories 125°, miles 12·2. The station consists of a solid pillar of masonry, having three mark-stones, one in the upper surface of the pillar, the second at the bottom of the pillar and the third at the bottom of the foundation.

[The Astronomical Station is coincident with the Trigonometrical Station of Jambo. It is situated on a small sand-ridge in the midst of a flat sandy desert: with the exception of small sand-hills, the whole desert is a plain as far as the eye can reach. No apparent cause exists for deflection of the plumb-line.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 27° 16′ 28″·88

168. Kaliánpur Hill Station [No. (VII) of the Great Arc Meridional Series, Section 24° to 30°, *vide* Base-line figures in volume III of the *Account of the Operations &c.*] is situated in the lands of the village of Kaliánpur in pargana Sironj of the Tonk State. It is on a flat, elevated ridge of iron-clay formation, locally called Bhuri Tori, which skirts the Sironj valley to the S.W. and N. The station consists of a solid pillar of masonry 2 feet high, containing mark-stones at top and bottom and enclosed in a platform of solid masonry 14½ feet square.

[The Trigonometrical Station, which is 1,765 feet above mean sea-level, is on the highest of a series of rolling hills or downs which form the eastern edge of an extensive plateau about 170 feet higher than the plain to the east. The edge of the plateau runs north and then north-east and disappears in the distance; it is somewhat higher than the central parts and more undulating. The town of Sironj lies about 2¼ miles to the south-east. The Latitude pillar is situated on the east side of the Trigonometrical Station on an Azimuth of 270° 4′ 38″ and at a distance of 39 feet 7 inches, so that the latitudes of the two may be considered identical.—G P.L.C.]

The adopted value of latitude (*vide* Chapter IV) is 24° 7′ 11″·26

169. Kámkhera Hill Station [No. (IV) of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*] is situated in the lands of the village of Imlani, in pargana Sironj of the territories of the Nawab of Tonk. The circumjacent villages, with their distances and directions are:—Imlani 2 miles, N.W.; Kámkhera 1½ miles, W.; Ladhora about 2 miles, N.; and Kua about 2 miles, S. The pillar is solid, and 10 feet high. It has a mark-stone at top, another at bottom, and two others at distances of 2 and 6 feet respectively above the latter.

[The Trigonometrical Station is on a flat-topped hill near the southern end of the Kaliánpur plateau. Its height is 1,780 feet above mean sea-level. The Latitude pillar is situated in the prime vertical of the Trigonometrical Station and 48 feet 11 inches east of it.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 23° 59′ 44″·93

170. Kanheri Hill Station (No. XVIII of the Bombay Longitudinal Series, volume XII of the *Account of the Operations &c.*) is situated on a knoll of the Báleghát range, about $\frac{1}{3}$ of a mile N.W. of the road from Sáwargaon to Vási, and $4\frac{3}{4}$ miles N.E. by E. of the large village of Bhum. It is in the lands of the village of Kanheri, district Naldurg, Nizam's territory. The directions and distances of the circumjacent villages are:—Kanára N.E. by N., miles $1\frac{1}{2}$; Sonágiri W. by N., miles 4; Pardi E. by N., miles $2\frac{3}{4}$; Hadangiri S.S.W., miles 2; and Bonágiri W. by N., miles $3\frac{1}{2}$. The station consists of a perforated pillar of masonry 4·9 feet high and has an aperture giving access to the lower mark.

[The Astronomical Station is coincident with the Trigonometrical Station. It is situated on a high point of the edge of the great raised plateau which extends to the north-east. This edge is a very marked feature, being some 800 feet above the country to the S.W. and rises rather abruptly. Its general direction is from N.W. to S.E. and it is possible therefore that, there being so much more elevated ground to the north than to the south, there may be some deviation of the plumb-line in the former direction. So far as immediate surroundings are concerned, the station is well placed.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 18° 29′ 30″·75

171. Karía Hill Station (No. L of the Biláspur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated in the lands of the village of Tangapal which lies about 2·5 miles N.; pargana Ambra of the Bastar State. It is on a well known hill of that name forming the highest of a series of undulations on the north bank of the Indrávati. The pillar is solid and contains two marks, the upper 2·96 feet above the lower which is engraved on a block of stone imbedded in the foundation. The azimuths and distances of the circumjacent villages are:—Dasapal 104°, miles 2·76; and Auli 241°, miles 3·37. The boundary between Jaipur and Bastar runs through the centre of the village of Auli which is thus partly subject to the jurisdiction of Jaipur and partly to that of Bastar.

[The Astronomical Station is on a low hill in an undulating country, and is identical with the Trigonometrical Station. The Eastern Gháts are nearly 40 miles distant and might account for a local attraction of 1″ to the S.E.—E.A.T.]

Geodetic Latitude of the Astronomical Station = 19° 12′ 5″·98

172. Károthol Hill Station (No. CIV of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated in the Karachi Collectorate of Sind, on the highest part of a hill of the same name. The pillar is 3 feet high.

[The Latitude pillar is $310\frac{1}{2}$ feet due east of the Trigonometrical Station which is on the highest point of a small hill, 3 miles S.S.W. of Janabad Railway Station, N.W. Railway. A deflection of not more than 2″ to the N.N.W. might be caused by the lower Baluchistan hills, the outer ranges of which are some 20 miles distant.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 24° 53′ 46″·69

173. Kaulia Hill Station is situated on the extreme summit of the range known locally as Kaulia. This range forms part of the Kukani hill and lies due west of the Resident's bungalow at Kukani. The mark is about $3\frac{1}{3}$ hours sharp walk from the Residency in Katmandu. The bearings of the adjacent places are:—N.W. corner of Prime Minister's House (new) 324° 5′, Katmandu Clock Tower 324° 15′, Kukani Bungalow 90° 55′, Budhnath Pagoda 307° 55′ and Rocko 12° 30′. A wooden peg, into the centre of which a nail has been driven, marks the site of observation. The mark has been covered with an old tin and surrounded by large rocks forming a cairn 6 feet in diameter and about 7 feet high. The position of the station was determined from observations to known peaks.

Captain Wood's "*Report on the Identification and Nomenclature of the Himalayan Peaks as seen from Katmandu, Nepal*" published in 1904, gives the geodetic co-ordinates of Kaulia as follows:—

Latitude 27° 48′ 58″·6
Longitude 85° 16′ 47″·9

174. Khankharia Station (No. LI of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated on a sand-hill $1\frac{3}{4}$ miles from Lelawa village, which is on the telegraph line from Deesa to Umarkot. The station is in Pálanpur State. The large village of Ninawa lies about $3\frac{1}{2}$ miles to the N.E., and Baja village is distant about $2\frac{1}{4}$ miles. The station consists of a

id pillar of masonry 8 feet high, having five marks, one at its base, and the others 2, 6, 7 and 8 feet respectively above it.

[The Astronomical Station is on the prime vertical and 40 feet west of the Trigonometrical Station. It is about 30 miles from Deesa. The out-skirts of the Jeypore hill tracts are some 60 miles to the N.E. The country is one of undulating sand-hills. There is no apparent local cause of deflection of the plumb-line at this station.—H.M.C]

Geodetic Latitude of the Astronomical Station = 24° 36′ 56″·19

175. Khánpisura Hill Station (No. XXI of the Bombay Longitudinal Series, volume XII of the *Account of the Operations &c.*) is situated in the lands of the village of Khadgaon, táluka Shrígonda of the Ahmednagar district, on a hill about $1\frac{1}{2}$ miles S.W. of the village of Khángad. The station consists of a solid pillar of masonry having two mark-stones, one at the ground level and the other 1 foot $7\frac{1}{2}$ inches below it. The directions and distances of the circumjacent villages are:—Vadghula N., miles 2; Khadgaon E.N.E., miles 2; Bhangaon S.W., miles $3\frac{3}{4}$; and Dhorja W.S.W., miles $3\frac{3}{4}$.

[The Astronomical Station is coincident with the Trigonometrical Station. It is situated on a flat-topped hill which forms the eastern flank of a pass through a range which runs rather irregularly to the N.W. A considerable spur runs out to the north, while to the south the fall is abrupt. The hills to the S.E. on the other side of the pass are of much the same height. The level of the country is somewhat higher towards the north than towards the south, and this together with the spur to the north, mentioned above, may cause some deviation to the north.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 18° 45′ 30″·65

176. Khirsar Hill Station (No. XLIV of the Jodhpore Meridional Series, volume IVA of the *Account of the Operations &c.*) is situated in the lands of the village of Khirsar in pargana Pungal of the Bickaneer territories. The hill slopes gently from the south and terminates abruptly to the north being there 186 feet above the adjacent plain. The path from Dattohar to Pungal runs south of the hill. The pillar, which is surrounded by a platform of stones and sand, is solid and 5·15 feet high with a foundation one foot deep, and has three mark-stones, one at the top of the foundation, a second 2·54 feet above it and the third 2·60 feet above the second, flush with the top of the pillar. The approximate directions and distances of the circumjacent villages are:—Dattohar S.W. by S., miles 10·05; Pungal E., miles 9·5; Ramra S., miles 6 nearly; and Khirsar E. by S., miles 3·37.

[The hamlet of Khirsar, mentioned by Colonel Rogers in 1874, has disappeared; there was no village within a day's march, and water had to be brought daily from Pungal, a distance of 11 miles. Perfectly flat sandy desert; plumb-line unaffected by hills. The Astronomical Station was coincident with the Trigonometrical Station.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 28° 29′ 40″·91

177. Khori Tower Station (No. XCI of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated in the Hyderabad Collectorate of Sind at about 1 mile from the largest of the three villages after which it is named. The village of Kariana is distant $2\frac{1}{2}$ miles, at an azimuth of 350°, and that of Rain 1·3 miles nearly due N. The pillar is 15 feet high, and has five mark-stones imbedded in it, one at level of foundation, the others at 6, 12, 14 and 15 feet respectively above it.

[The Latitude pillar is 106 feet due west of the Trigonometrical Station. It is situated on the Sind plains $5\frac{3}{4}$ miles N.W. from Dádáh village. The Trigonometrical Station was in good condition in 1901. There is no apparent cause for any deflection of the plumb-line.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 25° 0′ 31″·53

178. Khundábolo Hill Station (No. XLI of the East Coast Series, volume VI of the *Account of the Operations &c.*) is on the summit of the highest of the elevated and extensive hilly tract lying to the west of the Chilka lake and dividing Gumsúr from Bhánpur. The hill on which the station is situated belongs partly to the former and partly to the latter; the part whereon the station is, appertains to the village of Koráchóli in the Gumsúr estate, district Ganjam. The country round is covered with heavy tree jungle and is very thinly populated; such small hamlets as exist are inhabited chiefly by Khonds. The nearest village is Kalsúli in the Gumsúr estate and it is distant about 10 miles to the north-west. The ascent which is long and easy, commences from the small village of Anpúrná, distant about 5 miles, N.E., and passes by the deserted Khond hamlet of Rájan. The pillar is solid, and contains two marks, one at the upper surface and the other engraved on the rock *in situ*.

[The Astronomical Station is on a hill over 3,000 feet high (the highest in the vicinity) known locally as Khundahana. The surrounding country is broken by lower hills of various heights, their mass does not seem to predominate greatly in any particular direction. The mass of the hill itself lies mainly to the N.E. of the station, and for this reason a deflection of 2″ to the N.E. might be expected. The best way to the station is from Balugaon railway station *viâ* Banpur Pertaup and Ankula. After Ankula coolie transport is necessary and a small camping ground can be found 1¼ miles beyond the forest guard hut at Rájan. The Latitude was observed at the Trigonometrical Station.—E.A.T.]

Geodetic Latitude of the Astronomical Station = 19° 51′ 12″·90

179. Kidarkanta Hill Station is a secondary station of the N.W. Himalaya Series (*vide* Synoptical volume VII). Its position was re-determined in 1903 by special triangulation (*vide* Appendix No. 2 of this volume). It is situated on the highest point of Kidarkanta hill on the watershed between the Tons and Jumna valleys in the lands of the village Durgaon (Tehri-Garhwál), and is about ¼ mile E. of the higher road from Onot and Bahshul to Shauro. It is about 3¼ miles N.N.E. of Our, 3¾ miles E. of Lodráo and 3½ miles S. of Shauro village. In 1903 the Astronomical Party marked the station by a circle and dot cut on the upper surface of a stone embedded centrally in a circular masonry pillar 3 feet in diameter and 2 feet high. Vertically below the upper mark, a similar mark was embedded below the pillar. The pillar was isolated in the usual manner from the surrounding platform, which was built up to the level of the upper surface of the pillar. The station is most easily approached from the north, the best route being *viâ* Chakráta, Mandali, Thadiar, Sendra Forest Bungalow, Naintwar Forest Bungalow (by Gainchra village) and Kidarkanta.

[The Astronomical Station is 38 feet south and 32 feet east of the Trigonometrical Station. The station seems well placed as regards the mass of the hill itself, and no local disturbance of the plumb-line of any importance need be expected. There is a small preponderance of mass to the south.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	31°	1′	22″·09
Reduction to Astronomical Station	=		—	0 ·38
Geodetic Latitude of the Astronomical Station	=	31	1	21 ·71

180. Kistama Hill Station (No. XXXI of the Madras Meridional and Coast Series, volume XIII of the *Account of the Operations &c.*) is situated in the lands of the village of Prabhagiripatnam, táluk Atmakur, district Nellore. It is on the top of Kistama hill. The directions and distances of the circumjacent villages are:—Prabhagiripatnam W. by N., mile ½; Navuru W.N.W., miles 5½; Bhattulapalle N.W. by N., miles 5½; and Tatiparti N. by E., miles 4½. The station consists of a platform of stones and earth enclosing a solid, circular and isolated pillar of masonry, 3⅓ feet in diameter in which are two marks, one engraved on the rock *in sitû* and the other 2·6 feet above it and level with the upper surface of the pillar.

[The Astronomical Station coincides with the Trigonometrical Station and is on the top of the eastern of two twin hills each about 350 feet above the surrounding country. The station is well placed over the centre of the hill mass. There are isolated peaks both to north and south, varying from 1½ miles to 30 miles distant, but no deviation in the meridian is to be expected on account of them, as the attraction in each direction should be nearly equal. A new road from Podalakur to Sangam is under construction and this runs within two miles of Kistama hill, for the last two miles there is no road.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 14° 27′ 14″·56

181. Kurseong Hill Station (a secondary station of the North-East Longitudinal Series) is situated on the Kurseong spur. The part of the spur on which it is situated is extremely narrow. The road from the Kurseong Railway Station going in a south-westerly direction towards Ambhuttia and Pankhabari Tea Estates passes alongside and to the north of the station. The station is about 1¼ miles distant from the Railway Station of Kurseong. The bifurcation of roads, the one leading to Ambhuttia in a westerly direction, the other to Pankhabari in a southerly direction takes place about 350 yards S.W. of the station. The Kurseong Church and Cemetery are about 500 yards N.E. of the station. The pillar is cylindrical 3 feet in diameter and 2 feet high, the upper surface being flush with the ground. There are two mark-stones, one vertically over the other at an interval of about 2 feet. The mark-stones have engraved on them a dot and concentric circles. The upper mark-stone is on the surface of the platform.

[The Latitude pillar is 485 feet due west of the Trigonometrical Station and is 113 feet lower in altitude.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 26° 52′ 5″·56

182. Ládimsir Tower Station (No. XVII of the Sutlej Series, volume IV of the *Account of the Operations &c.*) stands on the summit of one of a group of sand-hills in the desert east of Baháwalpur. It is in the Baháwalpur territory. The village from which the station takes its name is distant about ⅝ of a mile to the N.E. The pillar is perforated and has a mark-stone at the level of the ground floor.

[Perfectly flat sandy desert, plumb-line unaffected by hills. The Latitude pillar was 600 feet due east of the Trigonometrical Station.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 29° 21′ 41″·58

183. Lambatach Hill Station is a secondary station of the N.W. Himalaya Series (*vide* Synoptical volume VII). Its position was re-determined in 1903, (*vide* Appendix No. 2 of this volume). It is situated on the highest point of Lambatach hill, which lies N.E. of the junction of the Pabar and Tons rivers, in the lands of the village Manjni (Tehri-Garhwál), about 1¾ miles N.W. of Deota Forest Bungalow, 1 mile N.E. of Maijon and Lambatach Forest Bungalow. In 1903 a circle and dot were cut in a stone embedded in the upper surface of a masonry pillar 3 feet in diameter and one foot high. This dot was placed vertically over the old mark defining Lambatach or Lambáthásh of the secondary triangulation. The pillar is isolated in the usual manner from the surrounding platform. The easiest approach is *viâ* Thadiar and Deota Forest Bungalows.

[The Astronomical Station is 82 feet 1⅝ inches north and 1 foot 8½ inches east of the Trigonometrical Station. There may be a slight local deflection of the plumb-line southwards, probably less than 1″ in amount.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	31° 1′ 7″·65
Reduction to Astronomical Station	=	+ 0 ·81
Geodetic Latitude of the Astronomical Station	=	31 1 8 ·46

184. Lingmára (or Báláji-ka-pahár) Hill Station (No. XVI of the Jabalpur Meridional Series, volume VI of the *Account of the Operations &c.*) is in the tahsil and thána of Rámpaili, and the district of Bálághát, formerly called Boorha, of the Central Provinces, the head quarters of the district being 10 miles to the north-east. The station is situated on the southern edge, and not on the highest part, of a long range of hills averaging 700 feet in height, and running east and west. To the immediate south of the range and ½ a mile distant are 5 conical hills 500 feet high.

[To avoid essentially local attraction, which promised to be considerable at the Trigonometrical Station, the Astronomical Station was built 1812 yards due east of the former, a site that was also east of the centre of gravity of the Lingmára range. 500 yards from the Astronomical Station in a N.N.E. direction is a small hillock 70 feet high: a heavy range of mountains looms along the northern horizon, 20 miles away, but the southern view is one unbroken plain. The Astronomical Station stands near the centre of a small plateau about 30 feet above the general level of the ground to the north and south. A northerly attraction should be expected here; the mountains to the N.N.W. and N.N.E. are shewn by the map to be more considerable than they appear to the eye; there is nothing on the southern side to counteract them, and the whole tendency of the ground level from 20 miles north of the station to 20 miles south of it is to slope downwards at 20 feet per mile.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 21° 43′ 3″·07

185. Lohágara Tower Station (No. XLII of the Calcutta Meridional Series, volume VIII of the *Account of the Operations &c.*) stands about a mile E. of a small stream called Nahara stream; and 7 miles S.W. of the large village of Dakkhin Batina on the high road from Dinajpur to Titalia, thána Thakurgaon, pargana Shálbári, district Dinajpur. The azimuths and perambulated distances of the circumjacent villages are:—Lakkhipur 215° 56′, mile 0·73; Matrapur 278° 26′, miles 1·30; Ráipur 344° 40′, mile 0·72; and Phakdampur 82° 20′, mile 0·44.

[The Latitude pillar is 42 feet east of the Trigonometrical Station and 2 feet south of the same. Some 8 feet of the Trigonometrical masonry pillar remain in good preservation—covered by a mound of earth. No "half way" mark was to be found and as it was thought inexpedient to open up more of the masonry pillar to get to the lower mark, the Latitude was referred to the centre of the square masonry pillar. It is very improbable that an error of as much as ± 0″·005 has been thus introduced into the value for the reduction to the Trigonometrical Station.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	26° 2′ 12″·04
Reduction to Astronomical Station	=	− 0 ·02
Geodetic Latitude of the Astronomical Station	=	26 2 12 ·02

186. Losalli Station (No. I of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated in the Sironj district of the Tonk territory, 1½ miles W. of Pagrani, and the same distance S.E. of Bara Losalli, on a gentle undulation of the high table-land which rises immediately to the west of the Sironj valley. Some of the circumjacent villages with their directions and distances are as follows:—Manakheri N., 2·33 miles; Alinagar W., 0·85 mile; and Bogra S.E., 3·39 miles. The pillar is solid, 14½ feet high, and has the usual mark-stones at top and bottom, besides two intermediate ones at 5 and 10 feet respectively above the lower mark.

[The Latitude pillar was to the west of the Trigonometrical Station and 60 feet from it. Its centre is practically in the prime vertical. Losalli Station is situated 1,749 feet above mean sea-level and in the middle of the Kaliánpur plateau, in perfectly flat ground, which is slightly lower than the undulating country to the west.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 24° 6′ 19″·17

187. Lúnki Hill Station (No. LXXI of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated on a sand-hill in that portion of the Thar, or Little-desert, appertaining to Bhúj. The village of Dadia is S.E. at about 2 miles, and that of Janji-ká-kúa N.W. at about 1·7 miles. The station consists of a solid pillar 3 feet high, having three mark-stones, one at top, another at bottom and a third 2 feet above the latter.

[The Astronomical Station is over the Trigonometrical Station of the same name, the centre of the instrument being 1 foot south of the Trigonometrical mark. The Trigonometrical Station is on the highest ridge of the locality and was found in good condition.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	24° 58′ 23″·16
Reduction to Astronomical Station	=	− 0 ·01
Geodetic Latitude of the Astronomical Station	=	24 58 23 ·15

188. Madhupur (Modupur) Tower Station (No. XIV of the Calcutta Meridional Series, volume VIII of the *Account of the Operations &c.*) is situated immediately on the right bank of the Jwalangi river and about a mile below its junction with the Bhairali; thána Nauda, pargana Kulberia, district Murshidabad. The azimuths and perambulated distances of the circumjacent villages are:—Madhupur (Indigo factory) 79° 35′, mile 0·48; Madhupur 120° 47′, miles 1·41; Dengapára 179° 59′, miles 1·31; Piárpur 304° 29′, miles 1·99; and Belnagar 233° 47′, mile 0·68. The station consists of a square tower of masonry 33·25 feet in height which has a mark-stone at bottom.

[The Latitude pillar is in the prime vertical of the Trigonometrical Station and 492·9 feet east of the same. There is nothing visible to which local deflection of the plumb-line could be attributed. The country seems of uniform character for miles all around,—flat low lying, alluvial tracts, wooded or under cultivation. The Trigonometrical Station is in excellent preservation.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 23° 56′ 38″·97

189. Madras Longitude Station (*vide* volume IX of the *Account of the Operations &c.*) was 65 feet due north from the axis of the Meridian Circle of the Madras observatory, which latter point was fixed by triangulation and called Madras Observatory No. 2 s. in Synoptical Volume XXVII of the Madras Longitudinal Series.

[The zenith telescope was set up on a small circular granite pillar originally erected by some officers of the U. S. Navy who were engaged on Electro-Telegraphic Longitude operations; it was on the same meridian as the Longitude Station of the Survey of India, and 41 feet 7½ inches north of it. The zenith sector pillar was 30 feet 7½ inches due east of the zenith telescope pillar.—S.G.B.]

Geodetic Latitude of the Longitude Station	=	13° 4′ 3″·75
Reduction to Latitude Station	=	+ 0 ·42
Geodetic Latitude of the Latitude Station	=	13 4 4 ·17

190. Mahadeo Pokra Hill Station is situated in Central Nepal: the station is marked with a pile of stones 6 feet in diameter and 6 feet high. The position of the station was determined from observations to known peaks.

Captain Wood's "*Report on the Identification and Nomenclature of the Himalayan Peaks as seen from Katmandu, Nepal*" published in 1904, gives the geodetic co-ordinates of Mahadeo Pokra as follows:—

Latitude 27° 41′ 31″·5
Longitude 85° 33′ 47″·1.

191. Majhár Hill Station (No. XIV of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated on the same elevated plateau as Gujara fort from which it is distant about 1½ miles due north: in the Gwalior State. The distances and directions of neighbouring places are: Jamrúha fort 2 miles, E.N.E.; and Naugamo village 3·1 miles, E.S.E. The station consists of a solid pillar, having a mark-stone at its upper surface.

[The Latitude pillar is 41 feet east of the site of the Trigonometrical Station. The original low tower and platform of which the Trigonometrical Station consisted, had fallen and about the year 1892 the platform was rebuilt by the local official to a height of about six feet. Some seven years later a small stone tower was built on the platform, in height some eight feet above the platform. The original top mark-stone which had fallen, is now, in 1902, to be seen built into the side of the platform. The lower mark seems to have been destroyed as none was found. The Latitude pillar cannot be more than 4 feet out of position however. The local visible masses are capable of producing a slight deflection of not more than 0″·5 southwards.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 26° 6′ 17″·00

192. Mal Hill Station (No. LI of the East Coast Series, volume VI of the *Account of the Operations &c.*) is situated in the lands of the village of Birimi on a low hill stretching about 1·5 miles, N.E. and S.W.; zamíndári Mandisa, district Ganjam. The hill originally belonged to Ankápilli, but that village having been abandoned it was attached to Birimi. The village of Birimi lies E.N.E., distant about 1 mile and the sea-coast is about 1·5 miles E. The station consists of a solid pillar, having two marks, the upper 1·50 feet above the lower which is engraved on the rock *in sitû.*

[The Astronomical Station is on a hill nearly 500 feet high, or 350 feet above the surrounding plains. The country is interspersed with low hills. The local attraction of those in the immediate vicinity, including that on which the station stands, would probably be a little N. by E., but there are heavy masses of hills, rising to nearly 5,000 feet about 16 miles distant to N.W. A local attraction towards the N.W. should be expected accordingly. This is however neglecting any effect which may be due to the fact that the sea-coast is within 2 miles in a S.E. direction from the station, the general direction of coast line being N.E. to S.W. The Astronomical Station coincides with the Trigonometrical Station.—E.A.T.]

Geodetic Latitude of the Astronomical Station = 18° 47′ 16″·97

193. Mándvi Hill Station (No. XXXI of the Bombay Longitudinal Series, volume XII of the *Account of the Operations &c.*) is situated in the lands of the village of Tikona, táluka Pován Mával, Bhor State. It is on a ridge of the Western Gháts and occupies the peak locally known as Mándvi: it is $1\frac{1}{2}$ miles W. of the village of Vaula whence there is a very decent path to the station, and $1\frac{3}{4}$ miles E. of Tikona hill fort which is connected with it by a remarkable ridge about a mile in length along which there is a foot-path. The station is at the N. end of the summit which rises precipitously from all sides to a height of about 500 feet above the level of the high ridges of the table-land. The hill is composed generally of hard vesicular basalt; the lower part is of amygdaloid. The directions and distances of the circumjacent villages are:—Malaundi N.W. by N., mile 1; Kásig S.W. by W., miles $1\frac{1}{2}$; Kolván S., miles $3\frac{1}{2}$; and Audhali S.E. by E., miles $1\frac{3}{4}$. The station consists of a solid pillar of masonry having two marks.

[The Astronomical Station is coincident with the Trigonometrical Station. This is situated at the summit of a conical peak of the Western Gháts. Its height is 4,110 feet above sea-level, and about 2,200 feet above the surrounding country. There are mountains on every side and it is impossible to foretell what their effect may be on the plumb-line; so far as the more immediate surroundings are concerned, an attraction to the south seems probable, as to the north the fall is very abrupt and there is a valley on this side about 4 miles wide, while to the south the hill extends, though at a low altitude, for a long way.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 18° 37′ 51″·11

194. Mooltan Longitude Station (*vide* volume XV of the *Account of the Operations &c.*) is about 53 feet north and 102 feet east of Mooltan Telegraph Office station, which is situated at the N.W. angle of the *paka* roof of the Government Telegraph Office. A circle and dot engraved on a stone let into the roof marks the Telegraph Office station. It is 2·83 feet from an arrow on the western parapet, 8·08 feet from the S.W. corner of the westerly of the two northern chimneys and 9·96 feet from the N.W. corner of the single central chimney.

[Suleimán mountain peaks just visible to N.W. on very clear days: otherwise the whole country is flat. The Latitude Station was coincident with the Longitude Station.—S.G.B.]

Geodetic Latitude of the Latitude Station = 30° 10′ 58″·70

195. Moulmein Longitude Station (*vide* volume X of the *Account of the Operations &c.*) is on the meridian of the Mess House station, 10·0 feet south of it. In 1884 a marble slab 15 inches square with a circle and letters G. T. S. painted thereon was placed between the transit pillars.

[The Latitude was observed from the Moulmein Longitude Station, the zenith telescope being placed on the westernmost of the two Transit pillars. These pillars were found in sound condition. The adjacent building described in Volume X is no longer the Mess House of Moulmein Volunteer Rifles. It is a private dwelling house. It is situated on the high ground of "Battery Point". In January 1905 there was no marble slab between the two transit pillars.—H.M.C.]

Geodetic Latitude of the Latitude Station = 16° 29′ 54″·62

Note.—It will be found that the Geodetic Latitude of the Longitude Station as given in Volume X is 1″·87 in excess of the value adopted here. The Series of Triangulation following the Burma Coast emanates from the side Gojalia, XLIX—Tulamura L of the Eastern Frontier Series. The values of the length and azimuth of this side were adjusted in the simultaneous reduction of the North-East Quadrilateral and this adjustment has necessitated a recalculation of the triangulation in Burma.

196. Nagarkhána Hill Station (No. LXXI of the Burma Coast Series, Section 11°-23°) is situated on the westernmost range in the Chittagong district known by the Muggs as the Hinglimoin Range, and extending from the Fenny river on the north to the Karnaphuli on the south, the range runs in a direction N.W. and S.E. and is distant from the latter river about 4 miles. It is on eastern edge of the range, overhanging the plains about ½ mile distant from the village of Naseerabad at W. A large tank, the Sultan Bajubasta *dargah* is situated N.N.E. about ½ mile, and the Judge's Kachahri in the civil station of Chittagong is distant 2·896 miles at an azimuth of 318° 58′ 39″·51. The station is in pargana Naseerabad, in thána and zillah Chittagong, and is marked by a masonry pillar 3 feet high and 3½ feet in diameter at top. The pillar contains 3 mark-stones, one at the top and the others 2 feet apart, the lowest being a foot below the surface of the hill.

[The Latitude Station is 23 feet 2 inches east of the Trigonometrical Station.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 22° 22′ 56″·38

197. Náharmau Hill Station (No. VI of the Calcutta Longitudinal Series, volume VI of the *Account of the Operations &c.*) is situated within a ruined fort on a hill about half a mile S.E. of the village of that name; thána Gaurjhamar, tahsil Rehli, district Saugor. On the hill top, adjacent to the Trigonometrical Station, is a reservoir of water, known as Nilkanth Maháráj's tank, which is resorted to by pilgrims immediately after the setting in of the rains. The station consists of a solid pillar 2 feet high, having two marks.

[The Latitude pillar is 2010 feet west of the Trigonometrical Station. The azimuth of pillar from Trigonometrical Station measured from north by west is 89° 58′ 35″. The Náharmau hill lies slightly to N.E., while to N.N.W. and W. there are extensive low lying tracts. To S.E. and S. is broken hilly country. No large masses are involved and the existence of more than a very small local attraction to south is not to be expected.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	23° 30′ 18″·14
Reduction to Astronomical Station	=	+ 0 ·01
Geodetic Latitude of the Astronomical Station	=	23 30 18 ·15

198. Niálamari Hill Station (No. II of the Madras Meridional and Coast Series, volume XIII of the *Account of the Operations &c.*) is situated in the lands of the village of Malkapuram, táluk Nalgŏnda, Nizam's territories. The azimuths and distances of the circumjacent villages are:—Niálamari 251° 57′, miles 2·45; Chidalla 27° 34′, miles 3·57; Malkapuram 277° 1′, miles 1·97; and Súrayapet 136° 25′, miles 9·8. The station consists of a platform enclosing a solid, circular and isolated pillar of masonry in which are two marks, one engraved on the rock *in sitú* and the other 2 feet above it on a stone imbedded flush with the upper surface of the pillar.

[The Latitude pillar is built on the Trigonometrical Station. The hill on which the station stands is very steep, about 500 feet high and may be best described as one vast granite rock. There is a small hill due north about ½ mile off and two others N. by W. distant 1¼ and 2 miles respectively and a considerable mass of hills N.N.W. distant 3 miles. There is a small hill due south distant 2 miles. All these hills are bare rocks. There is probably a small amount of northern local attraction.—J.E.]

Geodetic Latitude of the Astronomical Station = 17° 1′ 33″·63

199. Nitali Hill Station (No. X of the Bombay Longitudinal Series, volume XII of the *Account of the Operations &c.*) is situated in the lands of the village of Nitali, district Naldurg, Nizam's territories. It lies on a hillock, 1½ miles N.N.W. of Nitali, and 4⅓ miles W. of Andúra village. The directions and distances of the circumjacent villages are:—Koand N.E., miles 2; Sumb W. by N., miles 1¾; Javoti S.W. by W., miles 2⅔; and Bála E.N.E., miles 4¼. The station consists of a perforated pillar of masonry, having two marks, one at the bottom and the other at its upper surface.

[The Latitude Station is coincident with the Trigonometrical Station. It is situated on a low stony hillock in the midst of a large and slightly undulating plain. No hill of any importance is in sight so that there is no reason to suspect any deviation of the plumb-line.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 18° 17′ 7″·16

200. Ongole Hill Station (No. XVIII of the Madras Meridional and Coast Series, volume XIII of the *Account of the Operations &c.*) is situated in the lands of the town of Ongole, táluk Ongole, district Nellore. It is on a low hill about 200 feet in height, lying immediately W.S.W. of the táluk town of Ongole, and ¾ of a mile W. of the road from Nellore to Ongole. The directions and distances of the circumjacent villages are:—Anavaripud E.S.E., mile 1; Perana Mitta N.W., miles 3½; Mámidipálĕm S.S.W., mile ½; and Guddalaguntapálĕm N.W., mile ½. The station consists of a platform

enclosing a solid, circular and isolated pillar of masonry $3\frac{1}{3}$ feet in diameter in which are two marks, one engraved on the rock *in sitû* and the other 2 feet above it on a stone imbedded flush with the upper surface of the pillar.

[The Astronomical Station is coincident with the Trigonometrical Station and situated on the top of the northern of two small hills which lie to the south-west of the large town of Ongole and about half a mile from it. Owing to the presence of this hill to the south, the station is not a very good one, and it would have been preferable to select a station in the prime vertical, but no suitable spot could be found and so the old station was adhered to. The hill is about 300 feet higher than the surrounding country which is very flat. It is very rocky and is difficult to pitch tents on. Ongole is a large native town through which the main road to Hyderabad passes.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 15° 29′ 56″·85

201. Oria Hill Station is situated on a small plateau; it is 200 yards S.W. of the Rest-house, and 1 mile S.S.W. of Gúru Sikkar Hill Station (No. XLII of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*)

[The position of Oria h.s. was fixed by secondary triangulation, specially executed for the purpose. The original intention of the observer was to observe from Gúru Sikkar, but a landslip had destroyed the path, and it was not possible without great expense to take the heavy Zenith Sector to the peak. It is intended in the future to observe with the Zenith Telescope at several stations situated on a section through Mount Abu: of these stations Gúru Sikkar and Oria will form two. The Latitude Station was originally misnamed Gúru Sikkar, but in view of its great distance from the Principal Station of that name, and of the prospect of latitude observations being taken in the near future at Gúru Sikkar itself, it has been considered advisable to rename it Oria.—S.G.B.]

Gúru Sikkar Hill Station is situated on the highest pinnacle of Mount Abu, in the territories of the Ráo of Sirohi, in Rajputana. The small rock temple of Gúru Sikkar, a resort of pilgrims from all parts of India, adjoins the station platform towards the S.W. The station consists of a solid pillar of masonry having a mark-stone at its upper surface and another engraved on the rock *in situ*.

Geodetic Latitude of the Astronomical Station at Oria = 24° 37′ 50″·96

202. Parampúdi Hill Station (No. LX of the Madras Meridional and Coast Series, volume XIII of the *Account of the Operations &c.*) is situated in the lands of the village of Parampúdi, táluk Yérnagúdĕm, district Godávari. It is on a low hill about 4 miles W. by N. of the large village of Ganapavaram, the same distance E. of Jelugumilli, and 5 miles N. of the large village of Taduvayi. The directions and distances of the circumjacent villages are:—Rámanapálém W.S.W., miles $2\frac{3}{4}$; Vírachĕttigúdĕm S.W. by W., miles $1\frac{3}{4}$; Ganganagúdĕm S.E. by S., miles $2\frac{1}{4}$; Rantugúdĕm E. by S., miles $2\frac{1}{4}$; and Narnapuram N.E. by N., miles $1\frac{1}{2}$. The station consists of a platform of stones and earth enclosing a solid, circular, and isolated pillar of masonry in which are two marks, one engraved on the rock *in sitû* and the other $2\frac{1}{2}$ feet above it on a stone imbedded flush with the upper surface of the pillar.

[The Astronomical Station is identical with the Trigonometrical Station. This is situated at the highest point of a small rising ground of insignificant height. There is nothing to lead to the anticipation of any deviation of the plumb-line.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 17° 12′ 38″·28

203. Patháídi Tower Station (No. XIX of the Biláspur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated on rising ground 0·17 mile E.N.E. of the deserted village of Patháídi, pargana Ratanpur, district Biláspur of the Central Provinces. The azimuths and distances of the following villages are:—Keonthara 170° 10′, miles 1·70; and Kári 207° 10′, miles 1·88. The station consists of a perforated pillar of masonry 25·13 feet high, having a mark-stone in the ground floor and another 2 feet below.

[Patháídi is a tower station; the masonry core was found intact, but the outer mud masonry has long since collapsed into a shapeless mound which envelopes the tower for half its height. There was no cause to expect any local attraction. The Latitude pillar was erected 318·5 feet to the west of the Trigonometrical Station and was found to be 1·5 feet south of its proper position in the prime vertical.—E.A.T.]

Geodetic Latitude of the Trigonometrical Station =	21°	48′	45″	·97
Reduction to Astronomical Station =			- 0	·01
Geodetic Latitude of the Astronomical Station =	21	48	45	·96

204. Patna Tower Station (No. XV of the East Coast Series, volume VI of the *Account of the Operations &c.*) is situated on the left bank of the Subarnarekha river at the northern extremity of the village of Patna in pargana Jellasore, district Balasore. The Baptist Mission Chapel is 100 yards south-west of the station. The azimuths and perambulated distances of the circumjacent villages

are:—Súkdúkhia 123° 28′, mile 0·908; Bhelbaria 172° 24′, mile 0·432; Chakharia 209° 41′, mile 0·762; Bagawâli 257° 55′, mile 0·566 and Balampur 357° 7′, mile 0·464. The tower is solid, 36·50 feet high, and has a central pillar of masonry, isolated from the ground level upwards, in which the mark-stones have been placed.

[The station is by the road about 1¼ miles from Jellasore Railway Station; 50 yards to the north of it flows the Subarnarekha river, flowing at this point roughly from E. to W. The kachcha portion of the tower is in ruins, but the paka core appears intact, and the upper mark-stone uninjured. The Latitude pillar is 40 feet 9 inches due west of the Trigonometrical Station. There are no hills in the vicinity to cause local attraction; the effect of the channel of the Subarnarekha, which is here some 400 yards broad with its bed 20 feet to 30 feet lower than the surrounding country, would probably be nearly balanced by the fact that the country is falling imperceptibly to the south. No local attraction should be anticipated accordingly. The sea is nearly 20 miles distant in a S.S.E. direction—E.A.T.]

Geodetic Latitude of the Astronomical Station = 21° 47′ 20″·83

205. Phallut Hill Station (a secondary station of the North-East Longitudinal Series) is situated on the watershed boundary between British Sikkim and Nepal; Pillar No. 1 of the series of pillars defining the said boundary is about 30 feet to the north of the station. This boundary pillar is the tri-junction point of British Sikkim, Independent Sikkim and Nepal. The Traveller's Bungalow lies S.E. of the station at a distance of about 1150 feet measured horizontally. The frontier road terminates about 60 feet north of the station.

[The Trigonometrical mark had been destroyed and all traces of the pillar removed. The description given of the station says that it was "about 30 feet" south of Boundary Pillar No. 1 of the Sikkim-Nepal Boundary. The highest point on the hill is this distance south of the Boundary Pillar, and as the ridge here is very sharp and runs roughly S.E. to N.W., there is little doubt as to where the station originally was; on this spot was found the usual Bhutia cairn and prayer flags. The position of this reclaimed point cannot be more than 1 foot north or south of the original mark. The Astronomical Station is 97·8 feet south and 88·3 feet east of the assumed point. The azimuth and distance of Boundary Pillar No. 1 from the Astronomical Station are 144° 0′ (from S. by W.) and 160·6 feet respectively.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	27° 12′ 41″·83
Reduction to Astronomical Station	=	− 0 ·97
Geodetic Latitude of the Astronomical Station	=	27 12 40 ·86

206. Pirmulo Hill Station (No. V of the Bider Longitudinal Series, volume VI of the *Account of the Operations &c.*) is situated on a rock 10 feet high on a hill within the lands of the village of Wadapaili, pargana Tupren, Zilla Medak of the Nizam's territories. A road from Wadapaili village leads to the station. The bearings and estimated distances of the circumjacent villages are:—Wadapaili W.S.W., miles 1·3; Rámarám N. by W., miles 2; Girpaili E.S.E., miles 2·3. The station consists of a solid pillar having two marks, the upper 1·13 feet above the lower, which was found deeply engraved on the rock *in sitû* and adopted for the station.

[The Trigonometrical Station of this name being unsuitable for the observations, a new station was selected to the east. The azimuth of this station from the original one is 270° 32′ 56″ and the horizontal distance between the two 1460·5 feet. Hence the Astronomical Station is 13·99 feet south of the Trigonometrical Station. There is a small hill to the north, the highest point being about 350 yards distant and 150 feet above it. The mass of the hill is small but being so close may have some slight effect on the plumb-line.—G.P.L.C.]

Geodetic Latitude of the Trigonometrical Station	=	17° 53′ 2″·95
Reduction to Astronomical Station	=	− 0 ·14
Geodetic Latitude of the Astronomical Station	=	17 53 2 ·81

207. Prome Longitude Station (*vide* volume X of the *Account of the Operations &c.*) is 105·3 feet due east of Prome Club s., and about 120 feet south-east of the Prome Club and Reading Room.

[The Latitude Station is 71 feet 2 inches north and 2 feet east of the Longitude Station. The old Reading Room appears to have been moved to make way for the buildings of the Pumping Station. Prome Club s. is described as being 120 feet south-east of the Prome Reading Room. The present Club and Reading Room lies midway between the Longitude and Club Stations, which are no longer intervisible. The Longitude Station is marked by a marble slab in the surface of the concrete tennis court of the Club. The Club Station is in good condition.—H.M.C.]

Geodetic Latitude of the Longitude Station	=	18° 49′ 13″·47
Reduction to Latitude Station	=	+ 0 ·71
Geodetic Latitude of the Latitude Station	=	18 49 14 ·18

Note.—It will be found that the Geodetic Latitude of the Longitude Station as given in Volume X is 1″·65 in excess of the value adopted here. The Series of Triangulation following the Burma Coast emanates from the side Gojalia, XLIX—Tulamura, L of the Eastern Frontier Series. The values of the length and azimuth of this side were adjusted in the simultaneous reduction of the North-East Quadrilateral and this adjustment has necessitated a recalculation of the triangulation in Burma.

208. Quetta Telegraph Office Station is a station of the Quetta Secondary Series which emanates from the Great Indus Series. It is situated in the compound of the house occupied by the Deputy Superintendent of Telegraphs, Quetta Division, and lies between the house and an out-office east of the house. It is 58·33 feet from the S.E. corner of the house, and 66·5 feet from the south corner of the out-office. The station consists of a platform enclosing a circular, isolated pillar of masonry having a wooden peg in its centre with two lines cut on it.

[The Latitude Station is coincident with the Quetta Telegraph Office Station, which is 22·25 feet west and 8·08 feet north of the Quetta Longitude Station (*vide* volume XV of the *Account of the Operations &c.*)]

Geodetic Latitude of the Latitude Station = 30° 11′ 57″·37

209. Rájpur Latitude Station is situated about the centre of the small level field immediately to the east of the ruined bungalow known as Seal's Kothi which stands just to the east of the upper end of the Rájpur Bazar. It consists of a circular masonry pillar 3 feet in diameter and 2 feet 6 inches in height, its upper surface level with the ground.

[The Latitude Station was connected by secondary triangulation with Kulhán s. and Rájpur h s, secondary stations of the North-East Longitudinal and Great Arc Meridional Series, Section 24°-30°, respectively. For the purposes of triangulation a point was selected 16 feet south and 9 inches west of the centre of the Latitude pillar.—G.P.L.C.]

Geodetic Latitude of the Trigonometrical Station	=	30° 23′ 56″·67
Reduction to the Latitude Station	=	+ 0 ·16
Geodetic Latitude of the Latitude Station	=	30 23 56 ·83

210. Rájuli (or Károba-ka-Dúngar) Hill Station (No. XXX of the Jabalpur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated in the lands of the village of Balárpur, tahsil Múl, district Chánda. The station consists of a solid pillar of masonry 9 feet high, having at least two mark-stones, the distance between which is not known.

[The Astronomical Station was built over the mark-stone of the Trigonometrical Station. It is situated on the highest part of a small hill, 400 feet high. To the immediate north are two more similar hills but not so large, the three together forming one small range 2 miles in length. The horizon from west to south-west is broken by a small cluster of low hills, 7 or 8 miles distant: with the exception of these and a few detached hillocks 100 to 200 feet high scattered about to the north, the entire field of view is one unbroken plain, studded in every direction with tanks The Astronomical Station is slightly north of the centre of gravity of the Rájuli Hill itself. The surrounding hillocks are so small and low, that their effect on the plumb-line must be inappreciable: the ground however has a very constant fall from north to south. This station should be a suitable one for Latitude observations, and the amount of local attraction is insignificant.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 20° 12′ 55″·45

211. Ramai Hill Station (No. XXXIII of the Bilàspur Meridional Series, volume VI of the *Account of the Operations &c.*) is situated in the lands of the village of Ameti; zamíndári Fingeshwar, district Ráipur of the Central Provinces. It stands on a small detached flat hill, situated in the midst of a low densely wooded mass of hills, lying north and south, overlooking the plains to the west called the Ramai-Pát. The azimuths and estimated distances of the circumjacent villages are:—Sorid 10° 41′, miles 1·5; Nawápára 310° 56′, miles 1·75; and Ameti 323° 26′, miles 1·5. The station consists of a solid pillar of masonry having two marks, the upper 4·00 feet above the lower which is engraved on the rock *in situ*.

[Ramai Hill Station is on the southern end of a steep flat-topped hill rising to a height of about 450 feet above the surrounding plain; there is no visible cause for a marked local attraction in any particular direction. The Astronomical Station is identical with the Trigonometrical Station.—E.A.T.]

Geodetic Latitude of the Astronomical Station = 20° 56′ 51″·47

212. Rámgír Hill Station (No. XIV of the Bider Longitudinal Series, volume VI of the *Account of the Operations &c.*) is situated in the jágír of Fakírán Múlk (son-in-law of the Nawáb Salár Jang) in the Hyderabad States, and has been built on the site of an old platform supposed to be Colonel Lambton's "Ramgeer". It is in the middle of a flat-topped conspicuous range with very precipitous approaches. From about half a mile to the east of the station the hill is extensively

fortified and the works are on a most stupendous scale. The village of Rámgír lies about 5 miles E. The station consists of a solid pillar of masonry 8·25 feet high, having at least two marks, the distance between which is not known.

[The Latitude pillar is built on the Trigonometrical Station, situated on the plateau on which the ruins of the fort of Rámgír stand. The particular part of the plateau on which the station is built runs N.W. and S.E. and there is apparently as much to the north as to the south. To the north there are no hills of any description; but to the south as far as the eye can reach, some 50 miles, there is a succession of hills and hillocks of all descriptions dotted about. There is probably some southern local attraction.—J.E.]

Geodetic Latitude of the Astronomical Station = 18° 35′ 26″·12

213. Ranjítgarh Tower Station (No. XCV of the Gurhagarh Meridional Series, volume IV of the *Account of the Operations &c.*) is built in the old fort of that name, close to the road from Siálkot to Chaprár and Jummoo, and distant about 7 miles from station of Siálkot; zilla, pargana and thána of Siálkot. The pillar is perforated and 20·5 feet high. It has a mark-stone at the ground floor.

[The Astronomical Station is 299½ feet west and 1·48 feet north of the Trigonometrical Station. The latter is situated on a mound, which forms part of the old fort of Ranjítgarh, ⅙th of a mile E.N.E. of the village of Khampur. This village is 7 miles from Siálkot on the Jummoo Chaprár road. A large northerly deflection of the plumb-line, perhaps 10″, might be expected due to the Himalayan masses some 40 miles to the N.—H.M.C.]

Geodetic Latitude of the Trigonometrical Station	=	32° 35′ 12″·10
Reduction to Astronomical Station	=	+ 0 ·01
Geodetic Latitude of the Astronomical Station	=	32 35 12 ·11

214. Ráwal Hill Station (No. LIX of the East Coast Series, volume VI of the *Account of the Operations &c.*) is situated on a low hill about 1 mile S.W. of the large village of Gángara in thána Pálkonda, táluk Párvatípur, district Vizagapatam. The nearest villages are Sítádípuram at the northern base of the hill and Ráwálsa at the southern base. The station consists of a solid pillar having two marks, the upper 1·75 feet above the lower which is engraved on the rock *in sitú*.

[The Astronomical Station is on a group of hills running E. and W. It is at a height of 600 feet above the surrounding plain (this was measured with 6″ theodolite from a 10 chain base). The local attractions of the range of hills on which the pillar stands would appear to cancel, but this is a difficult thing to estimate. There are hills all round except to the E. and S.E. The masses of the Eastern Gháts lying 30 miles W. and 40 miles N. should exert a W.N.W. attraction, but there is a considerable mass of hills 15 miles N.E., and a few small hills to the S., 8 miles distant. On the whole a probable attraction of 6″ N. should be considered. The Astronomical Station coincides with the Trigonometrical Station.—E.A.T.]

Geodetic Latitude of the Astronomical Station = 18° 32′ 9″·22

215. Rojhra Hill Station (No. LXXV of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) was situated on a sand-hill in that part of the Thar, or Little-desert, appertaining to Bhúj. The village of Pariára is distant about 3½ miles to the N.N.W.

[The Latitude pillar is 28 feet due east of the remains of the Trigonometrical Station of the same name. The latter had disappeared entirely in 1900 and it was only by digging extensively that the remains of the foundations were found 4 feet below the surface. The centre of these foundations was adopted as the Trigonometrical Station.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 24° 57′ 26″·28

216. Salímpur Tower Station (No. XXVI of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated on the crest of a mound (about 20 feet in height) distant 600 yards west of the small village of Salímpur: thána and tahsil Kásganj, pargana Bilrám, district Etah. The distances and directions of the surrounding villages are:—Badampur 0·9 mile, E.S.E.; Naráinpur 0·5 mile, S.; Kutubpur 1·2 miles, N.W.; and Dharampur 1·3 miles, N.E. by N. The station consists of a tower of sun-dried bricks and mud cement, 48 feet high and 13 feet square at top, having a central hollow core of burnt bricks; it has a mark-stone at 1 foot below the ground floor.

[The Latitude pillar was situated 1222 feet west of the Trigonometrical Station. The azimuth of the latter from the former was 270° 0′ 20″, so that the latitudes of the two points may be considered identical.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 27° 46′ 36″·46

217. Samdari Hill Station (No. VII of the Jodhpore Meridional Series, volume IVA of the *Account of the Operations &c.*) is situated on a small isolated, irregularly shaped hill locally named Mátalalasi, on the north bank of the river Lúni and close to the large village of Samdari, in táluk Siwána of the Jodhpur territories. The azimuths and distances of the circumjacent villages are:—Devalihari

66°, miles 1·7; Mokrundi 180°, miles 2·25; Deopura 213°, miles 2·1; and Kamáwas 335°, miles 2·6. The pillar, which is surrounded by a platform, is solid and contains three marks, one in the foundation, 2 feet below the ground, another flush with the hill top and the third on the surface of the pillar; the difference of heights between the upper and lower marks is 3·13 feet.

[The Astronomical Station is built on the prime vertical of the Trigonometrical Station, and about 600 yards west of the latter. The southern horizon is broken by a rocky range, but this is not sufficiently large to affect the plumb-line at Samdari sensibly. The nearest range is south-west rather than south Due south is a hill some 20 miles distant, and to the S.E. are a few scattered hills. The northern horizon is free from hills. There is thus no apparent cause for any appreciable deflection of the plumb-line.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 25° 48′ 59″·55

218. Sánjib Hill Station (No. XLI of the Bider Longitudinal Series, volume VI of the *Account of the Operations &c.*) is situated in the estate of the Rája of Uratla, táluk Golgonda, district Vizagapatam. It is on the summit of a high and conspicuous hill so named, the most elevated of the group or range running parallel with the coast, of which it forms a part. The sea is about 10 miles from the station. The large village of Uratla, the residence of the Rája, lies about 3 miles N. and Gotiára, near which the ascent commences, is 2 miles E.N.E. The station consists of a solid pillar, having two marks, the upper 1·50 feet above the lower.

[The Astronomical Station is identical with the Trigonometrical Station. This is situated at the top of a lofty hill 2000 feet from base to summit. This hill is one of the highest points of the range which runs nearly N.E and S.W. parallel to the coast. As there are large masses of hills on all sides except the west it is impossible to say what the resultant effect on the plumb-line is likely to be —G P L.C]

Geodetic Latitude of the Astronomical Station = 17° 31′ 18″·68

219. Sankráo Tower Station (No. XXVIII of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated on the site of an old fort on a high spur of the bank which bounds the southern edge of the *Khádar* or low lands of the Ganges, and stands close to the west side of the village of Sankráo which is less than half a mile from the south bank of the old bed of that river; tahsil Atrauli, pargana Gangíri, district Aligarh. The distances and directions of the surrounding villages are:—Rustamnala 1·1 miles, W. by N.; Mohkampur 1·2 miles, S.S.E.; and Síkri 1·1 miles, E. by S. The station consists of a tower of burnt bricks and mud cement, 37·3 feet high and 14 feet in diameter at top, having a central hollow core of masonry; it has a mark-stone at 1 foot below the ground floor.

[The Latitude pillar was situated 1245 feet west of the Trigonometrical Station. The azimuth of the latter from the former was 270° 2′ 15″, so that the Latitude pillar was 0·82 foot north of the prime vertical of the Trigonometrical Station.—G.P.L.C.]

Geodetic Latitude of the Trigonometrical Station	=	28° 2′ 28″·99
Reduction to Astronomical Station	=	+ 0 ·01
Geodetic Latitude of the Astronomical Station	=	28 2 29 ·00

220. Sarey Khan Latitude Station is situated ¾ mile S.W. of Sarandi Pat Hill Station (No. XI of the Jabalpur Meridional Series, volume VI of the *Account of the Operations &c.*) and near the village of Sarey Khan, thána Gour-Jhola, tahsil and district Seoni. The village of Sarandi Pat lies about 1½ miles N.N.E. and that of Chilki about 1 mile north. The station consists of a brick pillar, having two marks Its position was fixed by secondary triangulation specially executed for the purpose.

[This Astronomical Station was formerly called Sarandi Pat, but as it is situated some distance from the Trigonometrical Station of that name it has been considered advisable to rename it Sarey Khan. The Astronomical Station is identical with the Trigonometrical Station of the special secondary triangulation —S G.B.]

Geodetic Latitude of the Astronomical Station = 22° 12′ 55″·61

221. Sarkára Tower Station (No. XLV of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated close to the high road from Hardwár to Moradabad, and distant about 0·6 mile S.S.E. of the village of Sarkára, tahsil Dhámpur, pargana Sherkot, district Bijnor. The distances and directions of the surrounding villages are:—Rajmul 0·3 mile, S.S.E.; Nasírpur Bhunwari 1·3 miles, W.S.W.; and Salímpur Sarai 0·8 mile, S. by W. The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 16·3 feet high; it has a mark-stone at summit.

[The Latitude pillar was situated 1702 feet east of the Trigonometrical Station on an azimuth of 270° 1′ 33″, it is therefore 0·77 foot south of the latter.—G.P.L.C.]

Geodetic Latitude of the Trigonometrical Station	=	29° 15′ 46″·92
Reduction to Astronomical Station	=	− 0 ·01
Geodetic Latitude of the Astronomical Station	=	29 15 46 ·91

222. Saugor Hill Station (No. V of the Calcutta Longitudinal Series, volume VI of the *Account of the Operations &c.*) is situated on the Bhunria hill about half a mile due east of Saugor jail and immediately above the old mint. The station consists of a solid pillar 2 feet high, having two marks.

[The Latitude pillar is 39·5 feet due east of the Trigonometrical Station. Immediately to the north and west extends the hollow in which Saugor lies, some 600 feet below the general level of the tops of the surrounding hills. To the south and east runs the ridge which contains the flat-topped hill. This ridge extends for about 1 mile eastwards before the mass merges gradually in the plain, and for some 2½ miles southwards. The country in the immediate neighbourhood would lead one to expect a small southerly deflection of the plumb-line not exceeding 0″·5.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 23° 49′ 48″·07

223. Senchal Hill Station (a secondary station of the North-East Longitudinal Series) is situated about 7 miles south of Darjeeling, and about ¾ of a mile S.E. of Majling-jong (Tiger Hill), west of and below which is the old cantonment of Senchal. The approach to the station is from Jor-Bungalow, whence a road has been cut to Tiger Hill, and from the latter a pathway is followed to the station. The station is identical with Sir A. S. Waugh's point pertaining to the North-East Longitudinal Series. It consists of a paka pillar 3 feet in diameter, surrounded by a platform of stones 4 feet high.

[The Latitude observations were taken from the Trigonometrical Station. The station is situated well over the centre of the hill; ¾ of a mile to the north is Tiger Hill, the mass of which is balanced to a great extent by other masses to the south. Beyond and north of Tiger Hill the ground falls rapidly to the Rangit valley. This deficiency of mass is balanced by the fall to the plains on the south of the station. Considering only the masses within 10 miles radius of the station, there should be only a very small deflection of the plumb-line, perhaps as much as 1″ and that to the south. The deflection in the prime vertical should be small and to the east.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 26° 59′ 8″·25

224. Siliguri Station (a secondary station of the North-East Longitudinal Series) is situated to the west of the Caragola-Darjeeling road and at the angle where it branches off to Pankhabari.

[The Astronomical Station consists of an isolated circular masonry pillar 3 feet in diameter and whose top is flush with the ground surface. It is 147 feet due east of Siliguri Trigonometrical Station. The Trigonometrical pillar was not found in very good condition and was therefore carefully rebuilt.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 26° 41′ 40″·37

225. Singáwáram Hill Station (No. XXIII of the Bider Longitudinal Series, volume VI of the *Account of the Operations &c.*) is on an isolated hill about 1 mile N.E. of the village of Gattúgúram, within the lands of which it is situated, táluk Bhadráchalam, district Upper Godávari of the Central Provinces. A road to the station was made from the village of Gattúgúram. The directions and distances of the circumjacent villages are:—Bhándargúram W., miles 1·5; Singáwáram N., miles 2; and Bhadráchalam (city) S.W. by S., miles 6·9. The station consists of a solid pillar, having two marks, the upper 3·88 feet above the lower which is engraved on a stone built into the foundation.

[The Astronomical Station is identical with the Trigonometrical Station. This is situated on an isolated hill of considerable height, about 500 feet. The station is considerably to the north of the centre of the hill, which is likely therefore to cause some deviation to the south in the plumb-line. In other respects there is no cause to anticipate any disturbing influences.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 17° 45′ 10″·38

226. Sironj Base-line N.E. End Station [No. (II) of the Great Arc Meridional Series, Section 24° to 30°, volume IV of the *Account of the Operations &c.*] is situated in the lands of the village of Rájpur, pargana Sironj of the territories of the Nawab of Tonk. The circumjacent villages, with their distances and directions, are:—Rájpur 0·7 mile, E.; Tal Barodia 1·5 miles, N.E.; Thanarpur Binchakeri 1·2 miles, E.S.E.; and Sialpur 1·7 miles, S. The station consists of a pillar of masonry 2 feet high, and 4 feet in diameter, having two mark-stones, one at its upper surface and the other at the bottom.

[The Latitude pillar was built in the prime vertical of the Trigonometrical Station and 50 feet west thereof. The centre of the pillar was within half an inch of the prime vertical. The station lies in the plain to the east of Kaliánpur and is 1,481 feet above mean sea-level. The plain is perfectly flat and the horizon almost unbroken except to the west where the edge of the plateau rises slightly above it.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 24° 8′ 53″·57

227. Sirsa Tower Station (No. XL of the Budhon Meridional Series, volume VII of the *Account of the Operations &c.*) is situated on a mound (about 15 feet in height) distant 600 yards north of the village of Sirsa; tahsil and pargana Amroha, district Moradabad. The distances and directions of the surrounding villages are:—Daryapur 0·7 mile, S.W. by W.; Mauye Chak 0·4 mile, N.E. by N.; Raghunáthpur 1 mile, S.E. by S.; and Háshampur 0·9 mile, N.W. The station consists of a tower of unburnt bricks and mud cement, 14 feet in diameter at top, enclosing a central solid pillar of masonry 26 feet high: it has a mark-stone at summit.

[The Latitude pillar was situated 2077 feet east of the Trigonometrical Station. The azimuth of the latter from the former was 90° 0′ 7″.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 28° 54′ 39″·64

228. Sítápár (or Garhi Húrki) Hill Station (No. XX of the Jabalpur Meridional Series, volume VI of the *Account of the Operations &c.*) is in the tahsil of Tirora and the district of Bhandára of the Central Provinces; it is situated on a hillock, 60 feet high, about half a mile E. by N. of the village of Chichárband. The hillock is 800 yards long, and the Trigonometrical Station is placed at its southern extremity, 400 yards from its centre of gravity.

[For fear that the inequality of matter to the immediate north and south might affect the direction of the plumb-line, the Astronomical Station was built 300 yards due west of the Trigonometrical Station, a site at which the small Sítápár mound could have no appreciable effect. A small northerly attraction should be expected at this station. The northern and eastern horizons are everywhere broken by the Bálághát range. The southern and western horizons are unbroken; but the whole field of view is studded with conical hills 400 feet high, a mile in circumference at their bases and from 5 to 8 miles apart; they should however exercise no appreciable effect on the observations.—S G B.]

Geodetic Latitude of the Astronomical Station = 21° 24′ 50″·54

229. Sonáda (Sanoda) Tower Station [No. XIX of the Gujarát (Guzerat) Longitudinal Series, volume XIV of the *Account of the Operations &c.*] is situated in the lands of the village of Sonáda, sub-division Dehgám, Baroda (Vadodra) State. It stands on rising ground covered with large trees, about a mile S.E. by E. of Sonáda village on the E. bank of the Khári river, and $4\frac{3}{4}$ miles S.W. of the town of Dehgám on the road from Ahmedabad to Modása. The directions and distances of the circum-jacent villages are:—Galudan N.W. by N., miles $1\frac{1}{4}$; Vadodra N. by W., miles $2\frac{2}{3}$; Rathoda Vásna E. by N., miles $2\frac{2}{3}$; Jalundra Mota S.E., miles $1\frac{1}{4}$; and Jhánk S.W. by S., miles 2. The station consists of a tower enclosing a solid pillar of masonry, having a mark-stone in its upper surface and others below at every 5 feet. Four small pillars, with marks thereon, are built around the tower, and the intersection of the lines joining these marks indicates the position of the upper mark on the central pillar.

[Sonáda Astronomical Station was built on the prime vertical of the Trigonometrical Station, about 100 yards west of the latter. It could not be made coincident with the Trigonometrical Station, because the latter is a high brick tower. The country is absolutely flat and no hills are to be seen. Owing to large numbers of big trees, one's view is however much circumscribed on all sides There is no apparent cause for a deflection of the plumb-line.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 23° 7′ 19″·89

230. St. Thomas's Mount Trestle Station (No. XLIV of the Madras Longitudinal Series, volume XIII of the *Account of the Operations &c.*) is situated in the táluk of Saidapet, district Chingleput. It is in the N.W. corner of the terrace of the Portuguese (Roman Catholic) Chapel of St. Thomas which stands on the well-known mount so called, distant 8 miles S.W. of Fort St. George, and 1·3 and 0·8 miles respectively W. by S. and N.W. of the Railway station of Guindy (Kandi) and St. Thomas's Mount. The station is 50 yards W. of the signal flag-staff and 19 yards N.W. of the N.W. corner of the chapel. The station consists of a large slab of stone $3\frac{1}{3}$ feet in diameter laid down flush with the ground level, on the upper surface of this stone in addition to the usual circle and dot, a broad arrow and the letters G.T.S. are also engraved.

[The Astronomical Station is coincident with the Trigonometrical Station, which is situated on the N.W. corner of the flat-topped hill, called St. Thomas's Mount. The mount is about 250 feet above the surrounding country; there are a few unimportant hills to the S.W., but as these are not less than 2 miles distant no deviation of the plumb-line is to be apprehended: possibly there may be some little attraction towards the south owing to the station not being centrally placed on the hill.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 13° 0′ 14″·79

231. Súrantál Hill Station [No. (III) of the Great Arc Meridional Series, volume IV of the *Account of the Operations &c.*] is situated in pargana Sironj of the territories of the Nawab of Tonk, and stands on the highest swell of an extensive range of flat hills running north and south. The circumjacent villages, with their distances and directions are:—Súrantál about 2 miles, N.N.E.; Bemakheri about $1\frac{1}{2}$ miles, S.W.; and Sareko about 2 miles, S.S.W. The station consists of a solid pillar, having the usual mark-stone at top.

[The Latitude pillar is situated 39 feet $11\frac{1}{2}$ inches east of the Trigonometrical Station on an azimuth of 269° 52′, so that the latitudes of the two may be considered identical. It is from a point very near this station that the edge of the Kaliánpur plateau bends towards the east.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 24° 14′ 20″·42

232. Telu Hill Station (No. LI of the Jodhpore Meridional Series, volume IVA of the *Account of the Operations &c.*) is situated in thána Maujgarh, pargana and state Baháwalpur. It is on a sand rise of ground hardly to be called a hill, about 6 miles N. of Bhiawala tank and 7·77 miles S.E. of Maujgarh town. There are two old mud towers near Telu from which the station takes its name, distant 0·55 of a mile at an azimuth of 86° 16′. Water is obtained from either Bhiawala or Maujgarh. The azimuth and distance of Gidarwala village are 180° 45,′ miles 2·37. The station consists of a solid pillar 5 feet high with 2·5 feet foundation, having three mark-stones, one at the bottom of the foundation, the second $2\frac{1}{2}$ feet above it flush with the hill top and the third 5 feet above the second at the surface of the pillar.

[The Astronomical Station was coincident with the Trigonometrical Station. It is situated in a perfectly flat sandy desert.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 28° 56′ 11″·34

233. Thob Hill Station (No. VIII of the Jodhpore Meridional Series, volume IVA of the *Account of the Operations &c.*) is situated on a low hill, about half a mile W. of the large village of Thob and 10 miles N. of Pachbudra village, in táluk Siwána of the Jodhpur territories. There is a well of fairly good water near the village. The azimuths and distances of the circumjacent villages are:—Havadhan Roáro 35°, miles 2·95; Thob 266°, mile 0·63; and Roáro 348°, miles 2·22. The station consists of a solid pillar, having two marks, one in the foundation, flush with the hill top and the other in the surface of the pillar which is 3 feet high.

[The Astronomical Station is coincident with the Trigonometrical Station. It is situated on the highest point of a hill of rock, rising 500 feet out of the plain. The southern horizon is broken by the Nagar Hills; peaks Bhadrajan and Kundol are visible. The northern horizon is unbroken. The whole country round is a flat desert plain. There is no apparent cause for deflection of plumb-line.—S.G.B.]

Geodetic Latitude of the Astronomical Station = 26° 3′ 5″·85

234. Tinsia Hill Station (No. III of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated in the Tonk territory on the western border of the Sironj district, half a mile S. of the small village of Tinsia, and 5 miles W.S.W. of Isarwás. The station consists of a solid pillar, having mark-stones at top and bottom. It was repaired in 1870 and mark-stones were inserted which are probably within 1 foot of the true positions.

[The Latitude pillar is 39 feet east of the new Trigonometrical Station and on the prime vertical of the latter. The station is surrounded by dense jungle, but is not far from a track which runs from Sironj to the valley of Parbatti.—G.P.L.C.]

Geodetic Latitude of the Astronomical Station = 24° 6′ 27″·97

235. Tonglu Hill Station (a secondary station of the North-East Longitudinal Series) is on a lofty mountain, situated on the boundary line between Sikkim and Nepal. At a distance it bears an aspect of a flat-topped cliff, but the summit is composed of three knobs or hillocks, whereof the north-western is the highest. There is a pond in the hollow between the centre and northern summits. Boundary pillar No. 17 stands 33 feet from the station in the direction of Kanchanjangha, and the travellers' bungalow is about 250 yards to the north-west. The station consists of a solid pillar containing a mark-stone and surrounded by a masonry platform.

[The Latitude observations were taken from the Trigonometrical Station. In the case of this station, on account of the distances of the masses, their enormous size and the absence of any experience in respect to stations so situated, it was impossible to form any opinion of the deflection of the plumb-line to be expected. The configuration of the ground in the immediate vicinity is not such as would lead one to suppose any appreciable local disturbance.—H.M.C.]

Geodetic Latitude of the Astronomical Station = 27° 1′ 53″·54

236. Vánákonda Hill Station (No. IX of the Bider Longitudinal Series, volume VI of the *Account of the Operations &c.*) is situated in táluk Warangal, sar-táluk Khamamet of the Nizam's territories. It is on a conspicuous hill surrounded by isolated hillocks distant from it about 6 miles. The azimuths and distances of the circumjacent villages are:—Mádápur 165° 47′, miles 1·13; Isnúr 231° 18′, miles 3·21; Darmápur 330° 21′, miles 1·58. The station consists of a solid pillar, having two marks, the upper 2·46 feet above the lower which is engraved on the rock *in sitú.*

[The Astronomical Station is identical with the Trigonometrical Station. This is situated on a high hill, about 700 feet above the surrounding country, there are a few similar isolated hills in the neighbourhood, but no deviation of the plumb-line is to be anticipated on their account. With regard to the position of the station with respect to the mass of the hill itself it is probable that the centre of attraction is somewhat south of it, but only slightly so, if at all, so that the situation may be regarded as favourable.—G.P L.C.]

Geodetic Latitude of the Astronomical Station	=	17°	36′	6″·87

237. Virária Hill Station (No. LXVII of the Karachi Longitudinal Series, volume III of the *Account of the Operations &c.*) is situated on a sand-hill in that portion of the Thar or Little-desert, which appertains to Bhúj. The large village of Jharpa is distant about 3 miles. The station consists of a solid pillar, having three mark-stones.

[The Astronomical Station is 1896 feet west and 11·95 feet south of the Trigonometrical Station of the same name. The country is rugged in appearance—the sand-hills being very steep and water-worn. In general the height of these hills from trough to crest is from 150 to 300 feet. The top of the Trigonometrical Station was found to have been destroyed but the rest was in good condition. The Trigonometrical pillar was found with difficulty as it had been covered by drifting sand to a depth of about 2 feet.—H.M C.]

Geodetic Latitude of the Trigonometrical Station	=	24°	56′	36″·25
Reduction to Astronomical Station	=		−	0 ·12
Geodetic Latitude of the Astronomical Station	=	24	56	36 ·13

238. Vizagapatam Base-line North End Station (No. LXVIII of the East Coast Series, volume VI of the *Account of the Operations &c.*) is situated in the Srungarapúkota táluk of Vizagapatam district, about 1000 yards S.S.E. of the village of Rámbhadrápuram-Agraharam, and about 3 miles west of Alamanda Railway station. The station consists of a solid pillar of masonry, having 3 circular mark-stones, 38 inches in diameter by 6 inches thick, the lowermost resting about 2 feet from the bottom and the two others in order vertically at intervals of 3 inches apart. Above the ground level there is a platform of cut-stone masonry, 8 feet square and 1 foot high, reaching to the edge of the annulus, there is also a fourth mark-stone resting over the others and separated from the nearest by a 6-inch layer of masonry. A pyramidal stone cap about 20 inches square by 15 inches high hollowed out at the base, protects the uppermost mark and a cut-stone masonry dome rises to the height of about 12 feet over the station.

[The Astronomical Station is 137 feet 7 inches to the east of the Trigonometrical Station; it is 0° 46 out of the prime vertical; *i.e.* it is 1·84 feet north of its proper position. The surrounding country has very gradual undulations and the Trigonometrical Station is on the highest point in the vicinity. The sea-coast runs in a N E -S W. direction and its nearest point is 17 miles S.W. of the station. The Eastern Gháts run roughly parallel to the sea-coast, and are at their nearest point 15 miles N.E. of the station. Peaks in the vicinity are 3000 to 4000 feet high; these hills probably exert an N.E. attraction but this would be counteracted by a mass of low hills S.E. and S. of the station. The resultant attraction should be very small.—E.A.T.]

Geodetic Latitude of the Trigonometrical Station	=	18°	1′	2″·91
Reduction to Astronomical Station	=		+	0 ·02
Geodetic Latitude of the Astronomical Station	=	18	1	2 ·93

239. Waltair Longitude Station (*vide* volume XV of the *Account of the Operations &c.*) is situated in the enclosure of Narsing Rao's house, and lies 95·50 feet east, and 44·25 feet south of the western end of the gable of the house.

[The Latitude Station is identical with the Longitude Station. The presence of the Demru-Simachilum range to the north makes a deviation of the plumb-line in this direction probable. In other respects the situation is favourable.—G.P.L.C.]

Geodetic Latitude of the Latitude Station	=	17°	43′	29″·31

ASTRONOMICAL LATITUDES.

ABSTRACTS AND SUMMARIES OF OBSERVATIONS AND RESULTS.

112.* Achola—*Co-latitude* 71° 45′ +

Latitude	... 18° 15′	*Instrument*—Zenith Telescope	
Longitude	... 77 2	*Mean Height of Barometer*	in 27·90
Height	... 2274 feet	*Mean Temperature*	73°·1

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half Observed Difference of Zenith Distance	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	930 & 953 Gr. 80	Feb. 28	7 59	E, W	72 8 54·43	− 23 40·51	13·9	13·9	0·7	1·2	1·01
2	962 & 995 Gr. 80 " " "	Feb. 28 Mar. 1	1 54	W, E E, W	71 37 20·67 20·67	+ 7 54·06 54·95	14·7 15·6	15·1	1·0	0·0	0·00
3	1021 & 1037 Gr. 80 " " "	Feb. 28 Mar. 1	3 49	E, W W, E	71 24 32·07 32·07	+ 20 43·34 42·97	15·4 15·0	15·2	1·0	0·1	0·01
4	1043 & 1053 Gr. 80 " " "	Feb. 28 Mar. 1	4 27	W, E E, W	71 19 0·91 0·90	+ 26 14·53 14·23	15·4 15·1	15·2	1·0	0·1	0·01
5	604 Gr. 72 & 1070 Gr. 80 " " " "	Feb. 28 Mar. 1	5 22	E, W W, E	72 2 51·85 51·84	− 17 37·37 38·27	14·5 13·6	14·0	1·0	1·1	1·21
6	1104 & 1139 Gr. 80 " " "	Feb. 28 Mar. 1	1 54	W, E E, W	71 36 48·53 48·51	+ 8 26·49 25·95	15·0 14·5	14·7	1·0	0·4	0·16
7	1161 & 1173 Gr. 80 " " "	Feb. 28 Mar. 1	10 28	W, E E, W	71 22 58·29 58·28	+ 22 17·08 16·36	15·4 14·6	15·0	1·0	0·1	0·01
8	1175 Gr. 80 & 664 Gr. 72 " " " "	Feb. 28 Mar. 1	15 47	E, W W, E	71 41 20·62 20·60	+ 3 53·15 54·64	13·8 15·2	14·5	1·0	0·6	0·36
9	1184 & 1208 Gr. 80 " " "	Feb. 28 Mar. 1	4 45	W, E E, W	71 56 35·53 35·51	− 11 20·10 20·91	15·4 14·6	15·0	1·0	0·1	0·01
10	1218 Gr. 80 & 716 Gr. 72	Mar. 1	2 17	W, E	71 37 31·08	+ 7 43·85	14·9	14·9	0·7	0·2	0·03
11	1265 & 1272 Gr. 80 " " "	Feb. 28 Mar. 1	6 41	W, E E, W	71 25 53·33 53·30	+ 19 20·80 21·41	14·1 14·7	14·4	1·0	0·7	0·49
12	1285 & 1289 Gr. 80 " " "	Feb. 28 Mar. 1	9 30	E, W W, E	71 21 34·81 34·79	+ 23 40·67 40·19	15·5 15·0	15·2	1·0	0·1	0·01
13	937 Gr. 64 & 1309 Gr. 80 " " " "	Feb. 28 Mar. 1	16 21	W, E E, W	71 30 48·04 48·02	+ 14 26·38 27·18	14·4 15·2	14·8	1·0	0·3	0·09
14	1311 & 1327 Gr. 80 " " "	Feb. 28 Mar. 1	0 26	E, W W, E	71 39 16·30 16·28	+ 5 58·91 57·59	15·2 13·9	14·5	1·0	0·6	0·36
15	1349 & 1368 Gr. 80 " " "	Feb. 28 Mar. 1	1 43	W, E E, W	71 32 28·17 28·14	+ 12 47·89 47·61	16·1 15·7	15·9	1·0	0·8	0·64

* Stations from 1 to 111 will be found in Vol. XI of the *Account of the Operations &c.*

112. Achola—*Co-latitude* 71° 45′ +

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
16	1383 Gr. 80 & 801 Gr. 72	Feb. 28	3 47	E, W	71 53 29 36	− 8 13 57	15 8	15 8	0·7	0·7	0·34
17	1402 & 1405 Gr. 80	Feb. 28	9 2	W, E	71 27 35·27	+ 17 40 10	15·4				
	,, ,, ,,	Mar. 1		E, W	35·24	41 05	16 3	15 8	1·0	0·7	0 49
18	1411 & 1413 Gr. 80	Mar. 1	0 39	W, E	71 57 45 20	− 12 28 78	16·4	16·4	0·7	1·3	1·18
19	1416 & 1419 Gr. 80	Mar. 1	8 38	E, W	71 20 38 58	+ 24 37 36	15 9	15 9	0 7	0·8	0·45
20	1452 & 1467 Gr. 80	Feb. 28	14 40	E, W	71 33 20·79	+ 11 52 97	13 8				
	,, ,, ,,	Mar. 1		W, E	20·76	53 79	14 5	14·1	1·0	1·0	1·00
21	1474 & 1477 Gr. 80	Feb. 28	11 10	W, E	72 1 6·13	− 15 51·53	14·6				
	,, ,, ,,	Mar. 1		E, W	6 11	53 35	12 8	13 7	1·0	1·4	1 96
22	1480 & 1489 Gr 80	Feb. 28	12 23	E, W	71 23 27 88	+ 21 46 01	13 9				
	,, ,, ,,	Mar. 1		W, E	27 84	47 53	15 4	14 6	0·7	0 5	0·18
23	1489 & 1493 Gr. 80	Mar. 1	12 19	E, W	71 19 52·06	+ 25 23·06	15 1	15·1	0·5	0 0	0·00
24	1504 & 1511 Gr 80	Feb. 27	6 19	E, W	71 25 37 08	+ 19 38·37	15 4				
	,, ,, ,,	Mar. 2		W, E	37 00	37 90	14 9	15 1	1 0	0 0	0·00
25	1517 & 1520 Gr. 80	Feb. 27	12 18	W, E	72 11 52·23	− 26 37·[illegible]	15·0				
	,, ,, ,,	Mar. 2		E, W	52 14	37 61	14 5	14·7	1·0	0·4	0·16
26	1536 & 1541 Gr. 80	Feb. 27	3 10	E, W	71 26 44·18	+ 18 31·03	15·2				
	,, ,, ,,	Mar. 2		W, E	44 07	31 47	15·5	15·3	1·0	0·2	0·04
27	1547 Gr. 80	Feb. 27	0 5	W, E	71 50 28·87	− 5 12·46	16·4				
	,, ,,	Mar. 2		E, W	28 77	13 52	15 2	15·8	1 0	0·7	0 49
28	1555 & 1573 Gr. 80	Feb. 27	8 14	E, W	71 35 6 22	+ 10 8·78	15·0				
	,, ,, ,,	Mar. 2		W, E	6·12	9·93	16 0	15 5	1·0	0·4	0·16
29	1585 & 1596 Gr. 80	Feb. 27	7 23	W, E	72 14 7·24	− 28 51·51	15·7				
	,, ,, ,,	Mar. 2		E, W	7·16	52 39	14·8	15·2	1·0	0·1	0·01
30	1603 & 1617 Gr 80	Feb. 27	3 35	E, W	71 54 21·96	− 9 6 40	15·6				
	,, ,, ,,	Mar. 2		W, E	21 86	6 16	15·7	15 6	1·0	0·5	0·25
31	1621 & 1628 Gr. 80	Feb 27	8 33	W, E	72 1 30·67	− 16 15 81	14·9				
	,, ,, ,,	Mar. 2		E, W	30 58	15·83	14·7	14·8	1·0	0·3	0·09
32	1646 Gr. 80 & 957 Gr. 72	Feb. 27	17 49	E, W	72 2 30·36	− 17 15·43	14·9				
	,, ,, ,, ,,	Mar. 2		W, E	30 28	16 09	14·2	14·5	1·0	0·6	0·36
33	1674 & 1681 Gr. 80	Feb. 27	2 26	W, E	72 3 8·45	− 17 53·51	14·9				
	,, ,, ,,	Mar. 2		E, W	8·36	53·07	15·3	15·1	1·0	0·0	0·00
34	1713 Gr. 80 & 1011 Gr. 72	Mar. 2	14 12	W, E	71 39 50·56	+ 5 23 99	14·5	14·5	0·7	0·6	0·25
35	1725 & 1728 Gr. 80	Mar. 2	12 59	E, W	71 43 27·04	+ 1 50·34	17·4				
	,, ,, ,,	Mar. 4		W, E	26 96	48·92	15·9	16 6	1·0	1·5	2·25

112. Achola—*Co-latitude* 71° 45′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
36	1732 & 1746 Gr. 80	Mar. 2	7 6	W, E	71 47 7·99	− 1 52·96	15·0				
	" " "	Mar. 9		E, W	7·70	53·19	14·5	14·7	1·0	0·4	0·16
37	1762 & 1793 Gr. 80	Mar. 2	2 22	E, W	71 37 3·26	+ 8 11·79	15·0				
	" " "	Mar. 9		W, E	3·00	12·46	15·5	15·2	1·0	0·1	0·01
38	1798 & 1802 Gr. 80	Mar. 2	15 33	W, E	71 51 47·82	− 6 31·32	16·5	16·5	0·5	1·4	0·98
39	1802 & 1812 Gr. 80	Mar. 2	16 51	E, W	72 9 54·97	− 24 39·08	15·9	15·9	0·5	0·8	0·32
								Σ P = 35·4		Σ P vv = 15·53	

Summary.

No. of pairs 39

No. of observations 69

Mean difference between observations taken E, W and those taken W, E = + 0″·14.

Observed Co-latitude (weighted mean) 71° 45′ 15″·06 ± 0″·072

Correction for Height above Sea-level + 0″·07

Final Co-latitude 71° 45′ 15″·13

		° ′ ″	
Astronomical Latitude (A)	=	18 14 44·87	± 0·072
Geodetic Latitude (G)	=	18 14 48·12	
Deflection of plumb-line (A − G)	=	− 3·25	

113. Agra-group east point—*Co-latitude* 62° 50′ +

Latitude ... 27° 9′ *Instrument*—Zenith Telescope

Longitude ... 78 9 *Mean Height of Barometer* 29·42 in.

Height ... 550 feet *Mean Temperature* 50°·4

Observer—Lieut. G. A. Beazeley, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	1197 & 1221 Gr. 80 „ „ „	Mar. 3 „ 4	3 2	W, E E, W	62 36 46·50 46·46	+ 13 58·22 57·20	44·72 43·66	44·19	0·7	0·42	0·1235
2	1227 & 1221 Gr. 80 „ „ „	Mar. 3 „ 4	3 3	W, E E, W	62 38 37·84 37·80	+ 12 5·45 5·89	43·29 43·69	43·49	0·7	0·28	0·0549
3	1250 & 1261 Gr. 80 „ „ „	Mar. 3 „ 4	10 7	E, W W, E	63 9 41·07 41·03	− 18 57·95 56·96	43·12 44·07	43·60	1·0	0·17	0·0289
4	1281 & 1298 Gr. 80 „ „ „	Mar. 3 „ 4	5 14	E, W W, E	63 7 0·85 0·81	− 16 17·49 17·12	43·36 43·69	43·53	1·0	0·24	0·0576
5	1324 & 1363 Gr. 80 „ „ „	Mar. 3 „ 4	1 18	E, W W, E	63 1 42·05 42·00	− 10 57·87 56·90	44·18 45·10	44·64	1·0	0·87	0·7569
6	1371 & 1390 Gr. 80 „ „ „	Mar. 3 „ 4	0 58	E, W W, E	63 3 7·84 7·78	− 12 23·41 23·72	44·43 44·06	44·25	1·0	0·48	0·2304
7	1397 & 1407 Gr. 80 „ „ „	Mar. 3 „ 4	2 49	W, E E, W	62 50 52·89 52·82	− 0 8·88 9·26	44·01 43·56	43·79	1·0	0·02	0·0004
8	1436 & 1450 Gr. 80 „ „ „	Mar. 3 „ 4	6 11	W, E E, W	63 1 42·98 42·91	− 10 58·16 58·63	44·82 44·28	44·55	1·0	0·78	0·6084
9	1452 & 1465 Gr. 80	Mar. 4	5 38	W, E	62 32 24·28	+ 18 19·63	43·91	43·91	0·5	0·14	0·0098
10	1483 & 1465 Gr. 80 „ „ „	Mar. 3 „ 4	5 31	E, W W, E	62 39 20·71 20·64	+ 11 22·99 22·95	43·70 43·59	43·65	0·7	0·12	0·0101
11	1493 & 1501 Gr. 80 „ „ „	Mar. 3 „ 4	21 3	E, W W, E	62 36 49·62 49·55	+ 13 53·91 55·28	43·53 44·83	44·18	1·0	0·41	0·1681
12	1511 & 1520 Gr. 80 „ „ „	Mar. 3 „ 4	2 36	W, E E, W	62 32 33·41 33·33	+ 18 10·52 9·93	43·93 43·26	43·60	1·0	0·17	0·0289
13	1540 & 1570 Gr. 80 „ „ „	Mar. 3 „ 4	24 42	E, W W, E	62 33 32·52 32·44	+ 17 10·04 12·55	42·56 44·99	43·78	1·0	0·01	0·0001
14	1599 & 1606 Gr. 80 „ „ „	Mar. 3 „ 4	3 6	W, E E, W	62 39 32·86 32·77	+ 11 11·41 9·71	44·27 42·48	43·38	1·0	0·39	0·1521
15	1617 & 1637 Gr. 80 „ „ „	Mar. 3 „ 4	5 23	E, W W, E	62 57 46·92 46·84	− 7 4·53 1·85	42·39 44·99	43·69	1·0	0·08	0·0064

113. Agra-group east point—*Co-latitude* 62° 50′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
16	1650 & 1664 Gr. 80	Mar. 2	16 28	W, E	63 2 34·23	− 11 50·65	43·58	43·58	0·7	0·19	0·0253
17	1690 & 1714 Gr. 80	Mar. 3	10 17	E, W	63 3 34·33	− 12 51·09	43·24	43·24	0·7	0·53	0·1966
18	1724 & 1728 Gr. 80 " " "	Mar. 3 " 4	3 45	W, E E, W	62 31 58·90 58·81	+ 18 45·51 44·15	44·41 42·96	43·69	1·0	0·08	0·0064
19	1733 & 1746 Gr. 80 " " "	Mar. 3 " 4	1 37	E, W W, E	63 6 3·68 3·59	− 15 20·31 19·34	43·37 44·25	43·81	0·7	0·04	0·0011
20	1780 & 1733 Gr. 80 " " "	Mar. 3 " 4	1 39	W, E E, W	63 8 33·88 33·79	− 17 51·04 49·30	42·84 44·49	43·67	0·7	0·10	0·0070
21	1791 & 1802 Gr. 80 " " "	Mar. 3 " 4	6 17	W, E E, W	62 38 16·16 16·07	+ 12 26·93 26·40	43·09 42·47	42·78	1·0	0·99	0·9801
								ΣP =	18·4	ΣPvv =	3·4530

Summary.

No. of pairs 21

No. of observations 39

Mean difference between observations taken E, W and those taken W, E = − 0″·71.

Observed Co-latitude (weighted mean) 62° 50′ 43″·77 ± 0″·065

Correction for Height above Sea-level + 0″·02

Final Co-latitude 62° 50′ 43″·79

		°	′	″	″
Astronomical Latitude (A)	=	27	9	16·21	± 0·065
Geodetic Latitude (G)	=	27	9	21·00	
Deflection of plumb-line (A−G)	=			− 4·79	

114. Agra-group north point—*Co-latitude* 62° 45′ +

Latitude	.. 27° 14′	*Instrument*—Zenith Telescope	
Longitude	... 78 4	*Mean Height of Barometer*	in. 29·20
Height	.. 550 feet	*Mean Temperature*	49°·5

Observer—Lieut. G. A. Beazeley, R.E.

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	1081 & 1116 Gr. 80	Feb. 19	22 12	E, W	62 51 51·67	− 6 0·34	51·33	51·33	0·7	1·66	1·9289
2	1138 & 1159 Gr 80	Feb. 19	1 55	W, E	62 50 50·12	− 4 58·72	51·40	51·40	0·7	1·73	2·0950
3	1179 & 1192 Gr. 80 „ „ „	Feb. 19 „ 20	10 56	E, W W, E	62 44 38·41 38·37	+ 1 11·65 11·55	50·06 49·92	49·99	1·0	0·32	0·1024
4	1197 & 1221 Gr. 80	Feb. 20	3 2	E, W	62 36 46·96	+ 9 1·54	48·50	48·50	0·5	1·17	0·6845
5	1221 & 1227 Gr. 80 „ „ „	Feb. 19 „ 20	3 4	E, W W, E	62 38 38·35 38·31	+ 7 10·43 11·32	48·78 49·63	49·21	0·7	0·46	0·1481
6	1250 & 1261 Gr 80	Feb 20	10 7	E, W	63 9 41·54	− 23 52·24	49·30	49·30	0·7	0·37	0·0958
7	1324 & 1363 Gr. 80 „ „ „	Feb. 19 „ 20	1 18	E, W W, E	63 1 42·70 42·65	− 15 52·87 55·63	49·83 47·02	48·43	1·0	1·24	1·5376
8	1371 Gr. 80 & 1011 Gr 64	Feb. 19	0 59	E, W	62 53 18·88	− 7 28·38	50·50	50·50	0·5	0·83	0·3445
9	1371 & 1390 Gr. 80	Feb. 20	0 59	W, E	63 3 8·46	− 17 18·34	50·12	50·12	0·5	0·45	0·1013
10	1397 & 1407 Gr. 80 „ „ „	Feb 19 „ 20	2 49	W, E E, W	62 50 53·63 53·57	− 5 3·46 4·94	50·17 48·63	49·40	1·0	0·27	0·0729
11	1452 & 1465 Gr. 80	Feb. 20	5 38	W, E	62 32 25·06	+ 13 24·30	49·36	49·36	0·5	0·31	0·0481
12	1483 & 1465 Gr. 80 „ „ „	Feb. 19 „ 20	5 31	E, W W, E	62 39 21·54 21·47	+ 6 28·65 28·43	50·19 49·90	50·05	0·7	0·38	0·1011
13	1493 & 1501 Gr. 80 „ „ „	Feb. 19 „ 20	21 3	E, W W, E	62 36 50·46 50·40	+ 8 58·26 9 0·29	48·72 50·69	49·71	1·0	0·04	0·0016
14	1511 & 1520 Gr. 80 „ „ „	Feb. 19 „ 20	2 37	W, E E, W	62 32 34·28 34·22	+ 13 15·04 15·65	49·32 49·87	49·60	1·0	0·07	0·0049
15	1540 & 1570 Gr. 80 „ „ „	Feb. 19 „ 20	24 42	E, W W, E	62 33 33·31 33·25	+ 12 16·47 17·90	49·78 51·15	50·47	1·0	0·80	0·6400
16	1690 & 1714 Gr. 80 „ „ „	Feb. 19 „ 20	10 17	E, W W, E	63 3 35·19 35·13	− 17 47·24 44·86	47·95 50·27	49·11	1·0	0·56	0·3136

114. Agra-group north point—*Co-latitude* 62° 45′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
17	1724 & 1728 Gr. 80	Feb. 19	3 45	W, E	62 31 59·78	+ 13 50·14	49·92				
	" " "	" 20		E, W	59·73	49·48	49·21	49·57	1·0	0·10	0·0100
18	1733 & 1746 Gr. 80	Feb. 20	1 37	W, E	63 6 4·47	− 20 14·83	49·64	49·64	0·7	0·03	0·0006
19	1791 & 1802 Gr. 80	Feb. 19	6 17	W, E	62 38 16·96	+ 7 32·39	49·35				
	" " "	" 20		E, W	16·91	32·51	49·42	49·39	1·0	0·28	0·0784
20	1810 & 1825 Gr. 80	Feb. 19	16 20	E, W	62 35 34·11	+ 10 14·94	49·05				
	" " "	" 20		W, E	34·07	16·11	50·18	49·62	1·0	0·05	0·0025
21	1846 & 1861 Gr. 80	Feb. 19	18 26	W, E	62 45 45·32	+ 0 4·79	50·11				
	" " "	" 20		E, W	45·29	3·93	49·22	49·67	1·0	0·00	0·0000
22	1870 & 1874 Gr. 80	Feb. 19	11 8	E, W	62 40 22·12	+ 5 26·30	48·42				
	" " "	" 20		W, E	22·08	26·76	48·84	48·63	1·0	1·04	1·0816
23	1908 & 1939 Gr. 80	Feb. 20	12 4	W, E	62 28 48·53	+ 17 1·86	50·39	50·39	0·7	0·72	0·3629
								Σ P =	18·9	Σ P vv =	9·7563

Summary.

No. of pairs 23
No. of observations 37

Mean difference between observations taken E, W and those taken W, E = − 0″·48.

Observed Co-latitude (weighted mean) 62° 45′ 49″·67 ± 0″·103

Correction for Height above Sea-level + 0″·02

Final Co-latitude 62° 45′ 49″·69

		°	′	″	″
Astronomical Latitude (A)	=	27	14	10·31	± 0·103
Geodetic Latitude (G)	=	27	14	14·10	
Deflection of plumb-line (A − G)	=		−	3·79	

115. Agra-group south point—*Co-latitude* 62° 54′ +

Latitude	27° 6′	*Instrument*—Zenith Telescope	
Longitude	78 3	*Mean Height of Barometer*	in 29 34
Height	550 feet	*Mean Temperature*	65°·4

Observer—Lieut. G. A. Beazeley, R E.

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	1197 & 1221 Gr. 80 " " "	Mar. 10 " 12	3 2	E, W W, E	62 36 46 25 46 18	+ 17 40·[illegible]8 43 12	26 53 29 30	27 92	0 7	0 89	0 5545
2	1221 & 1227 Gr 80 " " "	Mar 10 " 12	3 4	W, E E, W	62 38 37 57 37 51	+ 15 49·49 49 51	27·06 27·02	27 04	0 7	0 01	0 0001
3	1250 & 1261 Gr 80 " " "	Mar 10 " 12	10 7	W, E E, W	63 9 40 79 40 71	− 15 14·40 14 10	26 39 26 52	26 46	1 0	0 57	0 3249
4	1281 & 1298 Gr. 80 " " "	Mar 10 " 12	5 14	W, E E, W	63 7 0·54 0 45	− 12 31 47 35 65	29 07 24 80	26 94	1 0	0 09	0·0081
5	1324 & 1363 Gr 80 " " "	Mar 10 " 12	1 18	E, W W, E	63 1 41 67 41 56	− 7 13 82 13 41	27·85 28 15	28 00	0·7	0 97	0 6586
6	1324 & 1390 Gr 80 " " "	Mar 10 " 12	1 4	E. W W, E	62 57 21 13 21 02	− 2 53 90 52·91	27 23 28 11	27 67	0 7	0 64	0·2867
7	1371 & 1363 Gr 80 " " "	Mar. 10 " 12	1 12	E, W W, E	63 7 27·07 27·86	− 13 0 70 0 19	27 [illegible]7 27 67	27 47	0 7	0 44	0 1355
8	1371 & 1390 Gr 80 " " "	Mar 10 " 12	0 58	E, W W, E	63 3 7·43 7 32	− 8 40 59 39 51	26 84 27 81	27 33	0 7	0 30	0 0630
9	1397 & 1407 Gr. 80 " " "	Mar 10 " 12	2 49	W, E E, W	62 50 52 44 52 32	+ 3 32 84 34 46	25·28 26 78	26 03	1 0	1 00	1 0000
10	1436 & 1450 Gr. 80 " " "	Mar 10 " 12	6 11	W, E E, W	63 1 42·51 42 37	− 7 14 08 15·01	28·43 27 36	27 90	1 0	0 87	0·7569
11	1452 & 1465 Gr. 80	Mar 10	5 38	E, W	62 32 23·86	+ 22 2 12	25 98	25 98	0 5	1 05	0·5513
12	1465 & 1483 Gr. 80	Mar 10	5 31	W, E	62 39 20·18	+ 15 7·44	27·62	27 62	0 5	0·59	0 1741
13	1493 & 1501 Gr. 80	Mar. 10	21 4	E, W	62 36 49 13	+ 17 36 35	25·48	25·48	0 7	1 55	1 6818
14	1511 & 1520 Gr. 80 " " "	Mar. 10 " 12	2 36	W, E E, W	62 32 32 86 32 69	+ 21 54·60 53 69	27 46 26 38	26·92	1·0	0 11	0·0121
15	1540 & 1570 Gr. 80 " " "	Mar. 10 " 12	24 42	E, W W, E	62 33 31·99 31·84	+ 20 54·94 55·90	26·93 27·74	27·34	1·0	0·31	0·0961

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
16	1577 & 1583 Gr. 80 " " "	Mar. 10 " 12	9 59	W, E E, W	63 7 47·12 46·95	− 13 20·73 20·92	26·39 26·03	26·21	1·0	0·82	0·6724
17	1599 & 1606 Gr. 80 " " "	Mar. 10 " 12	3 6	E, W W, E	62 39 32·51 32·08	+ 14 53·58 53·96	26·09 26·04	26·07	1·0	0·96	0·9216
18	1617 & 1637 Gr. 80 " " "	Mar. 10 " 12	5 23	W, E E, W	62 57 46·33 46·14	− 3 19·03 18·65	27·30 27·49	27·40	1·0	0·37	0·1369
19	1650 & 1664 Gr. 80 " " "	Mar. 10 " 12	16 28	E, W W, E	63 2 33·66 33·48	− 8 6·33 4·17	27·33 29·31	28·32	1·0	1·29	1·6641
20	1690 & 1714 Gr. 80 " " "	Mar. 10 " 12	10 17	E, W W, E	63 3 33·67 33·49	− 9 6·72 6·96	26·95 26·53	26·74	1·0	0·29	0·0841
21	1724 & 1728 Gr. 80 " " "	Mar. 10 " 12	3 45	W, E E, W	62 31 58·25 58·05	+ 22 28·79 28·25	27·04 26·30	26·67	1·0	0·36	0·1296
22	1733 & 1746 Gr. 80 " " "	Mar. 10 " 12	1 37	E, W W, E	63 6 3·05 2·85	− 11 36·70 35·35	26·35 27·50	26·93	0·7	0·10	0·0070
23	1733 & 1780 Gr. 80 " " "	Mar. 10 " 12	1 39	E, W W, E	63 8 33·25 33·05	− 14 6·36 5·59	26·89 27·46	27·18	0·7	0·15	0·0158
24	1791 & 1802 Gr. 80 " " "	Mar. 10 " 12	6 17	W, E E, W	62 38 15·50 15·31	+ 16 11·97 10·89	27·47 26·20	26·84	1·0	0·19	0·0361
25	1810 & 1825 Gr. 80 " " "	Mar. 10 " 12	16 19	E, W W, E	62 35 32·76 33·06	+ 18 53·93 55·34	26·69 28·40	27·55	1·0	0·52	0·2704
								Σ P = 21·3		Σ Pvv = 10·2417	

Summary.

No. of pairs 25
No. of observations 47

Mean difference between observations taken E, W and those taken W, E = − 0″·90

Observed Co-latitude (weighted mean) 62° 54′ 27″·03 ± 0″·095

Correction for Height above Sea-level + 0″·02

Final Co-latitude 62° 54′ 27″·05

		°	′	″	″
Astronomical Latitude (A)	=	27	5	32·95	± 0·095
Geodetic Latitude (G)	=	27	5	38·51	
Deflection of plumb-line (A−G)	=		−	5·56	

116. Agra-group west point—*Co-latitude* 62° 50′ +

Latitude ... 27° 10′ — *Instrument*—Zenith Telescope

Longitude . 77 59 — *Mean Height of Barometer* 29·44 in.

Height ... 550 feet — *Mean Temperature* 49°·8

Observer—Lieut. G. A. Beazeley, R E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	1197 & 1221 Gr 80 " " "	Feb 25 " 26	3 2	W, E E, W	62 36 46·74 46 70	+ 13 31·88 30 67	18·62 17·37	18 00	0 7	0·55	0 2118
2	1227 & 1221 Gr. 80 " " "	Feb 25 " 26	3 4	W, E E, W	62 38 38 10 38 05	+ 11 40·34 40·90	18 44 18 95	18 70	0·7	0 15	0 0158
3	1250 & 1261 Gr 80	Feb. 25	10 7	E, W	63 9 41·32	− 19 23·26	18·06	18·06	0 7	0·49	0·1681
4	1281 & 1298 Gr. 80 " " "	Feb 25 " 26	5 14	E, W W, E	63 7 1·12 1·08	− 16 42·74 41·26	18·38 19 82	19·10	1 0	0·55	0·3025
5	1324 & 1363 Gr. 80 " " "	Feb 25 " 26	1 19	W, E E, W	63 1 42 37 42 32	− 11 23 46 23 [illegible]	18 91 18 53	18 72	1 0	0·17	0·0289
6	1371 & 1390 Gr 80	Feb 25	0 58	W, E	63 3 8·19	− 12 50·03	18 16	18 16	0·7	0 39	0 1065
7	1397 & 1407 Gr 80	Feb 25	2 49	E, W	62 50 53·25	− 0 35·06	18·19	18·19	0 7	0·36	0·0907
8	1436 & 1450 Gr 80 " " "	Feb 25 " 26	6 12	W, E E, W	63 1 43·38 43 31	− 11 24·53 24 50	18·85 18·81	18·83	1·0	0·28	0 0784
9	1452 & 1465 Gr. 80 " " "	Feb 25 " 26	5 38	E, W W, E	62 32 24 74 24·68	+ 17 52·74 54·87	17·48 19 55	18·52	0 7	0 03	0·0006
10	1483 & 1465 Gr. 80 " " "	Feb 25 " 26	5 31	E, W W, E	62 39 21·13 21·06	+ 10 58·93 59·77	20 06 20·83	20·45	0·7	1·90	2·5270
11	1493 & 1501 Gr. 80	Feb 26	21 4	W, E	62 36 49·98	+ 13 29·65	19·63	19·63	0·7	1·08	0·8165
12	1511 & 1520 Gr. 80 " " "	Feb 25 " 26	2 37	W, E E, W	62 32 33 86 33·78	+ 17 45·43 44·52	19 29 18·30	18·80	1·0	0·25	0 0625
13	1540 & 1570 Gr. 80	Feb. 26	24 42	W, E	62 33 32·86	+ 16 44·44	17·30	17·30	0·7	1·25	1·0938
14	1577 & 1583 Gr. 80	Feb. 26	9 59	E, W	63 7 48·06	− 17 29·43	18·63	18·63	0·7	0·08	0·0045
15	1724 & 1728 Gr. 80 " " "	Feb. 25 " 26	3 45	W, E E, W	62 31 59·38 59·31	+ 18 20·48 19 61	19·86 18·92	19·39	1·0	0·84	0·7056
16	1733 & 1746 Gr. 80 " " "	Feb. 25 " 26	1 37	E, W W, E	63 6 4·15 4·08	− 15 44·74 45·52	19·41 18·56	18·99	0·7	0·44	0 1355

116. Agra-group west point—*Co-latitude* 62° 50′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
17	1780 & 1733 Gr. 80	Feb. 26	1 39	E, W	63 8 34·27	− 18 15·87	18·40	18·40	0·5	0·15	0·0113
18	1791 & 1802 Gr. 80 " " "	Feb. 25 " 26	6 17	W, E E, W	62 38 16·59 16·53	+ 12 1·76 0·34	18·35 16·87	17·61	1·0	0·94	0·8836
19	1810 & 1825 Gr. 80 " " "	Feb. 25 " 26	16 20	E, W W, E	62 35 33·79 33·73	+ 14 43·46 46·40	17·25 20·13	18·69	1·0	0·14	0·0196
20	1846 & 1861 Gr. 80 " " "	Feb. 25 " 26	18 26	W, E E, W	62 45 45·03 44·97	+ 4 34·07 32·37	19·10 17·34	18·22	1·0	0·33	0·1089
21	1870 & 1874 Gr. 80 " " "	Feb. 25 " 26	11 7	E, W W, E	62 40 21·87 21·82	+ 9 55·54 56·22	17·41 18·04	17·73	1·0	0·82	0·6724
22	1940 & 1954 Gr. 80	Feb. 26	1 51	W, E	63 1 21·57	− 11 3·04	18·53	18·53	0·7	0·02	0·0003
23	1961 & 2009 Gr. 80 " " "	Feb. 25 " 26	14 29	W, E E, W	62 33 49·04 48·99	+ 16 30·24 29·06	19·28 18·05	18·67	1·0	0·12	0·0144
24	1974 & 2009 Gr. 80 " " "	Feb. 25 " 26	14 14	W, E E, W	62 48 4·68 4·69	+ 2 14·04 12·69	18·72 17·38	18·05	1·0	0·50	0·2500
								Σ P = 19·9		Σ P vv = 8·3072	

Summary.

No. of pairs 24
No. of observations 40

Mean difference between observations taken E, W and those taken W, E = − 0″·81

Observed Co-latitude (weighted mean) 62° 50′ 18″·55 ± 0″·091

Correction for Height above Sea-level + 0″·02

Final Co-latitude 62° 50′ 18″·57

		° ′ ″	
Astronomical Latitude (A)	=	27 9 41·43	± 0·091
Geodetic Latitude (G)	=	27 9 45·86	
Deflection of plumb-line (A − G)	=	− 4·43	

117. Agra Longitude station, 1st visit—*Co-latitude* 62° 50′ +

Latitude . 27° 10′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude .. 78 3 *Mean Height of Barometer* 29·34 in.

Height ... 550 feet *Mean Temperature* 63°·1

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	14 Gr. 80 & 39 Gr. 72	Oct. 29	16 26	E, W	63 0 36·26	− 10 9·52	26·74				
	,, ,, ,, ,,	,, 30		W, E	36·15	9·77	26·38	26·56	0·7	1·07	0·8014
2	14 Gr. 80 & 44 Gr. 72	Oct. 29	16 19	E, W	63 7 10·89	− 16 45·23	25·66				
	,, ,, ,, ,,	,, 30		W, E	10·78	44·98	25·80	25·73	0·7	0·24	0·0403
3	25 & 39 Gr. 72	Oct. 29	28 35	W, E	62 30 56·64	+ 19 28·75	25·39				
	,, ,, ,,	,, 30		E, W	56·53	29·63	26·16	25·77	0·7	0·28	0·0549
4	25 Gr. 72 & 91 Gr. 80	Oct. 29	28 35	W, E	62 30 53·53	+ 19 32·26	25·79				
	,, ,, ,, ,,	,, 30		E, W	53·42	33·29	26·71	26·25	0·7	0·76	0·4043
5	39 Gr. 72 & 95 Gr. 80	Oct. 29	28 32	E, W	62 33 54·11	+ 16 31·05	25·16				
	,, ,, ,, ,,	,, 30		W, E	54·00	30·96	24·96	25·06	0·7	0·43	0·1294
6	91 & 95 Gr. 80	Oct. 29	28 32	E, W	62 33 51·00	+ 16 34·56	25·56				
	,, ,, ,,	,, 30		W, E	50·89	34·62	25·51	25·53	0·7	0·04	0·0011
7	58 Gr. 72 & 120 Gr. 80	Oct. 29	20 21	W, E	62 38 32·39	+ 11 51·98	24·37				
	,, ,, ,, ,,	,, 30		E, W	32·28	52·42	24·70	24·53	1·0	0·96	0·9216
8	137 & 160 Gr. 80	Oct. 29	4 6	E, W	62 51 14·03	− 0 50·17	23·86				
	,, ,, ,,	,, 30		W, E	13·91	47·47	26·44	25·15	0·7	0·34	0·0809
9	137 & 173 Gr. 80	Oct. 29	4 17	E, W	62 39 51·29	+ 10 32·50	23·79				
	,, ,, ,,	,, 30		W, E	51·17	35·33	26·50	25·14	0·7	0·35	0·0858
10	146 & 160 Gr. 80	Oct. 29	4 12	E, W	62 57 30·01	− 7 4·95	25·06				
	,, ,, ,,	,, 30		W, E	29·89	3·42	26·47	25·76	0·7	0·27	0·0510
11	146 & 173 Gr. 80	Oct. 29	4 23	E, W	62 46 7·26	+ 4 17·74	25·00				
	,, ,, ,,	,, 30		W, E	7·15	19·36	26·51	25·75	0·7	0·26	0·0473
12	185 & 199 Gr. 80	Oct. 29	19 50	W, E	63 9 10·64	− 18 45·00	25·64				
	,, ,, ,,	,, 30		E, W	10·53	45·24	25·29	25·46	0·7	0·03	0·0006
13	185 & 200 Gr. 80	Oct. 29	19 50	W, E	63 9 5·31	− 18 40·59	24·72	24·72	0·5	0·77	0·2965
14	237 & 239 Gr. 80	Oct. 29	9 23	E, W	62 41 31·24	+ 8 54·21	25·45				
	,, ,, ,,	,, 30		W, E	31·12	54·12	25·24	25·34	1·0	0·15	0·0225
15	242 & 256 Gr. 80	Oct. 29	12 58	W, E	62 55 7·19	− 4 41·76	25·43	25·43	0·5	0·06	0·0018

117. Agra Longitude station, 1st visit—*Co-latitude* 62° 50′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1893	° ′		° ′ ″	′ ″	″	″			
16	251 & 256 Gr. 80	Oct. 30	13 9	E, W	63 6 16·52	− 15 52·39	24·13	24·13	0·5	1·36	0·9248
17	273 & 274 Gr. 80	Oct. 29	10 16	E, W	62 50 41·73	− 0 16·56	25·17				
	" " "	" 30		W, E	41·61	16·29	25·32	25·24	1·0	0·25	0·0625
18	291 & 296 Gr. 80	Oct. 29	9 44	W, E	62 58 10·26	− 7 44·40	25·86				
	" " "	" 30		E, W	10·14	45·47	24·67	25·26	1·0	0·23	0·0529
19	317 & 325 Gr. 80	Oct. 29	5 19	E, W	62 32 25·20	+ 18 0·21	25·41				
	" " "	" 30		W, E	25·07	0·13	25·20	25·30	1·0	0·19	0·0361
20	339 & 348 Gr. 80	Oct. 29	6 31	W, E	62 46 20·80	+ 4 4·93	25·73				
	" " "	" 30		E, W	20·68	2·73	23·41	24·57	1·0	0·92	0·8464
21	350 & 376 Gr. 80	Oct. 29	8 8	E, W	62 27 16·19	+ 23 9·20	25·39				
	" " "	" 30		W, E	16·07	9·04	25·11	25·25	1·0	0·24	0·0576
22	382 & 403 Gr. 80	Oct. 29	7 20	W, E	63 6 21·23	− 15 57·60	23·63				
	" " "	" 30		E, W	21·12	54·69	26·43	25·03	1·0	0·46	0·2116
23	406 Gr. 80	Oct. 30	0 6	W, E	62 44 32·74	+ 5 52·05	24·79	24·79	0·7	0·70	0·3430
24	425 & 438 Gr. 80	Oct. 29	12 18	W, E	63 3 23·59	− 12 57·90	25·69				
	" " "	" 30		E, W	23·48	57·33	26·15	25·92	1·0	0·43	0·1849
25	454 & 471 Gr. 80	Oct. 29	1 20	E, W	62 38 27·39	+ 11 58·95	26·34				
	" " "	" 30		W, E	27·28	58·31	25·59	25·96	1·0	0·47	0·2209
26	3489 & 3494 Gr. 80	Oct. 31	0 29	E, W	62 49 17·63	+ 1 7·34	24·97				
	" " "	Nov. 1		W, E	17·74	8·67	26·41	25·69	1·0	0·20	0·0400
27	3509 & 3516 Gr. 80	Oct. 31	23 5	W, E	63 1 50·09	− 11 24·32	25·77				
	" " "	Nov. 1		E, W	50·09	23·51	26·58	26·17	0·7	0·68	0·3237
28	3508 & 3518 Gr. 80	Oct. 31	23 5	W, E	63 1 50·92	− 11 24·53	26·39	26·39	0·5	0·90	0·4050
29	3509 & 3518 Gr. 80	Oct. 31	23 5	W, E	63 1 49·11	− 11 23·91	25·20				
	" " "	Nov. 1		E, W	49·12	22·76	26·36	25·78	0·7	0·29	0·0589
30	3542 & 3557 Gr. 80	Oct. 31	32 17	E, W	62 43 44·80	+ 6 40·95	25·75				
	" " "	Nov. 1		W, E	44·80	41·04	25·84	25·79	1·0	0·30	0·0900
31	3623 & 3624 Gr. 80	Oct. 31	43 39	E, W	62 48 46·37	+ 1 39·75	26·12				
	" " "	Nov. 1		W, E	46·33	38·83	25·16	25·64	1·0	0·15	0·0225
32	3627 & 3633 Gr. 80	Oct. 31	10 28	W, E	62 40 4·18	+ 10 21·78	25·96	25·96	0·7	0·47	0·1546
33	3585 Gr. 80	Oct. 31	0 2	W, E	62 51 6·87	− 0 40·10	26·77				
	" "	Nov. 1		E, W	6·86	40·60	26·26	26·51	1·0	1·02	1·0404
34	11 & 42 Gr. 80	Oct. 31	9 17	E, W	63 5 18·50	− 14 52·64	25·86				
	" " "	Nov. 1		W, E	18·40	52·15	26·25	26·05	1·0	0·56	0·3136
35	96 & 105 Gr. 80	Oct. 31	38 23	E, W	62 48 34·06	+ 1 51·93	25·99				
	" " "	Nov. 1		W, E	33·95	53·06	27·01	26·50	1·0	1·01	1·0201

117. Agra Longitude station, 1st visit—*Co-latitude* 62° 50′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
36	139 & 148 Gr. 80 " " "	Oct. 31 Nov. 1	0 54	W, E E, W	62 28 17·75 17·63	+ 22 8·27 6·51	26·02 24·14	25·08	1·0	0·41	0·1681
37	156 & 185 Gr 80 " " "	Oct 31 Nov. 1	19 39	E, W W, E	62 58 32·90 32·79	− 8 6·45 9·04	26·45 23·75	25·10	0·7	0·39	0·1065
38	162 & 185 Gr. 80 " " "	Oct. 31 Nov. 1	19 41	E, W W, E	63 0 2·28 2·17	− 9 36·35 36·95	25·93 25·22	25·57	0·7	0·08	0·0045
39	189 & 202 Gr. 80	Nov. 1	36 4	E, W	62 25 33·29	+ 24 52·28	25·57	25·57	0·5	0·08	0·0032
40	215 & 231 Gr. 80 " " "	Oct. 31 Nov 1	35 54	E, W W, E	62 50 25·41 25·31	+ 0 1·63 − 0 0·41	27·04 24·90	25·97	0·7	0·48	0·1613
41	189 & 215 Gr. 80 " " "	Oct. 31 Nov. 1	36 11	W, E E, W	62 32 40·30 40·19	+ 17 44·88 45·99	25·18 26·18	25·68	0·7	0·19	0·0253
42	202 & 231 Gr. 80	Nov. 1	35 47	W, E	62 43 18·41	+ 7 5·87	24·28	24·28	0·7	1·21	1·0249
43	259 & 264 Gr. 80	Nov. 1	7 29	E, W	62 45 59·53	+ 4 24·80	24·33	24·33	0·7	1·16	0·9419
								Σ P =	34·2	ΣPvv =	11·7846

Summary.

No. of pairs 43
No. of observations 77

Mean difference between observations taken E,W and those taken W, E = − 0″·04

Observed Co-latitude (weighted mean) 62° 50′ 25″·49 ± 0″·061

Correction for Height above Sea-level + 0″·02

Corrected Co-latitude 62° 50′ 25″·51 ± 0″·061

For final Co-latitude and deduction of (A — G) see 2nd visit.

117. Agra Longitude station, 2nd visit—*Co-latitude* 62° 50′ +

Latitude	... 27° 10′	*Instrument*—Zenith Telescope	
Longitude	... 78 3	*Mean Height of Barometer*	in. 29·27
Height	... 550 feet	*Mean Temperature*	69°·9

Observers—Captain G. P. Lenox Conyngham, R.E. and Lieut. G. A. Beazeley, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	1081 & 1116 Gr. 80	Feb. 12	22 13	E, W	62 51 51·94	− 1 27·03	24·91				
	" " "	" 13		W, E	51·90	27·39	24·51	24·71	1·0	0·52	0·2704
2	1138 & 1159 Gr. 80	Feb. 12	1 56	W, E	62 50 50·37	− 0 26·36	24·01				
	" " "	" 13		E, W	50·33	26·22	24·11	24·06	1·0	1·17	1·3689
3	1179 & 1192 Gr. 80	Feb. 12	10 57	E, W	62 44 38·68	+ 5 47·19	25·87				
	" " "	" 13		W, E	38·64	45·75	24·39	25·13	1·0	0·10	0·0100
4	1197 & 1221 Gr. 80	Feb. 12	3 2	W, E	62 36 47·30	+ 13 38·33	25·63				
	" " "	" 13		E, W	47·26	37·00	24·26				
	" " "	Mar. 24		W, E	45·85	39·79	25·64				
	" " "	" 26		E, W	45·82	39·02	24·84				
	" " "	" 27		W, E	45·80	40·53	26·33	25·34	0·9	0·11	0·0109
5	1221 & 1227 Gr. 80	Feb. 12	3 4	E, W	62 38 38·66	+ 11 46·40	25·06				
	" " "	" 13		W, E	38·61	45·85	24·46				
	" " "	Mar. 23		W, E	37·18	48·11	25·29				
	" " "	" 24		E, W	37·16	47·63	24·79				
	" " "	" 26		W, E	37·11	48·32	25·43				
	" " "	" 27		E, W	37·09	48·36	25·45	25·08	1·0	0·15	0·0225
6	1250 & 1261 Gr. 80	Feb. 12	10 7	E, W	63 9 41·91	− 19 15·65	26·26				
	" " "	Mar. 23		W, E	40·37	14·57	25·80				
	" " "	" 24		E, W	40·34	15·99	24·35				
	" " "	" 26		W, E	40·29	15·72	26·57	25·75	1·3	0·52	0·3515
7	1281 & 1298 Gr. 80	Mar. 23	5 14	E, W	63 7 0·07	− 16 33·52	26·55				
	" " "	" 24		W, E	0·04	33·92	26·12				
	" " "	" 26		E, W	6 59·97	35·05	24·92				
	" " "	" 27		W, E	59·94	33·60	26·34	25·98	1·3	0·75	0·7313
8	1324 & 1363 Gr. 80	Feb. 13	1 18	W, E	63 1 43·00	− 11 16·85	26·15				
	" " "	Mar. 23		W, E	41·01	15·05	25·96				
	" " "	" 24		E, W	40·97	16·15	24·82				
	" " "	" 26		W, E	40·88	13·95	26·93				
	" " "	" 27		E, W	40·84	16·38	24·46	25·66	0·9	0·43	0·1664
9	1324 Gr. 80 & 1011 Gr. 64	Mar. 26	1 4	W, E	62 47 30·66	+ 2 56·10	26·76				
	" " " "	" 27		E, W	30·61	54·16	24·77	25·77	0·7	0·54	0·2041
10	1363 & 1371 Gr. 80	Feb. 12	1 12	W, E	63 7 29·39	− 17 4·50	24·89				
	" " "	" 13		E, W	29·33	4·42	24·91				
	" " "	Mar. 23		E, W	27·25	2·10	25·15				
	" " "	" 24		W, E	27·21	1·23	25·98				
	" " "	" 26		E, W	27·11	1·42	25·69				
	" " "	" 27		W, E	27·06	1·60	25·46	25·35	1·0	0·12	0·0144

117. Agra Longitude station, 2nd visit—*Co-latitude* 62° 50′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
11	1371 Gr. 80 & 1011 Gr. 64	Mar. 26	0 58	W, E	62 53 16·89	− 2 51·37	25·52				
	" " " "	" 27		E, W	16 84	51 07	25·77	25·65	0·7	0·42	0·1235
12	1371 & 1390 Gr. 80	Feb. 12	1 8	E, W	63 3 8·90	− 12 44 86	24·04				
	" " "	" 13		W, E	8·85	43·31	25·54				
	" " "	Mar 23		W, E	6·72	41 11	25 61				
	" " "	" 24		E, W	6 67	40 95	25·72				
	" " "	" 26		W, E	6 57	40 75	25 82				
	" " "	" 27		E, W	6 52	40·51	26 01	25·46	1 0	0 23	0·0529
13	1324 & 1390 Gr. 80	Feb 13	1 14	W, E	62 57 22·51	− 6 55 85	26·66				
	" " "	Mar. 23		W, E	20 47	54 15	26 32				
	" " "	" 24		E, W	20 43	55 08	24 45				
	" " "	" 26		W, E	20 34	53 39	26·95				
	" " "	" 27		E, W	20 30	55 30	25 00	25 88	0 9	0 65	0 3803
14	1397 & 1407 Gr. 80	Feb 12	2 49	W, E	62 50 54·01	− 0 27 63	26·38				
	" " "	" 13		E, W	53 96	29 24	24·72	25·55	1·0	0 32	0·1024
15	1436 & 1450 Gr. 80	Feb. 12	6 12	W, E	63 1 44·10	− 11 18·83	25 27				
	" " "	" 13		E, W	44·05	18 38	25·67	25 47	1 0	0 24	0·0576
16	1452 & 1465 Gr. 80	Feb. 12	5 38	E, W	62 32 25·54	+ 17 58 39	23·93	23·93	0 5	1 30	0 8450
17	1465 & 1483 Gr. 80	Feb. 12	5 31	W, E	62 39 21 95	+ 11 2 70	24 65				
	" " "	" 13		E, W	21 90	3·31	25 21	24 93	0·7	0·30	0·0630
18	1493 & 1501 Gr. 80	Feb. 12	21 4	E, W	62 36 50 81	+ 13 34 34	25·15				
	" " "	" 13		W, E	50 76	33 44	24 20	24·68	1·0	0 55	0 3364
19	1511 & 1520 Gr. 80	Feb 12	2 37	W, E	62 32 34·70	+ 17 49·50	24·20				
	" " "	" 13		E, W	34 64	50 02	24 66	24·43	1 0	0 80	0 6400
20	1540 & 1570 Gr. 80	Feb 13	24 42	E, W	62 33 33·58	+ 16 52 99	26 57				
	" " "	Mar. 25		W, E	30 82	54·99	25·81				
	" " "	" 27		E, W	30 67	55 12	25·79	26 06	1 2	0 83	0 8267
21	1577 & 1583 Gr. 80	Feb. 12	9 59	E, W	63 7 48·89	− 17 23 81	25 08				
	" " "	" 13		W, E	48 84	23 07	25·77	25·43	1 0	0 20	0 0400
22	1599 & 1606 Gr. 80	Feb 12	3 6	W, E	62 39 34·18	+ 10 50·45	24·63				
	" " "	" 16		W, E	33·96	50 66	24 62	24·63	1 0	0·60	0 3600
23	1617 & 1637 Gr 80	Feb. 12	5 24	E, W	62 57 48·15	− 7 22·02	26 13				
	" " "	" 13		W, E	48·10	22 66	25 44				
	" " "	" 16		E, W	47 95	23 26	24 69	25·42	1·2	0 19	0·0433
24	1650 & 1664 Gr. 80	Feb. 14	16 28	E, W	63 2 35·31	− 12 8·31	27·00				
	" " "	" 16		W, E	35·22	9·52	25·70	26·35	1·0	1·12	1·2544
25	1690 & 1714 Gr. 80	Feb. 14	10 17	W, E	63 3 35 39	− 13 11·00	24·39				
	" " "	" 16		E, W	35·32	10 73	24 59				
	" " "	Mar. 24		E, W	32·28	5·96	26 32				
	" " "	" 25		W, E	32·17	6·01	26·16				
	" " "	" 27		E, W	31·95	6·74	25·21				
	" " "	" 31		E, W	31·50	6·36	25·14				
	" " "	Apr. 3		W, E	31·19	6·13	25·06	25 27	1 6	0 04	0·0026

117. Agra Longitude station, 2nd visit—*Co-latitude* 62° 50′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
26	1724 & 1728 Gr. 80	Feb. 14	3 45	W, E	62 32 0·03	+ 18 24·52	24·55				
	,, ,, ,,	,, 16		E, W	31 59·93	23·89	23·82				
	,, ,, ,,	Mar. 24		E, W	56·73	28·33	25·06				
	,, ,, ,,	,, 25		W, E	56·61	29·70	26·31				
	,, ,, ,,	,, 27		W, E	56·37	29·73	26·10				
	,, ,, ,,	,, 31		W, E	55·89	28·75	24·64				
	,, ,, ,,	Apr. 3		E, W	55·55	29·09	24·64	25·02	1·6	0·21	0·0706
27	1733 & 1746 Gr. 80	Feb. 14	1 37	E, W	63 6 4·74	− 15 39·47	25·27				
	,, ,, ,,	,, 16		W, E	4·67	39·37	25·30				
	,, ,, ,,	Mar. 24		W, E	1·54	34·88	26·66				
	,, ,, ,,	,, 25		E, W	1·41	36·96	24·45				
	,, ,, ,,	,, 31		E, W	0·71	35·71	25·00				
	,, ,, ,,	Apr. 3		W, E	0·37	35·70	24·67	25·23	1·0	0·00	0·0000
28	1733 & 1780 Gr. 80	Feb. 14	1 39	E, W	63 8 34·91	− 18 9·94	24·97				
	,, ,, ,,	,, 16		W, E	34·84	9·36	25·48				
	,, ,, ,,	Mar. 24		W, E	31·71	4·47	27·24				
	,, ,, ,,	,, 25		E, W	31·59	6·74	24·85				
	,, ,, ,,	,, 31		E, W	30·88	6·02	24·86				
	,, ,, ,,	Apr. 3		W, E	30·52	5·08	25·44	25·47	1·0	0·24	0·0576
29	1791 & 1802 Gr. 80	Feb. 14	6 17	W, E	62 38 17·13	+ 12 6·59	23·72				
	,, ,, ,,	,, 16		E, W	17·06	7·00	24·06				
	,, ,, ,,	Mar. 24		E, W	13·95	10·32	24·27				
	,, ,, ,,	,, 25		W, E	13·82	12·40	26·22				
	,, ,, ,,	,, 27		W, E	13·57	11·65	25·22				
	,, ,, ,,	,, 31		W, E	13·09	11·63	24·72				
	,, ,, ,,	Apr. 3		E, W	12·69	12·30	24·99	24·74	1·6	0·49	0·3842
30	1810 & 1825 Gr. 80	Feb. 14	16 19	E, W	62 35 34·29	+ 14 50·73	25·02				
	,, ,, ,,	,, 16		W, E	34·23	50·69	24·92				
	,, ,, ,,	Mar. 24		W, E	31·22	55·48	26·70				
	,, ,, ,,	,, 25		E, W	31·09	53·63	24·72				
	,, ,, ,,	,, 27		E, W	30·86	53·17	24·03				
	,, ,, ,,	,, 31		E, W	30·37	53·76	24·13				
	,, ,, ,,	Apr. 3		W, E	30·01	55·11	25·12	24·95	1·6	0·28	0·1254
31	1846 & 1861 Gr. 80	Feb. 16	18 26	E, W	62 45 45·42	+ 4 38·65	24·07				
	,, ,, ,,	,, 17		W, E	45·39	38·59	23·98				
	,, ,, ,,	Mar. 24		E, W	42·53	43·07	25·60				
	,, ,, ,,	,, 25		W, E	42·41	43·40	25·81				
	,, ,, ,,	,, 27		W, E	42·17	44·95	27·12				
	,, ,, ,,	,, 31		W, E	41·68	43·86	25·54				
	,, ,, ,,	Apr. 3		E, W	41·32	44·00	25·32	25·35	1·6	0·12	0·0230
32	1870 & 1874 Gr. 80	Mar. 24	11 7	W, E	62 40 19·50	+ 10 5·34	24·84				
	,, ,, ,,	,, 26		E, W	19·26	5·00	24·26				
	,, ,, ,,	,, 27		E, W	19·13	4·32	23·45				
	,, ,, ,,	,, 31		E, W	18·65	5·50	24·15				
	,, ,, ,,	Apr. 3		W, E	18·26	5·03	23·29	24·00	1·4	1·23	2·1181
33	1961 & 2009 Gr. 80	Mar. 24	14 29	E, W	62 33 46·65	+ 16 37·76	24·41				
	,, ,, ,,	,, 25		W, E	46·52	39·95	26·47				
	,, ,, ,,	,, 26		E, W	46·39	37·63	24·02				
	,, ,, ,,	,, 27		W, E	46·26	39·75	26·01				
	,, ,, ,,	Apr. 3		W, E	45·34	40·01	25·35	25·25	0·9	0·02	0·0004
34	1974 & 2009 Gr. 80	Mar. 24	14 14	E, W	62 48 3·21	+ 2 22·15	25·36				
	,, ,, ,,	,, 26		E, W	2·96	21·83	24·79				
	,, ,, ,,	Apr. 3		W, E	1·92	23·31	25·23	25·13	0·8	0·10	0·0080

117. Agra Longitude station, 2nd visit—*Co-latitude* 62° 50′ +

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
35	1940 & 1951 Gr 80	Mar 25	1 51	E, W	63 1 18 97	− 10 53 87	25 10				
	” ” ”	” 26		W, E	18·84	52 58	26 26				
	” ” ”	” 27		W, E	19 20	53 27	25 93				
	” ” ”	Apr 3		E, W	17 75	52 91	24 84	25·53	1 3	0 30	0 1170
36	1908 & 1939 Gr. 80	Mar. 31	12 4	E, W	62 28 44·83	+ 21 40 75	25 58				
	” ” ”	Apr. 3		W, E	44 41	41 20	25·61	25 60	1·0	0 37	0 1300
								Σ P - 38 7		Σ Pvv - 11 3197	

Summary.

No. of pairs 36
No. of observations 140

Mean difference between observations taken E, W and those taken W, E = − 0″·55

	°	′	″	″
Observed Co-latitude (weighted mean)	62	50	25·23	± 0·061
Correction for Height above Sea-level		+	0·02	
Corrected Co-latitude	62	50	25·25	± 0·061
” ” by 1st visit	62	50	25·51	± 0·061
Final Co-latitude	**62**	**50**	**25·38**	**±0·043**

		°	′	″	″
Astronomical Latitude (A)	=	27	9	34·62	± 0·043
Geodetic Latitude (G)	=	27	9	39·93	
Deflection of plumb-line (A − G)	=		−	5·31	

118. Agra parade point—*Co-latitude* 62° 51′ +

Latitude	... 27° 9′	*Instrument*—Zenith Telescope	
Longitude	... 78 4	*Mean Height of Barometer*	in. 29·24
Height	... 550 feet	*Mean Temperature*	78°·6

Observers—Captain G. P. Lenox Conyngham, R.E. and Lieut. G. A. Beazeley, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	1227 & 1221 Gr. 80 " " "	Mar. 17 " 18	3 4	E, W W, E	62 38 37·34 37·32	+ 12 31·07 30·65	8·41 7·97	8·19	1·0	0·39	0·1521
2	1250 & 1261 Gr. 80 " " "	Mar. 17 " 18	10 7	W, E E, W	63 9 40·55 40·52	− 18 32·46 32·75	8·09 7·77	7·93	1·0	0·13	0·0169
3	1281 & 1298 Gr. 80 " " "	Mar. 17 " 18	5 14	W, E E, W	63 7 0·27 0·24	− 15 52·30 52·72	7·97 7·52	7·75	1·0	0·05	0·0025
4	1324 & 1363 Gr. 80 " " "	Mar. 17 " 18	1 18	E, W W, E	63 1 41·31 41·25	− 10 33·16 32·56	8·15 8·69	8·42	1·0	0·62	0·3844
5	1324 & 1390 Gr. 80 " " "	Mar. 17 " 18	1 4	E, W W, E	62 57 20·77 20·72	− 6 14·13 11·60	6·64 9·12	7·88	0·7	0·08	0·0045
6	1363 & 1371 Gr. 80 " " "	Mar. 17 " 18	1 13	W, E E, W	63 7 27·58 27·52	− 16 18·52 19·89	9·06 7·63	8·35	0·7	0·55	0·2118
7	1371 & 1390 Gr. 80 " " "	Mar. 17 " 18	0 58	E, W W, E	63 3 7·04 6·99	− 11 59·29 12 0·16	7·75 6·83	7·29	0·7	0·51	0·1821
8	1397 & 1407 Gr. 80 " " "	Mar. 17 " 18	2 49	W, E E, W	62 50 52·01 51·95	+ 0 16·63 15·82	8·64 7·77	8·21	1·0	0·41	0·1681
9	1436 & 1450 Gr. 80 " " "	Mar. 17 " 18	6 11	W, E E, W	63 1 42·02 41·95	− 10 33·52 34·42	8·50 7·53	8·02	1·0	0·22	0·0484
10	1452 & 1465 Gr. 80 " " "	Mar. 17 " 18	5 38	E, W W, E	62 32 23·37 23·30	+ 18 45·31 44·20	8·68 7·50	8·09	0·7	0·29	0·[illegible]89
11	1465 & 1483 Gr. 80	Mar. 18	5 31	E, W	62 39 19·59	+ 11 48·06	7·65	7·6[illegible]	0·5	0·15	0·0113
12	1493 & 1501 Gr. 80 " " "	Mar. 17 " 18	21 4	E, W W, E	62 36 48·65 48·58	+ 14 19·49 20·45	8·14 9·03	8·59	1·0	0·79	0·6241
13	1511 & 1520 Gr. 80 " " "	Mar. 17 " 18	2 37	W, E E, W	62 32 32·77 32·19	+ 18 36·57 35·12	9·34 7·31	8·33	1·0	0·53	0·2809

118. Agra parade point—*Co-latitude* 62° 51′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
14	1540 & 1570 Gr. 80	Mar. 17	24 42	E, W	62 33 31·44	+ 17 36·73	8·17				
	„ „ „	„ 18		W, E	31·36	37·91	9·27	8·72	1·0	0·92	0·8464
15	1577 & 1583 Gr. 80	Mar. 17	9 59	W, E	63 7 46·49	− 16 37·95	8·54				
	„ „ „	„ 18		E, W	46·40	41·08	5·32	6·93	1·0	0·87	0·7569
16	1599 & 1606 Gr. 80	Mar. 17	3 6	W, E	62 39 31·61	+ 11 35·89	7·50				
	„ „ „	„ 18		E, W	31·51	35·61	7·12	7·31	1·0	0·49	0·2401
17	1617 & 1637 Gr. 80	Mar. 17	5 23	E, W	62 57 45·66	− 6 39·64	6·02				
	„ „ „	„ 18		W, E	45·56	36·80	8·76	7·39	1·0	0·41	0·1681
18	1650 & 1664 Gr. 80	Mar. 17	16 28	W, E	63 2 33·00	− 11 24·31	8·69				
	„ „ „	„ 18		E, W	32·90	24·92	7·98	8·34	1·0	0·54	0·2916
19	1690 & 1714 Gr. 80	Mar. 17	10 18	W, E	63 3 33·01	− 12 24·19	8·82				
	„ „ „	„ 18		E, W	32·91	26·00	6·91				
	„ „ „	Apr. 1		E, W	31·40	23·82	7·58				
	„ „ „	„ 2		W, E	31·29	22·46	8·83	8·04	1·3	0·24	0·0749
20	1724 & 1728 Gr. 80	Mar. 17	3 45	E, W	62 31 57·53	+ 19 9·25	6·78				
	„ „ „	„ 18		W, E	57·42	11·10	8·52				
	„ „ „	Apr. 1		W, E	55·78	10·75	6·53				
	„ „ „	„ 2		E, W	55·66	11·68	7·34	7·29	1·3	0·51	0·3381
21	1733 & 1746 Gr. 80	Mar. 17	1 37	W, E	63 6 2·34	− 14 54·29	8·05				
	„ „ „	„ 18		E, W	2·23	55·02	7·21				
	„ „ „	Apr. 1		E, W	0·60	52·78	7·82	7·69	0·8	0·11	0·0097
22	1780 & 1733 Gr. 80	Mar. 17	1 40	E, W	63 8 32·53	− 17 24·59	7·94				
	„ „ „	„ 18		W, E	32·42	24·87	7·55				
	„ „ „	Apr. 1		W, E	30·76	22·49	8·27	7·92	0·8	0·12	0·0115
23	1791 & 1802 Gr. 80	Mar. 17	6 17	E, W	62 38 14·76	+ 12 50·46	5·22				
	„ „ „	„ 18		W, E	14·65	53·70	8·35				
	„ „ „	Apr. 1		W, E	12·96	53·71	6·67				
	„ „ „	„ 2		E, W	12·83	54·14	6·97	6·80	1·3	1·00	1·3000
24	1810 & 1825 Gr. 80	Mar. 17	16 20	W, E	62 35 32·03	+ 15 36·33	8·36				
	„ „ „	„ 18		E, W	31·91	35·58	7·49				
	„ „ „	Apr. 1		E, W	30·25	37·26	7·51				
	„ „ „	„ 2		W, E	30·13	37·92	8·05	7·85	1·3	0·05	0·0033
25	1846 & 1861 Gr. 80	Apr. 1	18 26	W, E	62 45 41·56	+ 5 26·82	8·38				
	„ „ „	„ 2		E, W	41·44	26·68	8·12	8·25	1·0	0·45	0·2025
26	1870 & 1874 Gr. 80	Apr. 1	11 7	E, W	62 40 18·52	+ 10 48·17	6·69				
	„ „ „	„ 2		W, E	18·39	48·83	7·22	6·96	1·0	0·84	0·7056

118. Agra parade point—*Co-latitude* 62° 51′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
27	1908 & 1939 Gr. 80	Apr. 1	12 4	E, W	62 28 44·69	+ 22 23·34	8·03				
	" " "	" 2		W, E	44·55	23·41	7·96	8·00	1·0	0·20	0·0400
28	1940 & 1954 Gr. 80	Apr. 2	1 51	E, W	63 1 17·89	− 10 11·41	6·48	6·48	0·7	1·32	1·2197
29	1961 & 2009 Gr. 80	Apr. 2	14 29	W, E	62 33 45·47	+ 17 21·96	7·43	7·43	0·5	0·37	0·0685
30	1974 & 2009 Gr. 80	Apr. 2	14 14	W, E	62 48 2·05	+ 3 5·45	7·50	7·50	0·5	0·30	0·0450
								Σ P = 27·8		Σ Pvv = 8·4679	

Summary.

No. of pairs 30

No. of observations 66

Mean difference between observations taken E, W and those taken W, E = − 0″·80

Observed Co-latitude (weighted mean) 62° 51′ 7″·80 ± 0″·069

Correction for Height above Sea-level + 0″·02

Final Co-latitude 62° 51′ 7″·82

		°	′	″	
Astronomical Latitude (A)	=	27	8	52·18	± 0·069
Geodetic Latitude (G)	=	27	8	57·47	
Deflection of plumb-line (A−G)	=		−	5·29	

119. Ahmadpur—*Co-latitude* 66° 23′ +

Latitude	.. 23° 36′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	77 43	*Mean Height of Barometer*	in. 28·11
Height	1713 feet	*Mean Temperature*	84°·4

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	1539 & 1572 Gr. 80 „ „ „	Mar. 26 „ 27	11 40	W, E E, W	66 36 14 37 14 31	− 12 33 94 32 07	40·43 42 24	41 34	0·7	0·17	0·0202
2	1572 & 1550 Gr. 80 „ „ „	Mar 26 „ 27	11 33	E, W W, E	66 43 9·66 9 59	− 19 29·31 28 46	40·35 41·13	40·74	0·7	0·77	0·4150
3	1577 & 1596 Gr. 80 „ „ „	Mar 26 „ 28	13 15	E, W W, E	66 24 14·17 14·01	− 0 32 22 33 79	41 95 40 22	41·09	0·7	0 42	0 1235
4	1596 & 1580 Gr. 80 „ „ „	Mar 26 „ 28	12 58	W, E E, W	66 41 36 65 36 49	− 17 55 01 55·35	41·64 41 14	41·39	0·7	0·12	0·0101
5	1603 & 1637 Gr. 80 „ „ „	Mar. 26 „ 28	8 59	W, E E, W	66 33 4·44 4 28	− 9 22·91 23 04	41·53 41·24	41·39	1·0	0·12	0 0144
6	1662 & 1681 Gr. 80 „ „ „	Mar. 26 „ 28	8 15	E, W W, E	66 16 35·52 35 33	+ 7 6 16 5·85	41·68 41·18	41·43	0·7	0·08	0·0045
7	1690 & 1705 Gr. 80 „ „ „	Mar. 26 „ 28	13 42	E, W W, E	66 28 41·27 41 09	− 5 0·64 4 59 52	40·63 41·57	41·10	0·7	0·41	0·1177
8	1705 & 1709 Gr. 80 „ „ „	Mar. 26 „ 28	13 31	W, E E, W	66 39 55·34 55·16	− 16 14 63 14·08	40·71 41·08	40·90	0·7	0·61	0·2605
9	1717 & 1730 Gr. 80 „ „ „	Mar. 26 „ 28	4 19	E, W W, E	66 15 58 16 57·96	+ 7 43·92 43 19	42 08 41 15	41·62	0·7	0·11	0·0085
10	1751 & 1759 Gr. 80 „ „ „	Mar. 26 „ 28	17 10	W, E E, W	66 11 50·39 50·18	+ 11 52·28 50·28	42·67 40·46	41·57	0·7	0·06	0 0025
11	2060 & 2107 Gr. 80 „ „ „	Mar. 26 „ 28	13 53	E, W W, E	66 10 47·40 47·17	+ 12 52·87 54·98	40·27 42·15	41·21	0 7	0·30	0 0630
12	2124 & 2148 Gr. 80 „ „ „	Mar. 26 „ 28	2 53	W, E E, W	66 40 5·38 5·13	− 16 22·94 22·54	42·44 42·59	42·51	1·0	1·00	1·0000
13	2167 & 2173 Gr. 80 „ „ „	Mar. 26 „ 28	4 33	E, W W, E	66 33 36·64 36·40	− 9 51·17 56·55	45·47 39·85	42·66	1·0	1·15	1·3225

119. Ahmadpur—*Co-latitude* 66° 23′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1899	° ′		° ′ ″	′ ″	″	″			
14	2176 & 2200 Gr. 80 " " "	Mar. 26 " 28	1 42	W, E E, W	66 7 35·28 35·04	+ 16 5·34 7·74	40·62 42·78	41·70	0·7	0·19	0·0253
15	2248 & 2266 Gr. 80 " " "	Mar. 26 " 28	6 59	W, E E, W	66 10 22·92 22·70	+ 13 17·24 19·18	40·16 41·88	41·02	0·7	0·49	0·1681
16	1256 & 1265 Gr. 80 " " "	Mar. 27 " 29	1 32	E, W W, E	66 17 39·15 39·11	+ 5 59·92 6 2·84	39·07 41·95	40·51	0·7	1·00	0·7000
17	1297 & 1300 Gr. 80 " " "	Mar. 27 " 29	7 34	W, E E, W	66 23 20·26 20·21	+ 0 21·47 23·09	41·73 43·30	42·52	1·0	1·01	1·0201
18	1324 & 1327 Gr. 80 " " "	Mar. 27 " 29	4 46	E, W W, E	66 29 16·25 16·17	− 5 34·51 32·96	41·74 43·21	42·47	1·0	0·96	0·9216
19	1363 & 1383 Gr. 80 " " "	Mar. 27 " 29	1 54	E, W W, E	66 13 45·83 45·74	+ 9 56·88 56·75	42·71 42·49	42·60	0·5	1·09	0·5941
20	1383 & 1390 Gr. 80 " " "	Mar. 27 " 29	1 58	W, E E, W	66 9 25·83 25·74	+ 14 16·77 14·65	42·60 40·39	41·49	0·5	0·02	0·0002
21	1397 & 1413 Gr. 80 " " "	Mar. 27 " 29	6 18	E, W W, E	66 19 57·34 57·26	+ 3 44·36 44·39	41·70 41·65	41·68	0·7	0·17	0·0202
22	1428 & 1450 Gr. 80 " " "	Mar. 27 " 29	9 19	W, E E, W	66 9 7·76 7·64	+ 14 35·28 34·40	43·04 42·04	42·54	0·5	1·03	0·5305
23	1452 & 1428 Gr. 80 " " "	Mar. 27 " 29	9 17	E, W W, E	66 11 14·60 14·48	+ 12 26·82 26·80	41·42 41·28	41·35	0·5	0·16	0·0128
24	1470 & 1474 Gr. 80 " " "	Mar. 27 " 29	5 18	E, W W, E	66 10 28·51 28·39	+ 13 13·78 13·78	42·29 42·17	42·23	0·5	0·72	0·2592
25	1482 & 1490 Gr. 80 " " "	Mar. 27 " 29	7 37	W, E E, W	66 39 31·63 31·51	− 15 50·58 50·43	41·05 41·08	41·06	0·7	0·45	0·1418
26	1490 & 1500 Gr. 80 " " "	Mar. 27 " 29	7 30	E, W W, E	66 32 12·51 12·40	− 8 32·61 31·49	39·90 40·91	40·41	0·7	1·10	0·8470
27	1511 & 1529 Gr. 80 " " "	Mar. 27 " 29	1 14	W, E E, W	66 22 26·44 26·31	+ 1 13·64 15·28	40·08 41·59	40·83	1·0	0·68	0·4624
28	1817 & 1825 Gr. 80 " " "	Mar. 27 " 29	20 5	W, E E, W	66 21 31·99 31·80	+ 2 11·16 9·08	43·15 40·88	42·02	0·5	0·51	0·1301

119. Ahmadpur—*Co-latitude* 66° 23′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P.D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
29	1825 & 1819 Gr. 80 " " "	Mar. 27 " 29	20 10	E, W W, E	66 26 3·99 3·79	− [illegible] 22·70 22·61	41·29 41·18	41·24	0·7	0·27	0·0510
30	1819 & 1843 Gr. 80 " " "	Mar. 27 " 29	20 24	W, E E, W	66 12 20·08 19·88	+ 11 20·99 21·42	41·07 41·30	41·18	0·5	0·33	0·0545
31	1843 & 1817 Gr. 80 " " "	Mar. 27 " 29	20 19	E, W W, E	66 7 48·08 47·89	+ 15 54·84 53·10	42·92 40·99	41·96	0·5	0·45	0·1013
32	1861 & 1870 Gr. 80 " " "	Mar. 27 " 29	14 49	E, W W, E	66 22 47·64 47·45	+ 0 53·18 54·58	40·82 42·03	41·42	0·7	0·09	0·0057
33	1870 & 1888 Gr. 80 " " "	Mar. 27 " 29	14 35	W, E E, W	66 8 10·96 10·75	+ 15 31·41 29·87	42·37 40·62	41·50	0·5	0·01	0·0001
34	1929 & 1940 Gr. 80 " " "	Mar. 27 " 29	5 15	E, W W, E	66 24 53·26 53·01	− 1 11·59 13·74	41·67 39·27	40·47	0·7	1·04	0·7571
35	1940 & 1965 Gr. 80 " " "	Mar. 27 " 29	4 57	W, E E, W	66 7 25·52 25·28	+ 16 15·68 15·70	41·20 40·98	41·09	0·5	0·42	0·0882
								ΣP = 24·3		ΣPvv = 10·2537	

Summary.

No. of pairs 35

No. of observations 70

Mean difference between observations taken E, W and those taken W, E = + 0″·08

Observed Co-latitude (weighted mean) 66° 23′ 41″·51 ± 0″·075

Correction for Height above Sea-level + 0″·07

Final Co-latitude 66° 23′ 41″·58

		° ′ ″	″
Astronomical Latitude (A)	=	23 36 18·42	± 0·075
Geodetic Latitude (G)	=	23 36 20·88	
Deflection of plumb-line (A−G)	=	− 2·46	

120. Akbar—*Co-latitude* 59° 6′ +

Latitude	... 30° 54′	*Instrument*—Zenith Telescope		
Longitude	... 73 20	*Mean Height of Barometer*	in. 29·36	
Height	... 641 feet	*Mean Temperature*	69°·4	

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
1	437 & 454 Newcomb	Mar. 24	10 36	E, W	58 41 39·36	+ 24 40·66	20·02				
	„ „ „	„ 25		W, E	39·36	41·77	21·13	20·58	1·0	0·86	0·7396
2	461 & 471 Newcomb	Mar. 24	8 40	W, E	59 10 40·49	− 4 18·60	21·89				
	„ „ „	„ 25		E, W	40·47	18·55	21·92	21·91	1·0	0·47	0·2209
3	476 & 489 Newcomb	Mar. 24	3 25	W, E	58 35 54·27	+ 30 27·12	21·39				
	„ „ „	„ 25		E, W	54·24	27·34	21·58	21·49	1·0	0·05	0·0025
4	485 & 489 Newcomb	Mar. 24	3 51	W, E	59 2 17·00	+ 4 5·69	22·69				
	„ „ „	„ 25		E, W	16·97	4·64	21·61	22·15	1·0	0·71	0·5041
5	496 & 498 Newcomb	Mar. 24	2 43	E, W	59 2 23·01	+ 3 58·55	21·56				
	„ „ „	„ 25		W, E	22·97	59·00	21·97	21·77	0·7	0·33	0·0762
6	498 & 517 Newcomb	Mar. 24	2 48	W, E	59 8 11·67	− 1 49·76	21·91				
	„ „ „	„ 25		E, W	11·63	49·60	22·03	21·97	0·7	0·53	0·1966
7	520 & 529 Newcomb	Mar. 24	21 10	E, W	59 21 38·32	− 15 16·71	21·61				
	„ „ „	„ 25		W, E	38·27	16·43	21·84	21·73	1·0	0·29	0·0841
8	533 & 534 Newcomb	Mar. 24	12 26	W, E	58 55 27·26	+ 10 53·48	20·74				
	„ „ „	„ 25		E, W	27·20	53·90	21·10	20·92	0·7	0·52	0·1893
9	533 & 542 Newcomb	Mar. 24	12 33	W, E	59 2 5·51	+ 4 16·26	21·77				
	„ „ „	„ 25		E, W	5·45	15·40	20·85	21·31	0·7	0·13	0·0118
10	1450 Gr. 80 & 552 Newc.	Mar. 24	2 1	E, W	58 52 3·72	+ 14 17·72	21·44				
	„ „ „ „	„ 25		W, E	3·70	18·08	21·78	21·61	0·7	0·17	0·0202
11	1452 Gr. 80 & 558 Newc.	Mar. 24	1 59	E, W	58 54 10·74	+ 12 9·72	20·46				
	„ „ „ „	„ 25		W, E	10·67	10·35	21·02	20·74	0·7	0·70	0·3430
12	1495 & 1508 Gr. 80	Mar. 24	2 30	E, W	59 12 38·61	− 6 16·81	21·80				
	„ „ „	„ 25		W, E	38·53	16·77	21·76	21·78	1·0	0·34	0·1156
13	587 & 593 Newcomb	Mar. 26	12 45	E, W	59 7 38·25	− 1 16·70	21·55				
	„ „ „	„ 27		W, E	38·15	16·15	22·00	21·78	1·0	0·34	0·1156
14	604 & 619 Newcomb	Mar. 26	20 54	W, E	58 46 2·31	+ 20 18·55	20·86				
	„ „ „	„ 27		E, W	2·19	18·75	20·94	20·90	1·0	0·54	0·2916
15	621 Newc. & 1613 Gr. 80	Mar. 26	16 1	E, W	59 31 29·67	− 25 7·58	22·09				
	„ „ „ „	„ 27		W, E	29·55	6·95	22·60	22·35	1·0	0·91	0·8281

120. Akbar—*Co-latitude* 59° 6′ +

Serial No of Pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
16	630 Newc & 1646 Gr. 80 " " " "	Mar 26 " 27	4 38	W, E E, W	58 54 11·10 10·96	+ 12 1[illegible]·41 10·49	21·51 21·45	21·48	1·0	0·04	0·0016
17	653 & 657 Newcomb " " "	Mar. 26 " 27	10 50	E, W W, E	58 50 1·16 1·02	+ 16 19·79 20·25	20·95 21·27	21·11	1·0	0·33	0·1089
18	666 & 682 Newcomb " " "	Mar 26 " 27	26 12	W, E E, W	59 42 33·53 33·40	− 36 12·50 13·18	21·03 20·22	20·63	0·7	0·81	0·459[illegible]
19	671 & 682 Newcomb " " "	Mar. 26 " 27	26 45	W, E E, W	59 9 25·68 25·55	− 3 4·62 5·91	21·06 19·64	20·35	0·7	1·09	0·8317
20	697 Newc. & 1762 Gr. 80 " " " "	Mar 26 " 27	10 8	W, E E, W	59 10 8·31 8·19	− 3 48·38 46·62	19·96 21·57	20·77	1·0	0·67	0·4489
21	708 & 713 Newcomb " " "	Mar 26 " 27	14 32	E, W W, E	59 30 3·17 3·01	− 23 41·73 40·74	21·41 22·27	21·86	1·0	0·42	0·1764
22	715 & 723 Newcomb " " "	Mar 26 " 27	19 29	W, E E, W	59 27 30·76 30·61	− 21 8·71 8·75	22·05 21·86	21·96	1·0	0·52	0·2704
23	739 & 748 Newcomb " " "	Mar 26 " 27	23 35	E, W W, E	59 20 22·70 22·55	− 14 0·80 1·92	21·91 20·63	21·27	0·7	0·17	0·0202
24	748 & 753 Newcomb " " "	Mar 26 " 27	23 33	W, E E, W	59 17 54·76 54·61	− 11 33·05 33·16	21·71 21·45	21·58	0·7	0·14	0·0137
25	768 & 787 Newcomb " " "	Mar 26 " 27	9 53	W, E E, W	58 40 36·51 36·33	+ 25 44·82 44·89	21·33 21·22	21·28	1·0	0·16	0·0256
								Σ P	22·0	Σ Pvv = 6·0959	

Summary.

No. of pairs 25
No. of observations 50

Mean difference between observations taken E, W and those taken W, E = − 0″·24

Observed Co-latitude (weighted mean) 59° 6′ 21″·44 ± 0″·073

Correction for Height above Sea-level + 0″·03

Final Co-latitude 59° 6′ 21″·47

		°	′	″	″
Astronomical Latitude (A)	=	30	53	38·53	± 0·073
Geodetic Latitude (G)	=	30	53	43·27	
Deflection of plumb-line (A − G)	=			− 4·74	

121. Akyab—*Co-latitude* 69° 51′ +

Latitude	... 20° 8′	*Instrument*—Zenith Telescope	
Longitude	... 92 56	*Mean Height of Barometer*	in. 29·92
Height	... 20 feet	*Mean Temperature*	65°·2

Observer—Captain H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1905	° ′		° ′ ″	′ ″	″	″			
1	347 Gr. 80 & 153 Newc.	Jan. 23	12 27	W, E	69 31 27·80	+ 20 16·78	44·58				
	" " " "	" 24		E, W	27·96	16·07	44·03	44·31	1·0	0·82	0·6724
2	170 & 183 Newcomb	Jan. 23	29 4	E, W	70 13 31·37	− 21 46·83	44·54				
	" " "	" 24		W, E	31·50	46·66	44·84				
	" " "	" 27		E, W	31·88	46·96	44·92	44·79	0·6	0·34	0·0694
3	183 & 196 Newcomb	Jan. 23	29 16	W, E	70 0 49·60	− 9 4·44	45·16				
	" " "	" 24		E, W	49·71	4·44	45·27				
	" " "	" 27		W, E	50·04	4·41	45·63	45·34	0·6	0·21	0·0265
4	199 & 209 Newcomb	Jan. 23	0 43	E, W	69 54 53·09	− 3 8·54	44·55				
	" " "	" 24		W, E	53·20	7·89	45·31				
	" " "	" 27		E, W	53·56	8·81	44·75	44·98	1·0	0·15	0·0225
5	211 & 221 Newcomb	Jan. 23	29 39	W, E	70 7 45·39	− 16 1·09	44·30				
	" " "	" 24		E, W	45·49	0·19	45·30				
	" " "	" 27		W, E	45·78	0·27	45·51	45·11	0·6	0·02	0·0002
6	252 & 258 Newcomb	Jan. 23	8 16	E, W	69 31 4·86	+ 20 40·46	45·32				
	" " "	" 24		W, E	4·93	39·50	44·43	44·88	1·0	0·25	0·0625
7	322 & 329 Newcomb	Jan. 22	25 34	W, E	69 39 20·62	+ 12 23·79	44·41				
	" " "	" 24		E, W	20·67	24·66	45·33	44·87	1·0	0·26	0·0676
8	332 & 338 Newcomb	Jan. 22	20 15	E, W	70 13 57·64	− 22 12·64	45·00				
	" " "	" 23		W, E	57·67	13·10	44·57				
	" " "	" 24		W, E	57·69	12·29	45·40	45·00	0·6	0·13	0·0101
9	332 & 350 Newcomb	Jan. 22	20 12	E, W	70 10 45·52	− 19 0·52	45·00				
	" " "	" 23		W, E	45·54	0·87	44·67				
	" " "	" 24		W, E	45·57	0·76	44·81	44·87	0·6	0·26	0·0406
10	369 & 373 Newcomb	Jan. 22	29 45	W, E	69 57 41·16	− 5 55·61	45·55				
	" " "	" 24		E, W	41·17	55·70	45·47	45·51	1·0	0·38	0·1444
11	1025 & 1059 Gr. 80	Jan. 22	0 29	E, W	70 20 15·78	− 28 30·24	45·54				
	" " "	" 23		W, E	15·78	30·37	45·41	45·48	0·5	0·35	0·0613
12	1059 Gr. 80 & 419 Newc.	Jan. 22	0 33	W, E	70 16 18·88	− 24 33·70	45·18				
	" " " "	" 23		E, W	18·88	33·84	45·04	45·11	0·5	0·02	0·0002

121. Akyab—*Co-latitude* 69° 51′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1905	° ′		° ′ ″	′ ″	″	″			
13	1127 Gr. 80 & 433 Newc. " " " "	Jan 22 " 23	7 33	E, W W, E	69 27 18·76 18·76	+ 24 26·35 26·73	45·11 45·49	45·30	0·8	0·17	0·0231
14	435 Newc. & 1192 Gr. 80 " " " "	Jan. 22 " 23	17 50	W, E E, W	69 39 11·35 11·35	+ 12 33·76 33·63	45·11 44·98	45·05	1·0	0·08	0·0064
15	462 & 475 Newcomb	Jan. 25	20 36	E, W	69 44 33·21	+ 7 11·90	45·11	45·11	1·0	0·02	0·0004
16	476 & 482 Newcomb	Jan. 25	7 54	W, E	69 54 27·93	− 2 42·65	45·28	45·28	0·5	0·15	0·0113
17	482 & 485 Newcomb	Jan. 25	7 27	E, W	70 20 52·16	− 29 6·68	45·48	45·48	0·5	0·35	0·0613
18	489 & 492 Newcomb	Jan. 25	14 40	W, E	69 52 3·71	− 0 17·44	46·27	46·27	0·7	1·14	0·9097
19	495 & 511 Newcomb	Jan. 25	4 18	E, W	69 40 4·40	+ 11 40·96	45·36	45·36	1·0	0·23	0·0529
								Σ P	14·5	Σ Pvv =	2·2428

Summary.

No. of pairs 19
No. of observations 39

Mean difference between observations taken E, W and those taken W, E = − 0″·04

Observed Co-latitude (weighted mean) 69° 51′ 45″·13 ±0″·063

Correction for Height above Sea-level + 0″·00

Final Co-latitude 69° 51′ 45″·13

		°	′	″	″
Astronomical Latitude (A)	=	20	8	14·87	±0·063
Geodetic Latitude (G)	=	20	8	12·86	
Deflection of plumb-line (A—G)	=		+	2·01	

122. Alamkhan—*Co-latitude* 65° 10′ +

Latitude ... 24° 50′ *Instrument*—Zenith Telescope

Longitude ... 68 46 *Mean Height of Barometer* 29·95 in.

Height ... 67 feet *Mean Temperature* 51°·1

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
1	165 & 170 Newcomb	Feb. 6	24 27	E, W	65 38 33·34	− 28 3·80	29·54	29·54	0·7	0·04	0·0011
2	414 Gr. 80 & 185 Newc.	Feb. 5	3 57	E, W	65 6 29·07	+ 4 0·60	29·67				
	„ „ „ „	„ 6		W, E	29·13	0·64	29·77	29·72	1·0	0·22	0·0484
3	186 & 195 Newcomb	Feb. 6	16 2	E, W	65 27 17·12	− 16 47·77	29·35	29·35	0·7	0·15	0·0158
4	471 Gr. 80 & 203 Newc.	Feb. 5	4 1	W, E	65 18 37·06	− 8 6·71	30·35				
	„ „ „ „	„ 6		E, W	37·11	6·59	30·52	30·44	0·7	0·94	0·6185
5	471 Gr. 80 & 209 Newc.	Feb. 5	3 58	W, E	65 15 14·42	− 4 43·88	30·54				
	„ „ „ „	„ 6		E, W	14·47	44·12	30·35	30·45	0·7	0·95	0·6318
6	229 & 236 Newcomb	Feb. 5	0 36	W, E	65 35 35·39	− 25 5·26	30·13				
	„ „ „	„ 6		E, W	35·44	5·65	29·79	29·96	0·7	0·46	0·1481
7	229 & 238 Newcomb	Feb. 5	0 37	W, E	65 35 40·94	− 25 11·03	29·91				
	„ „ „	„ 6		E, W	40·99	11·99	29·00	29·46	0·7	0·04	0·0011
8	589 Gr 80 & 248 Newc.	Feb. 5	14 27	E, W	64 43 4·18	+ 27 25·02	29·20	29·20	0·7	0·30	0·0630
9	660 Gr. 80 & 268 Newc.	Feb. 5	15 48	E, W	65 33 38·25	− 23 8·00	30·25				
	„ „ „ „	„ 6		W, E	38·26	8·74	29·52	29·89	1·0	0·39	0·1521
10	273 & 283 Newcomb	Feb. 5	9 27	W, E	65 7 28·97	+ 3 0·48	29·45				
	„ „ „	„ 6		E, W	28·99	0·86	29·85	29·65	0·7	0·15	0·0158
11	273 & 287 Newcomb	Feb. 5	9 51	W, E	65 31 3·09	− 20 33·14	29·95				
	„ „ „	„ 6		E, W	3·11	33·06	30·05	30·00	0·7	0·50	0·1750
12	740 & 776 Gr. 80	Feb. 5	12 30	E, W	65 11 13·13	− 0 43·51	29·62				
	„ „ „	„ 6		W, E	13·15	43·59	29·56	29·59	0·7	0·09	0·0057
13	749 & 776 Gr. 80	Feb. 5	12 39	E, W	65 20 29·58	− 9 59·75	29·83				
	„ „ „	„ 6		W, E	29·59	59·69	29·90	29·87	0·7	0·37	0·0958
14	305 & 313 Newcomb	Feb. 5	19 7	W, E	65 26 37·20	− 16 7·47	29·73				
	„ „ „	„ 6		E, W	37·20	6·90	30·30	30·02	1·0	0·52	0·2704
15	327 Newc. & 869 Gr. 80	Feb. 5	13 35	W, E	65 12 6·17	− 1 36·75	29·42				
	„ „ „ „	„ 6		E, W	6·16	36·32	29·84	29·63	1·0	0·13	0·0169

122. Alamkhan—*Co-latitude* 65° 10′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
16	343 Newc. & 902 Gr. 80 " " " "	Feb. 5 " 6	3 20	E, W W, E	64 48 44·37 44·35	+ 21 45·02 44·64	29·39 28·99	29·19	1·0	0·31	0·0961
17	348 Newc. & 943 Gr. 80 " " " "	Feb. 5 " 6	7 35	W, E E, W	65 27 6·20 6·18	− 16 35·89 36·40	30·31 29·78	30·05	0·7	0·55	0·2118
18	348 & 371 Newcomb " " "	Feb. 5 " 6	7 13	W, E E, W	65 5 42·90 42·89	+ 4 46·89 46·81	29·79 29·70	29·75	0·7	0·25	0·0438
19	374 & 391 Newcomb " " "	Feb. 5 " 6	14 45	E, W W, E	65 37 3·66 3·65	− 26 33·43 33·83	30·23 29·82	30·03	1·0	0·53	0·2809
20	1025 & 1058 Gr. 80 " " "	Feb. 7 " 8	4 42	E, W W, E	65 9 49·19 49·18	+ 0 39·37 40·74	28·56 29·92	29·24	0·7	0·26	0·0473
21	1058 Gr. 80 & 419 Newc. " " " "	Feb. 7 " 8	4 38	W, E E, W	65 5 48·29 48·28	+ 4 41·17 41·31	29·46 29·59	29·53	0·7	0·03	0·0006
22	426 & 430 Newcomb " " "	Feb. 7 " 8	14 45	E, W W, E	65 16 8·24 8·23	− 5 38·67 39·02	29·57 29·21	29·39	1·0	0·11	0·0121
23	440 & 458 Newcomb " " "	Feb. 7 " 8	9 0	E, W W, E	64 55 2·24 2·23	+ 15 27·60 26·87	29·84 29·10	29·47	0·7	0·03	0·0006
24	440 & 464 Newcomb " " "	Feb. 7 " 8	8 53	E, W W, E	64 47 53·54 53·52	+ 22 35·55 35·24	29·09 28·76	28·93	0·7	0·57	0·2274
25	468 & 479 Newcomb " " "	Feb. 7 " 8	16 17	W, E E, W	65 13 42·19 42·18	− 3 12·47 12·60	29·72 29·58	29·65	0·7	0·15	0·0158
26	475 & 479 Newcomb " " "	Feb. 7 " 8	16 11	W, E E, W	65 19 34·89 34·87	− 9 6·07 5·70	28·82 29·17	29·00	0·7	0·50	0·1750
27	484 Newc. & 1311 Gr. 80 " " " "	Feb. 7 " 8	7 7	E, W W, E	64 59 58·69 58·65	+ 10 29·82 30·84	28·51 29·49	29·00	1·0	0·50	0·2500
28	498 & 511 Newcomb " " "	Feb. 7 " 8	8 48	E, W W, E	65 8 46·40 46·37	+ 1 43·83 43·24	30·23 29·61	29·92	1·0	0·42	0·1764
29	517 & 521 Newcomb " " "	Feb. 7 " 8	3 7	W, E E, W	65 1 57·54 57·51	+ 8 31·85 32·08	29·39 29·59	29·49	0·7	0·01	0·0001
30	521 & 531 Newcomb " " "	Feb. 7 " 8	2 51	E, W W, E	65 17 58·54 58·51	− 7 29·05 28·36	29·49 30·15	29·82	0·7	0·32	0·0717
31	1418 & 1425 Gr. 80	Feb. 8	0 12	W, E.	65 20 13·39	− 9 45·26	28·13	28·13	0·5	1·37	0·9385
32	1418 & 1432 Gr. 80	Feb. 8	0 14	W, E	65 21 58·67	− 11 30·16	28·51	28·51	0·5	0·99	0·4901
33	544 & 558 Newcomb " " "	Feb. 7 " 8	4 11	W, E E, W	65 3 13·91 13·88	+ 7 15·99 15·52	29·90 29·40	29·65	0·7	0·15	0·0158

122. Alamkhan—*Co-latitude* 65° 10′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1901	° ′		° ′ ″	′ ″	″	″			
34	544 & 565 Newcomb " " "	Feb. 7 " 8	3 58	W, E E, W	65 15 38·00 37·48	− 5 8·03 7·98	29·97 29·50	29·74	0·7	0·24	0·0403
35	578 & 583 Newcomb " " "	Feb. 9 " 12	13 54	E, W W, E	65 2 48·17 48·04	+ 7 41·99 41·55	30·16 29·59	29·88	1·0	0·38	0·1444
36	592 & 605 Newcomb " " "	Feb. 9 " 12	12 45	W, E E, W	65 31 27·40 27·30	− 20 56·48 58·50	30·92 28·80	29·86	0·7	0·36	0·0907
37	605 & 607 Newcomb " " "	Feb. 9 " 12	12 33	E, W W, E	65 42 59·69 59·60	− 32 30·13 31·11	29·56 28·49	29·03	0·7	0·47	0·1546
38	634 & 638 Newcomb " " "	Feb. 9 " 12	16 31	E, W W, E	64 58 52·81 52·73	+ 11 36·80 35·90	29·61 28·63	29·12	1·0	0·38	0·1444
39	641 Newc. 1662 Gr. 80 " " " "	Feb. 9 " 12	7 22	W, E E, W	65 24 8·01 7·92	− 13 38·71 38·67	29·30 29·25	29·28	1·0	0·22	0·0484
40	657 & 673 Newcomb " " "	Feb. 9 " 12	17 16	E. W W, E	65 16 27·71 27·63	− 5 58·67 58·30	29·04 29·33	29·19	1·0	0·31	0·0961
41	683 & 694 Newcomb	Feb. 12	0 47	E, W	65 30 46·11	− 20 16·56	29·55	29·55	0·7	0·05	0·0018
42	699 & 708 Newcomb " " "	Feb. 9 " 12	20 27	W, E E, W	65 24 45·73 45·69	− 14 15·53 16·61	30·20 29·08	29·64	1·0	0·14	0·0196
43	713 & 718 Newcomb " " "	Feb. 9 " 12	8 50	E, W W, E	65 12 9·53 9·50	− 1 40·09 40·07	29·44 29·43	29·44	1·0	0·06	0·0036
44	720 & 728 Newcomb " " "	Feb. 9 " 12	18 34	W, E E, W	64 51 39·43 39·42	+ 18 49·54 49·82	28·97 29·24	29·11	1·0	0·39	0·1521
45	758 & 768 Newcomb " " "	Feb. 13 " 14	15 58	E, W W, E	64 45 30·29 30·29	+ 24 59·34 59·30	29·63 29·59	29·61	1·0	0·11	0·0121
46	783 & 787 Newcomb	Feb. 14	3 41	E, W	64 52 26·40	+ 18 3·03	29·43	29·43	0·7	0·07	0·0034
47	798 & 807 Newcomb " " "	Feb. 13 " 14	16 36	W, E E, W	65 11 18·30 18·32	− 0 49·18 49·11	29·12 29·21	29·17	1·0	0·33	0·1089
48	818 & 821 Newcomb " " "	Feb. 13 " 14	13 41	E, W W, E	64 49 59·90 59·92	+ 20 29·38 29·14	29·28 29·06	29·17	0·7	0·33	0·0762
49	821 & 828 Newcomb " " "	Feb. 13 " 14	13 46	W, E E, W	64 44 50·39 50·42	+ 25 39·46 39·22	29·65 29·64	29·65	0·7	0·15	0·0158
50	852 & 866 Newcomb " " "	Feb. 13 " 14	24 57	E, W W, E	65 8 46·60 46·64	+ 1 43·12 42·66	29·72 29·30	29·51	1·0	0·01	0·0001

122. Alamkhan—*Co-latitude* 65° 10′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
51	2173 & 2176 Gr. 80	Feb. 13	2 54	W, E	64 55 37·56	+ 14 51·78	29·34				
	,, ,, ,,	,, 14		E, W	37·61	52·39	30·00	29·67	0·7	0·17	0·0202
52	2176 Gr. 80 & 880 Newc.	Feb. 13	2 51	E, W	64 59 0·31	+ 11 29·02	29·33				
	,, ,, ,, ,,	,, 14		W, E	0·36	29·54	29·90	29·62	0·7	0·12	0·0101
53	895 Newc. & 2228 Gr. 80	Feb. 13	26 41	E, W	64 51 37·97	+ 18 50·84	28·81				
	,, ,, ,, ,,	,, 14		W, E	38·03	51·26	29·29	29·05	1·0	0·45	0·2025
54	905 & 910 Newcomb	Feb. 13	5 34	W, E	64 45 58·20	+ 24 30·85	29·05				
	,, ,, ,,	,, 14		E, W	58·27	30·98	29·25	29·15	0·7	0·35	0·0858
55	905 & 915 Newcomb	Feb. 13	5 15	W, E	65 4 53·43	+ 5 35·52	28·95				
	,, ,, ,,	,, 14		E, W	53·49	35·81	29·30	29·13	0·7	0·37	0·0958
56	932 & 956 Newcomb	Feb. 13	22 52	E, W	64 49 46·50	+ 20 42·73	29·23				
	,, ,, ,,	,, 14		W, E	46·59	42·60	29·19	29·21	1·0	0·29	0·0841
57	966 & 977 Newcomb	Feb. 13	8 57	W, E	65 16 28·12	− 5 58·62	29·50	29·50	0·7	0·00	0·0000
58	985 & 999 Newcomb	Feb. 13	6 38	E, W	64 56 2·99	+ 14 26·43	29·42				
	,, ,, ,,	,, 14		W, E	3·09	26·35	29·44	29·43	1·0	0·07	0·0049
								Σ P = 46·8		Σ Pvv = 6·9294	

Summary.

No. of pairs 58

No. of observations 108

Mean difference between observations taken E, W and those taken W, E = + 0″·03

Observed Co-latitude (weighted mean) 65° 10′ 29″·50 ± 0″·034

Correction for Height above Sea-level +0″·00

Final Co-latitude 65° 10′ 29″·50

		°	′	″	″
Astronomical Latitude (A)	=	24	49	30·50	± 0·034
Geodetic Latitude (G)	=	24	49	31·23	
Deflection of plumb-line (A − G)	=			− 0·73	

123. Algi—*Co-latitude* 64° 30′ +

Latitude	... 25° 30′	*Instrument*—Zenith Telescope	
Longitude	... 78 24	*Mean Height of Barometer*	in. 29·11
Height	... 854 feet	*Temperature*	59°·1

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	1507 & 1523 Newcomb	Nov. 25	1 44	E, W	64 10 22·69	+ 19 48·45	11·14				
	" " "	" 26		W, E	22·72	49·55	12·27				
	" " "	" 28		E, W	22·77	48·21	10·98	11·67	1·2	0·14	0·0235
2	1529 & 1540 Newcomb	Nov. 25	23 0	W, E	64 14 12·04	+ 16 0·88	12·92				
	" " "	" 26		E, W	12·06	15 59·97	12·03				
	" " "	" 27		W, E	12·06	16 0·52	12·58				
	" " "	" 28		E, W	12·08	15 59·95	12·03	12·39	1·3	0·58	0·4373
3	1553 & 1567 Newcomb	Nov. 25	20 3	E, W	64 6 25·68	+ 23 45·83	11·51				
	" " "	" 26		W, E	25·68	45·97	11·65				
	" " "	" 27		E, W	25·67	46·35	12·02				
	" " "	" 28		W, E	25·67	47·11	12·78	11·99	0·9	0·18	0·0292
4	1567 & 1569 Newcomb	Nov. 25	20 25	W, E	64 28 48·22	+ 1 23·55	11·77				
	" " "	" 26		E, W	48·22	23·67	11·89				
	" " "	" 27		W, E	48·22	23·72	11·94				
	" " "	" 28		E, W	48·22	24·27	12·49	12·02	0·9	0·21	0·0397
5	1586 & 1 Newcomb	Nov. 25	31 37	E, W	64 38 32·66	− 8 20·70	11·96				
	" " "	" 26		W, E	32·64	20·83	11·81				
	" " "	" 27		E, W	32·63	21·06	11·57				
	" " "	" 28		W, E	32·61	20·66	11·95	11·82	0·9	0·01	0·0001
6	10 & 14 Newcomb	Nov. 25	10 48	E, W	64 33 4·16	− 2 52·15	12·01				
	" " "	" 26		W, E	4·14	51·90	12·24				
	" " "	" 27		E, W	4·12	52·16	11·96				
	" " "	" 28		W, E	4·10	51·97	12·13	12·09	1·3	0·28	0·1019
7	30 & 37 Newcomb	Nov. 25	30 3	W, E	64 3 30·14	+ 26 41·54	11·68				
	" " "	" 26		E, W	30·11	41·46	11·57				
	" " "	" 27		W, E	30·07	41·86	11·93				
	" " "	" 28		E, W	30·04	41·80	11·84	11·76	1·3	0·05	0·0033
8	45 Newc. & 139 Gr. 80	Nov. 25	1 28	W, E	64 47 9·98	− 16 58·10	11·88				
	" " " "	" 26		E, W	9·95	58·42	11·53				
	" " " "	" 27		W, E	9·91	56·77	13·14				
	" " " "	" 28		E, W	9·88	57·29	12·59	12·29	1·3	0·48	0·2995
9	61 Newc. & 179 Gr. 80	Nov. 25	18 2	E, W	64 36 4·49	− 5 52·58	11·91				
	" " " "	" 26		W, E	4·46	52·79	11·67				
	" " " "	" 27		E, W	4·42	52·89	11·53				
	" " " "	" 28		W, E	4·38	52·67	11·71	11·71	0·9	0·10	0·0090

123. Algi—*Co-latitude* 64° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
10	179 Gr 80 & 76 Newc	Nov 25	18 11	W, E	64 45 14·61	− 15 2·63	11·98				
	" " " "	" 26		E, W	14·57	2·94	11·63				
	" " " "	" 27		W, E	14·53	3·07	11·46				
	" " " "	" 28		E, W	14·49	2·65	11·84	11·73	0·9	0·08	0·0058
11	82 & 93 Newcomb	Nov. 25	19 42	E, W	64 39 57·57	− 9 46·50	11·07				
	" " "	" 26		W, E	57·53	45·98	11·55				
	" " "	" 27		E, W	57·49	45·81	11·68				
	" " "	" 28		W, E	57·44	45·95	11·49	11·45	0·9	0·36	0·1166
12	88 & 93 Newcomb	Nov. 27	19 38	E, W	64 43 23·47	− 13 12·27	11·20	11·20	0·5	0·61	0·1861
13	98 & 102 Newcomb	Nov. 26	14 14	E, W	64 7 57·82	+ 22 14·47	12·29				
	" " "	" 27		W, E	57·78	14·53	12·31				
	" " "	" 28		E, W	57·75	14·33	12·08	12·25	1·2	0·44	0·2323
14	118 Newc. & 325 Gr. 80	Nov. 26	3 28	W, E	64 21 8·98	+ 9 3·56	12·54				
	" " " "	" 27		E, W	8·95	2·84	11·79				
	" " " "	" 28		W, E	8·91	2·97	11·88	12·00	1·2	0·19	0·0433
15	141 & 155 Newcomb	Nov. 26	8 4	E, W	64 39 44·28	− 9 32·65	11·63				
	" " "	" 27		W, E	44·24	32·30	11·94				
	" " "	" 28		E, W	44·20	32·42	11·78	11·83	1·2	0·02	0·0005
16	161 & 176 Newcomb	Nov. 26	3 39	W, E	64 48 22·44	− 18 10·59	11·85				
	" " "	" 27		E, W	22·40	10·82	11·58				
	" " "	" 28		W, E	22·36	10·34	12·02	11·76	1·2	0·05	0·0030
17	182 & 201 Newcomb	Nov. 26	26 58	E, W	64 35 47·06	− 5 35·09	11·97				
	" " "	" 27		W, E	47·02	35·14	11·88				
	" " "	" 28		E, W	46·99	35·51	11·48	11·81	0·8	0·00	0·0000
18	190 & 201 Newcomb	Nov. 26	27 21	E, W	64 12 57·49	+ 17 15·01	12·50				
	" " "	" 27		W, E	57·46	14·38	11·84				
	" " "	" 28		E, W	57·42	14·02	11·44	11·91	0·8	0·10	0·0080
19	208 & 217 Newcomb	Nov. 26	22 20	W, E	64 39 45·64	− 9 34·52	11·12				
	" " "	" 27		E, W	45·60	34·23	11·37				
	" " "	" 28		W, E	45·56	33·96	11·60	11·37	0·8	0·44	0·1549
20	208 & 230 Newcomb	Nov. 26	22 14	W, E	64 45 15·50	− 15 4·27	11·23				
	" " "	" 27		E, W	15·46	3·97	11·49				
	" " "	" 28		W, E	15·42	3·88	11·54	11·44	0·8	0·37	0·1095
21	235 & 245 Newcomb	Nov. 26	35 28	E, W	64 38 3·48	− 7 51·24	12·24				
	" " "	" 28		E, W	3·41	51·52	11·89	12·07	1·0	0·26	0·0676
22	256 & 258 Newcomb	Nov. 29	3 28	E, W	64 43 21·74	− 13 9·16	12·58				
	" " "	" 30		W, E	21·71	11·26	10·45				
	" " "	Dec 1		E, W	21·68	10·43	11·25	11·19	1·2	0·62	0·4613
23	273 & 277 Newcomb	Nov. 29	8 31	W, E	64 10 37·70	+ 19 34·12	11·82				
	" " "	" 30		E, W	37·67	33·99	11·66				
	" " "	Dec. 1		W, E	37·63	35·13	12·76	11·98	1·2	0·17	0·0347
24	282 & 289 Newcomb	Nov. 29	28 38	E, W	64 55 35·07	− 25 23·96	11·11				
	" " "	" 30		W, E	35·05	23·46	11·59				
	" " "	Dec. 1		E, W	35·03	24·52	10·51	11·20	0·8	0·61	0·2977

123. Algi—Co-latitude 64° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
25	282 & 299 Newcomb	Nov. 29	28 34	E, W	64 52 2·15	− 21 50·86	11·29				
	" " "	" 30		W, E	2·13	50·42	11·71				
	" " "	Dec. 1		E, W	2·11	51·53	10·58	11·33	0·8	0·48	0·1843
26	304 & 309 Newcomb	Nov. 29	7 10	W, E	64 9 27·88	+ 20 44·56	12·44				
	" " "	" 30		E, W	27·86	43·50	11·36				
	" " "	Dec. 1		W, E	27·83	43·67	11·50	11·67	1·2	0·14	0·0235
27	833 & 861 Gr. 80	Nov. 29	7 2	E, W	64 27 23·94	+ 2 48·24	12·18				
	" " "	" 30		W, E	23·92	48·56	12·48				
	" " "	Dec. 1		E, W	23·91	47·97	11·88	12·26	0·8	0·45	0·1620
28	833 Gr. 80 & 348 Newc.	Nov. 29	6 48	E, W	64 41 3·17	− 10 51·40	11·77				
	" " " "	" 30		W, E	3·16	51·15	12·01				
	" " " "	Dec. 1		E, W	3·14	51·11	12·03	11·96	0·8	0·15	0·0180
29	357 Newc. & 969 Gr. 80	Nov. 29	30 46	W, E	64 41 28·38	− 11 16·19	12·19				
	" " " "	" 30		E, W	28·37	16·19	12·18				
	" " " "	Dec. 1		W, E	28·37	16·92	11·45	12·00	0·8	0·19	0·0289
30	358 Newc. & 969 Gr. 80	Nov. 29	30 47	W, E	64 42 15·33	− 12 3·52	11·81				
	" " " "	" 30		E, W	15·33	3·49	11·84				
	" " " "	Dec. 1		W, E	15·32	4·49	10·83	11·58	0·8	0·23	0·0423
31	357 & 377 Newcomb	Nov. 29	30 34	W, E	64 53 12·33	− 23 0·12	12·21				
	" " "	" 30		E, W	12·33	0·40	11·93				
	" " "	Dec. 1		W, E	12·33	0·58	11·75	11·96	0·8	0·15	0·0180
32	388 & 401 Newcomb	Nov. 29	11 29	E, W	64 17 2·69	+ 13 9·36	12·05				
	" " "	" 30		W, E	2·69	9·25	11·94				
	" " "	Dec. 1		E, W	2·69	10·04	12·73	12·17	1·2	0·36	0·1555
33	406 & 410 Newcomb	Nov. 29	33 25	W, E	64 22 13·09	+ 7 58·25	11·34				
	" " "	" 30		E, W	13·10	58·38	11·48				
	" " "	Dec. 1		W, E	13·11	57·93	11·04	11·34	1·2	0·47	0·2651
34	422 & 432 Newcomb	Nov. 29	18 8	E, W	64 27 49·02	+ 2 22·94	11·96				
	" " "	" 30		W, E	49·04	22·32	11·36				
	" " "	Dec. 1		E, W	49·07	22·69	11·76	11·61	1·2	0·20	0·0480
									Σ P = 34·1		Σ Pvv = 3·6104

Summary.

No. of pairs 34

No. of observations 109

Mean difference between observations taken E, W and those taken W, E = − 0″·11

Observed Co-latitude (weighted mean) 64° 30′ 11″·81 ± 0″·038

Correction for Height above Sea-level + 0″·03

Final Co-latitude 64° 30′ 11″·84

		°	′	″	″
Astronomical Latitude (A)	=	25	29	48·16	± 0·038
Geodetic Latitude (G)	=	25	29	46·19	
Deflection of plumb-line (A − G)	=		+	1·97	

124. Amritsar—*Co-latitude* 58° 21′ +

Latitude ... 31° 38′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude . 74 55 *Mean Height of Barometer* 29·13 in.

Height ... 770 feet *Mean Temperature* 61°·2

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	1483 & 1490 Gr. 80	Mar. 22	0 56	E, W	58 4 21·59	+ 17 35·91	57·50				
	" " "	" 23		W, E	21·49	37·01	58·50				
	" " "	" 24		W, E	21·40	34·90	56·30	57·43	1·2	0·02	0·0005
2	1499 & 1505 Gr. 80	Mar. 22	1 5	W, E	58 15 47·68	+ 6 11·21	58·89				
	" " "	" 23		E, W	47·59	10·91	58·50				
	" " "	" 24		E, W	47·50	8·76	56·26				
	" " "	" 25		W, E	47·40	10·72	58·12				
	" " "	" 26		W, E	47·30	12·06	59·36	58·23	0·9	0·78	0·5476
3	1499 & 1507 Gr. 80	Mar. 22	1 1	W, E	58 20 42·39	+ 1 14·66	57·05				
	" " "	" 23		E, W	42·29	17·01	59·30				
	" " "	" 24		E, W	42·20	13·43	55·63				
	" " "	" 25		W, E	42·10	17·09	57·19				
	" " "	" 26		W, E	42·00	14·84	56·84	57·20	0·9	0·25	0·0563
4	1510 & 1533 Gr. 80	Mar. 22	16 5	E, W	58 29 58·01	− 8 0·50	57·51				
	" " "	" 23		W, E	57·92	0·48	57·44				
	" " "	" 24		W, E	57·82	0·03	57·79				
	" " "	" 25		E, W	57·73	1·53	56·20				
	" " "	" 26		E, W	57·64	1·34	56·30	57·05	1·4	0·40	0·2240
5	1545 & 1554 Gr. 80	Mar. 22	5 49	W, E	58 33 21·04	− 11 25·67	55·37				
	" " "	" 23		E, W	20·94	23·35	57·59				
	" " "	" 24		E, W	20·84	22·78	58·06				
	" " "	" 25		W, E	20·73	23·85	56·88				
	" " "	" 26		W, E	20·63	24·73	55·90				
	" " "	" 27		E, W	20·53	22·83	57·70	56·92	1·0	0·53	0·2809
6	1546 & 1554 Gr. 80	Mar. 22	5 49	W, E	58 33 20·59	− 11 25·24	55·35				
	" " "	" 23		E, W	20·49	23·18	57·31				
	" " "	" 24		E, W	20·39	22·69	57·70				
	" " "	" 25		W, E	20·28	23·73	56·55				
	" " "	" 26		W, E	20·18	24·06	56·12				
	" " "	" 27		E, W	20·08	21·96	58·12	56·86	1·0	0·59	0·3481
7	1555 & 1577 Gr. 80	Mar. 22	5 7	E, W	58 14 45·45	+ 7 12·91	58·36				
	" " "	" 23		W, E	45·34	13·11	58·45				
	" " "	" 24		W, E	45·23	13·82	59·05				
	" " "	" 25		E, W	45·12	11·37	56·49				
	" " "	" 26		E, W	45·01	10·57	55·58				
	" " "	" 27		W, E	44·91	12·76	57·67	57·60	1·0	0·15	0·0225

124. Amritsar—*Co-latitude* 58° 21′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
8	1555 & 1580 Gr. 80	Mar. 22	4 50	E, W	58 32 7·04	− 10 7·95	59·09				
	" " "	" 23		W, E	6·93	9·81	57·12				
	" " "	" 24		W, E	6·82	8·44	58·38				
	" " "	" 25		E, W	6·72	10·41	56·31				
	" " "	" 26		E, W	6·61	11·98	54·63				
	" " "	" 27		W, E	6·50	9·35	57·15	57·11	1·0	0·34	0·1156
9	1577 & 1595 Gr. 80	Mar. 22	5 14	W, E	58 22 4·32	− 0 6·49	57·83				
	" " "	" 23		E, W	4·21	4·43	59·78				
	" " "	" 24		E, W	4·10	6·22	57·88				
	" " "	" 25		W, E	3·98	7·49	56·49				
	" " "	" 26		W, E	3·87	7·16	56·71				
	" " "	" 27		E, W	3·76	5·29	58·47	57·86	1·0	0·41	0·1681
10	1580 & 1595 Gr. 80	Mar. 22	4 57	W, E	58 39 25·91	− 17 27·35	58·56				
	" " "	" 23		E, W	25·80	27·34	58·46				
	" " "	" 24		E, W	25·69	28·48	57·21				
	" " "	" 25		W, E	25·58	29·26	56·32				
	" " "	" 26		W, E	25·47	29·71	55·76				
	" " "	" 27		E, W	25·36	27·40	57·96	57·38	1·0	0·07	0·0049
11	1617 & 1629 Gr. 80	Mar. 22	9 57	E, W	58 22 58·75	− 0 60·25	58·50				
	" " "	" 23		W, E	58·64	61·34	57·30				
	" " "	" 24		W, E	58·52	61·64	56·88				
	" " "	" 26		E, W	58·28	61·74	56·54				
	" " "	" 27		W, E	58·16	59·40	58·76	57·60	1·4	0·15	0·0315
12	1636 & 1639 Gr. 80	Mar. 22	22 55	W, E	58 31 17·06	− 9 19·26	57·80				
	" " "	" 23		E, W	16·96	18·99	57·97				
	" " "	" 24		E, W	16·84	19·12	57·72				
	" " "	" 26		W, E	16·63	20·62	56·01				
	" " "	" 27		E, W	16·51	18·61	57·90	57·48	1·4	0·03	0·0013
13	1664 & 1672 Gr. 80	Mar. 22	11 43	E, W	58 16 26·86	+ 5 30·12	56·98				
	" " "	" 23		W, E	26·75	30·21	56·96				
	" " "	" 24		W, E	26·62	31·56	58·18				
	" " "	" 26		E, W	26·37	29·78	56·15	57·07	1·3	0·38	0·1877
14	1685 & 1694 Gr. 80	Mar. 22	24 43	W, E	58 11 53·40	+ 10 5·63	59·03				
	" " "	" 23		E, W	53·28	5·03	58·31				
	" " "	" 24		E, W	53·16	4·36	57·52				
	" " "	" 26		W, E	52·93	5·88	58·81	58·42	1·3	0·97	1·2232
15	1706 & 1717 Gr. 80	Mar. 22	3 44	E, W	58 11 40·38	+ 10 18·29	58·67				
	" " "	" 23		W, E	40·24	17·42	57·66				
	" " "	" 24		W, E	40·11	17·01	57·12				
	" " "	" 26		E, W	39·84	17·35	57·19	57·66	1·3	0·21	0·0573
16	1720 & 1728 Gr. 80	Mar. 22	0 30	W, E	58 15 17·08	+ 6 39·84	56·92				
	" " "	" 23		E, W	16·94	40·87	57·81				
	" " "	" 24		E, W	16·81	39·16	55·97				
	" " "	" 26		W, E	16·53	41·00	57·53	57·06	1·3	0·39	0·1977
17	1733 & 1743 Gr. 80	Mar. 22	3 8	E, W	58 20 27·85	+ 1 28·45	56·30				
	" " "	" 23		W, E	27·72	29·98	57·70				
	" " "	" 24		W, E	27·57	29·42	56·99				
	" " "	" 26		E, W	27·30	28·62	55·92	56·73	1·3	0·72	0·6739

124. Amritsar—*Co-latitude* 58° 21′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
18	1759 & 1761 Gr. 80	Mar. 22	25 9	W, E	58 11 25·22	+ 10 33·08	58·30	58·30	0·7	0·85	0·5058
19	1763 & 1766 Gr. 80	Mar. 23	30 53	W, E	58 33 16·31	− 11 17·53	58·78				
	" " "	" 24		W, E	16·19	18·27	57·92				
	" " "	" 26		E, W	15·96	18·64	57·32	58·01	1·2	0·56	0·3763
								Σ P	21·6	Σ Pvv = 5·0232	

Summary.

No. of pairs 19
No. of observations 88

Mean difference between observations taken E, W and those taken W, E = − 0″·03

Observed Co-latitude (weighted mean) 58° 21′ 57″·45 ± 0″·077

Correction for Height above Sea-level + 0″·04

Final Co-latitude 58° 21′ 57″·49

		°	′	″	″
Astronomical Latitude (A)	=	31	38	2·51	± 0·077
Geodetic Latitude (G)	=	31	37	58·72	
Deflection of plumb-line (A − G)	=		+	3·79	

125. Amua—*Co-latitude* 66° 0′ +

Latitude ... 24° 0′ *Instrument*—Zenith Telescope

Longitude ... 80 32 *Mean Height of Barometer* 27·87 in.

Height ... 2113 feet *Mean Temperature* 61°·3

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	157 & 162 Gr. 80	Dec. 5	16 44	E, W	65 54 59·60	+ 5 3·24	2·84				
	" " "	" 8		W, E	59·64	4·43	4·07	3·46	1·0	0·56	0·3136
2	168 & 179 Gr. 80	Dec. 5	19 9	W, E	65 43 53·62	+ 16 7·41	1·03				
	" " "	" 8		E, W	53·57	9·32	2·89				
	179 & 184 Gr. 80	" 5	19 9	E, W	52·74	8·19	0·93				
	" " "	" 8		W, E	52·68	9·87	2·55	1·85	1·5	1·05	1·6538
3	204 & 210 Gr. 80	Dec. 5	20 58	E, W	65 57 1·62	+ 3 2·36	3·98				
	" " "	" 8		W, E	1·55	2·71	4·26				
	222 & 204 Gr. 80	" 5	20 55	W, E	66 0 27·05	− 0 24·04	3·01				
	" " "	" 8		E, W	26·98	23·32	3·66	3·73	1·5	0·83	1·0334
4	256 & 268 Gr. 80	Dec. 5	15 43	W, E	65 38 2·38	+ 21 59·67	2·05				
	" " "	" 8		E, W	2·59	22 0·26	2·85	2·45	1·0	0·45	0·2025
5	285 & 288 Gr. 80	Dec. 5	5 9	E, W	66 2 52·48	− 2 49·59	2·89				
	" " "	" 8		W, E	52·42	49·40	3·02	2·96	1·0	0·06	0·0036
6	331 & 334 Gr. 80	Dec. 5	5 24	W, E	65 33 55·43	+ 26 7·77	3·20	3·20	0·5	0·30	0·0450
7	340 & 347 Gr. 80	Dec. 5	9 3	E, W	66 8 39·31	− 8 36·21	3·10				
	" " "	" 8		W, E	39·22	36·06	3·16				
	340 & 348 Gr. 80	" 5	9 29	E, W	65 42 28·82	+ 17 33·89	2·71				
	" " "	" 8		W, E	28·72	34·64	3·36	3·09	1·5	0·19	0·0542
8	350 & 353 Gr. 80	Dec. 5	4 22	W, E	66 11 13·74	− 11 10·72	3·02				
	" " "	" 8		E, W	13·63	10·50	3·13				
	353 & 373 Gr. 80	" 5	4 23	E, W	12 3·04	59·39	3·65				
	" " "	" 8		W, E	2·95	12 0·46	2·49	3·08	1·5	0·18	0·0486
9	376 & 389 Gr. 80	Dec. 5	11 51	W, E	66 8 18·41	− 8 16·32	2·09				
	" " "	" 8		E, W	18·32	14·30	4·02	3·06	1·0	0·16	0·0256
10	394 & 396 Gr. 80	Dec. 5	2 33	E, W	65 55 1·42	+ 5 1·72	3·14				
	" " "	" 8		W, E	1·33	2·17	3·50	3·32	1·0	0·42	0·1764
11	403 & 414 Gr. 80	Dec. 5	4 38	W, E	65 47 19·51	+ 12 43·41	2·92				
	" " "	" 8		E, W	19·41	43·71	3·12	3·02	1·0	0·12	0·0144
12	419 & 444 Gr. 80	Dec. 5	2 57	E, W	66 6 11·15	− 6 7·99	3·16				
	" " "	" 8		W, E	11·07	8·66	2·41	2·79	1·0	0·11	0·0121
13	471 & 475 Gr. 80	Dec. 5	4 41	W, E	65 58 33·28	+ 1 30·11	3·39				
	" " "	" 8		E, W	33·19	30·02	3·21	3·30	1·0	0·40	0·1600

125. Amua—*Co-latitude* 66° 0′ +

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P Ds	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1899	° ′		° ′ ″	′ ″	″	″			
14	500 & 525 Gr 80	Dec. 5	25 1	E, W	66 17 17 66	− 17 14 13	3 53				
	,, ,, ,,	,, 8		W, E	17 55	14 84	2 71	3 12	1 0	0 22	0 0484
15	553 & 562 Gr. 80	Dec. 5	1 4	E, W	66 3 17 61	− 3 14 31	3 30				
	,, ,, ,,	,, 8		W, E	17 51	15 12	2 39	2·85	1 0	0 05	0·0025
16	577 & 581 Gr 80	Dec. 8	0 16	E, W	66 6 11 15	− 6 7·97	3 18				
	584 & 577 Gr. 80	Dec 8	0 11	W, E	1 24 22	1 21·77	2 45	2 82	1 0	0 08	0 0064
17	613 & 620 Gr. 80	Dec. 5	11 39	E, W	66 8 34 35	− 8 31·45	2 90				
	,, ,, ,,	,, 8		E, W	34 27	31 58	2 69	2 80	1 0	0 10	0 0100
18	633 & 648 Gr 80	Dec 5	2 15	W, E	66 1 8 87	− 1 6 58	2 29				
	648 & 677 Gr 80	Dec 5	2 21	E, W	7 22 19	7 19·13	3 06				
	,, ,, ,,	,, 8		W, E	22 11	18 76	3 35	2 90	1 0	0 00	0 0000
19	686 & 700 Gr 80	Dec 5	1 40	W, E	66 16 11·39	− 16 7·99	3 40				
	,, ,, ,,	,, 8		E, W	11 33	7 79	3 54				
	686 & 704 Gr 80	Dec 5	1 25	W, E	0 31 99	0 29 07	2 92				
	,, ,, ,,	,, 8		E, W	31 92	28·65	3 27	3·29	1 5	0 39	0 2282
20	994 & 998 Gr 80	Dec 7	3 40	E, W	66 4 38 12	− 4 35·13	2 99				
	,, ,, ,,	,, 10		W, E	38 14	34 93	3 21	3 10	1·0	0 20	0 0400
21	1010 & 1021 Gr 80	Dec. 7	1 47	W, E	65 49 50 21	+ 10 13·01	3 22				
	,, ,, ,,	,, 10		E, W	50 24	11·91	2 15	2·69	1 0	0 21	0 0441
22	1026 & 1048 Gr 80	Dec. 7	0 36	E, W	66 8 42 82	− 8 39·54	3 28				
	,, ,, ,,	,, 10		W, E	42 78	39 96	2 82				
	1043 & 1048 Gr 80	Dec 7	0 40	E, W	12 53 33	12 49·47	3 86				
	,, ,, ,,	,, 10		W, E	53 39	49 92	3 47	3 36	1 5	0 46	0 3174
23	1104 & 1127 Gr 80	Dec 4	3 55	W, E	65 48 46 83	+ 11 14 80	1 63				
	,, ,, ,,	,, 7		W, E	46 90	15 87	2 77				
	,, ,, ,,	,, 10		E, W	46 98	15 51	2 49	2 36	1 0	0 54	0 2916
24	1181 & 1193 Gr. 80	Dec 4	2 10	E, W	65 57 19·68	+ 2 42 71	2 39				
	,, ,, ,,	,, 7		E, W	19 79	42 07	1 86				
	,, ,, ,,	,, 10		W, E	19 91	43 48	3 39	2 76	1 0	0 14	0·0196
25	1206 & 1223 Gr 80	Dec 4	3 9	E, W	66 7 57 18	− 7 55 47	1 71				
	,, ,, ,,	,, 7		E, W	57 32	54 43	2 89				
	,, ,, ,,	,, 10		W, E	57·47	56 43	1 04	1 67	1 0	1 23	1 5129
26	1237 & 1256 Gr. 80	Dec. 4	1 27	W, E	66 23 22 46	− 23 18 32	4·14				
	,, ,, ,,	,, 7		W, E	22 62	17 84	4·78				
	,, ,, ,,	,, 10		E, W	22 89	18 70	4 19				
	1256 & 1265 Gr. 80	Dec 4	1 33	E W	17 49 00	17 47 30	1·70				
	,, ,, ,,	,, 7		E, W	49 17	46 73	2 44				
	,, ,, ,,	,, 10		W, E	49 45	45 89	3 56	3 58	1·5	0 68	0 6936
27	1271 & 1279 Gr. 80	Dec. 7	3 47	W, E	65 46 28 59	+ 13 33 52	2 11				
	,, ,, ,,	,, 10		E, W	28 84	33 63	2 47	2 29	1 0	0 61	0 3721
28	1284 & 1297 Gr 80	Dec. 7	7 59	E, W	65 59 21 27	+ 0 42 24	3 51				
	,, ,, ,,	,, 10		W, E	21 45	40 87	2 32				
	1297 & 1300 Gr 80	Dec. 10	7 35	E, W	66 23 31·31	− 23 28 69	2 62	2·77	1 5	0 13	0 0254

125. Amua—*Co-latitude* 66° 0′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1899	° ′		° ′ ″	′ ″	″	″			
29	1363 & 1373 Gr. 80	Dec. 6	1 40	W, E	65 59 36·33	+ 0 26·35	2·68				
	„ „ „	„ 9		E, W	36·59	26·62	3·21	2·95	1·0	0·05	0·0025
30	1367 & 1378 Gr. 80	Dec. 6	1 14	W, E	65 51 34·03	+ 8 28·97	3·00				
	„ „ „	„ 9		E, W	34·29	28·84	3·13	3·07	1·0	0·17	0·0289
31	1397 & 1411 Gr. 80	Dec. 6	5 39	E, W	65 41 50·93	+ 18 11·63	2·56	2·56	0·5	0·34	0·0578
32	1428 & 1450 Gr. 80	Dec. 6	9 19	W, E	66 9 22·09	− 9 18·40	3·69				
	„ „ „	„ 9		E, W	22·43	18·21	4·22				
	1452 & 1428 Gr. 80	Dec. 6	9 17	E, W	11 28·95	11 26·25	2·70				
	„ „ „	„ 9		W, E	29·29	25·26	4·03	3·67	1·5	0·77	0·8894
33	1470 & 1473 Gr. 80	Dec. 6	5 18	E, W	66 10 43·28	− 10 41·62	1·66	1·66	0·5	1·24	0·7688
34	1482 & 1483 Gr. 80	Dec. 6	8 34	W, E	65 43 2·97	+ 17 0·02	2·99				
	„ „ „	„ 9		E, W	3·32	16 59·51	2·83	2·91	1·0	0·01	0·0001
35	1498 & 1507 Gr. 80	Dec. 6	8 28	E, W	65 49 41·10	+ 10 19·11	0·21				
	„ „ „	„ 9		W, E	41·49	21·18	2·67	1·44	1·0	1·46	2·1316
36	1511 & 1524 Gr. 80	Dec. 6	1 12	W, E	66 21 16·26	− 21 13·76	2·50				
	„ „ „	„ 9		E, W	16·65	14·01	2·64	2·57	1·0	0·33	0·1089
37	1538 & 1543 Gr. 80	Dec. 6	30 11	E, W	65 45 11·77	+ 14 51·48	3·25				
	„ „ „	„ 9		W, E	12·15	50·59	2·74	3·00	1·0	0·10	0·0100
38	1572 & 1580 Gr. 80	Dec. 6	12 16	W, E	66 0 1·28	+ 0 1·82	3·10	3·10	0·5	0·20	0·0200
39	1595 & 1617 Gr. 80	Dec. 6	2 22	E, W	65 59 47·31	+ 0 15·72	3·03				
	„ „ „	„ 9		W, E	47·78	15·66	3·44	3·24	1·0	0·34	0·1156
40	1632 & 1646 Gr. 80	Dec. 6	11 25	W, E	65 40 34·16	+ 19 29·12	3·28				
	„ „ „	„ 9		E, W	34·66	28·16	2·82				
	1646 & 1652 Gr. 80	Dec. 6	11 39	E, W	54 32·52	5 30·11	2·63				
	„ „ „	„ 9		W, E	33·01	29·82	2·83	2·89	1·5	0·01	0·0002
41	1681 & 1701 Gr. 80	Dec. 6	8 42	E, W	65 49 1·21	+ 11 1·87	3·08				
	„ „ „	„ 9		W, E	1·76	0·93	2·69	2·89	1·0	0·01	0·0001
42	1714 & 1728 Gr. 80	Dec. 6	7 17	W, E	66 4 28·61	− 4 26·13	2·48				
	„ „ „	„ 9		E, W	29·17	27·13	2·04	2·26	1·0	0·64	0·4096

125. Amua—*Co-latitude* 66° 0′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
43	1751 & 1759 Gr. 80	Dec. 6	17 10	E, W	66 12 6·13	− 12 3·20	2·93				
	„ „ „	„ 9		W, E	6·73	3·37	3·36	3·15	1·0	0·25	0·0625
44	1793 & 1799 Gr 80	Dec. 6	8 4	E, W	65 58 8·86	+ 1 53·48	2·34				
	„ „ „	„ 9		W, E	9·50	53·24	2·74	2·54	1·0	0·36	0·1296
45	1817 & 1825 Gr. 80	Dec. 9	20 5	E, W	66 21 47·55	− 21 43·85	3·70	3·70	0·5	0·80	0·3200
								Σ P = 47·5		Σ Pvv = 12·4110	

Summary.

No. of pairs 45

No. of observations 110

Mean difference between observations taken E, W and those taken W, E = − 0″·04

Observed Co-latitude (weighted mean) 66° 0′ 2″·90 ± 0″·052

Correction for Height above Sea-level + 0″·08

Final Co-latitude 66° 0′ 2″·98

		° ′ ″	″
Astronomical Latitude (A)	=	23 59 57·02	± 0·052
Geodetic Latitude (G)	=	23 59 56·24	
Deflection of plumb-line (A − G)	=	+ 0·78	

126. Andhiari—*Co-latitude* 65° 18′ +

Latitude ... 24° 41′ — *Instrument*—Zenith Telescope

Longitude ... 78 16 — *Mean Height of Barometer* 28·74 in.

Height ... 1330 feet — *Mean Temperature* 64°·1

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	1543 Newc. & 3927 Gr. 80	Dec. 14	34 53	E, W	65 16 0·46	+ 2 48·90	49·36				
	,, ,, ,, ,,	,, 18		W, E	0·67	47·60	48·27	48·82	1·0	0·18	0·0324
2	1553 & 1568 Newcomb	Dec. 11	18 27	E, W	65 42 29·09	− 23 40·88	48·21				
	,, ,, ,,	,, 14		W, E	29·25	40·65	48·60				
	,, ,, ,,	,, 15		E, W	29·31	40·46	48·85				
	,, ,, ,,	,, 18		W, E	29·49	41·19	48·30	48·49	1·3	0·15	0·0293
3	1572 Newc. & 4036 Gr. 80	Dec. 11	18 44	W, E	64 56 6·92	+ 22 41·02	47·94				
	,, ,, ,, ,,	,, 14		E, W	7·06	41·51	48·57				
	,, ,, ,, ,,	,, 15		W, E	7·11	41·04	48·15				
	,, ,, ,, ,,	,, 18		E, W	7·28	41·05	48·33	48·25	1·3	0·39	0·1977
4	4 & 15 Newcomb	Dec. 11	34 0	W, E	65 22 15·22	− 3 26·20	49·02				
	,, ,, ,,	,, 13		E, W	15·28	27·24	48·04				
	,, ,, ,,	,, 14		W, E	15·30	26·25	49·05				
	,, ,, ,,	,, 17		E, W	15·36	26·79	48·57	48·67	1·3	0·03	0·0012
5	30 & 31 Newcomb	Dec. 11	28 45	E, W	65 22 46·09	− 3 57·54	48·55				
	,, ,, ,,	,, 13		W, E	46·12	57·35	48·77				
	,, ,, ,,	,, 14		E, W	46·15	58·11	48·04				
	,, ,, ,,	,, 18		W, E	46·22	57·17	49·05	48·60	1·3	0·04	0·0021
6	54 & 69 Newcomb	Dec. 11	35 27	E, W	65 15 1·86	+ 3 47·13	48·99				
	,, ,, ,,	,, 13		W, E	1·92	46·34	48·26				
	,, ,, ,,	,, 14		E, W	1·87	47·17	49·04				
	,, ,, ,,	,, 18		W, E	1·90	47·08	48·98	48·82	1·3	0·18	0·0421
7	73 & 81 Newcomb	Dec. 17	3 52	E, W	65 37 22·29	− 18 33·85	48·44				
	,, ,, ,,	,, 18		W, E	22·32	32·93	49·39	48·92	1·0	0·28	0·0784
8	97 & 108 Newcomb	Dec. 17	16 8	W, E	65 12 12·01	+ 6 36·19	48·20				
	,, ,, ,,	,, 18		E, W	12·03	36·87	48·90	48·55	0·7	0·09	0·0057
9	102 & 108 Newcomb	Dec. 17	15 43	W, E	65 37 14·36	− 18 26·16	48·20				
	,, ,, ,,	,, 18		E, W	14·38	25·62	48·76	48·48	0·7	0·16	0·0179
10	118 & 121 Newcomb	Dec. 18	4 23	W, E	65 16 41·84	+ 2 7·00	48·84	48·84	0·7	0·20	0·0280
11	131 & 138 Newcomb	Dec. 12	16 45	E, W	64 52 14·49	+ 26 34·70	49·19				
	,, ,, ,,	,, 13		W, E	14·48	33·75	48·23				
	,, ,, ,,	,, 14		E, W	14·47	34·32	48·79	48·61	0·8	0·03	0·0007
12	131 & 153 Newcomb	Dec. 12	16 56	E, W	65 3 14·24	+ 15 34·79	49·03				
	,, ,, ,,	,, 13		W, E	14·23	33·31	47·54				
	,, ,, ,,	,, 14		E, W	14·22	34·48	48·70	48·21	0·8	0·43	0·1479

126. Andhiari—*Co-latitude* 65° 18′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	Pvv
		1902	° ′		° ′ ″	′ ″	″	″			
13	165 & 170 Newcomb	Dec. 12	24 28	W, E	65 38 6·58	− 19 17·72	48·86				
	" " "	" 14		E, W	6·55	18·03	48·52	48·69	1·0	0·05	0·0025
14	176 & 185 Newcomb	Dec. 12	3 57	E, W	65 6 3·72	+ 12 44·36	48·08				
	" " "	" 13		W, E	3·70	44·44	48·14				
	" " "	" 14		E, W	3·69	44·89	48·58	48·24	1·2	0·40	0·1920
15	471 Gr. 80 & 203 Newc.	Dec. 12	4 1	W, E	65 18 14·31	+ 0 34·61	48·92				
	" " " "	" 13		E, W	14·29	33·74	48·03				
	" " " "	" 14		W, E	14·27	34·88	49·15	48·54	0·8	0·10	0·0080
16	471 Gr. 80 & 209 Newc.	Dec. 12	3 57	W, E	65 14 52·07	+ 3 56·69	48·76				
	" " " "	" 13		E, W	52·05	56·49	48·54				
	" " " "	" 14		W, E	52·03	56·88	48·91	48·69	0·8	0·05	0·0020
17	211 & 224 Newcomb	Dec. 12	24 43	E, W	65 11 42·61	+ 7 6·23	48·84				
	" " "	" 13		W, E	42·59	6·16	48·75				
	" " "	" 14		E, W	42·57	6·23	48·80	48·79	1·2	0·15	0·0270
18	229 & 236 Newcomb	Dec. 12	0 37	W, E	65 35 17·16	− 16 28·54	48·62				
	" " "	" 13		E, W	17·15	28·84	48·31				
	" " "	" 14		W, E	17·13	28·09	49·04	48·57	0·8	0·07	0·0039
19	229 & 238 Newcomb	Dec. 12	0 37	W, E	65 35 22·93	− 10 34·81	48·12				
	" " "	" 13		E, W	22·91	34·14	48·77				
	" " "	" 14		W, E	22·89	34·06	48·83	48·63	0·8	0·01	0·0001
20	252 Newc. & 643 Gr. 80	Dec. 12	12 47	E, W	64 59 58·36	+ 18 50·60	48·96				
	" " " "	" 13		W, E	58·34	50·14	48·48				
	" " " "	" 14		E, W	58·32	50·10	48·42	48·59	1·2	0·05	0·0030
21	273 & 283 Newcomb	Dec. 12	9 28	W, E	65 7 17·50	+ 11 30·97	48·47				
	" " "	" 13		E, W	17·48	30·87	48·35				
	" " "	" 14		W, E	17·46	30·91	48·37	48·39	0·8	0·25	0·0500
22	273 & 287 Newcomb	Dec. 12	9 51	W, E	65 30 51·80	− 12 2·98	48·82				
	" " "	" 13		E, W	51·78	3·10	48·68				
	" " "	" 14		W, E	51·76	3·41	48·35	48·64	0·8	0·00	0·0000
23	305 & 313 Newcomb	Dec. 12	19 8	E, W	65 26 30·80	− 7 42·17	48·63				
	" " "	" 14		W, E	30·77	42·28	48·49	48·56*	1·0	0·08	0·0064
24	318 Newc. & 874 Gr. 80	Dec. 12	9 12	W, E	65 32 40·03	− 13 51·38	48·65				
	" " " "	" 13		E, W	40·02	50·77	49·25				
	" " " "	" 14		W, E	40·01	50·87	49·14	49·08	1·2	0·44	0·2323
25	348 Newc. & 943 Gr. 80	Dec. 16	7 34	E, W	65 27 5·91	− 8 16·39	49·52				
	" " " "	" 17		W, E	5·90	16·86	49·04				
	" " " "	" 18		E, W	5·89	18·15	47·74	48·84	0·8	0·20	0·0320
26	348 & 371 Newcomb	Dec. 16	7 13	E, W	65 5 43·50	+ 13 5·00	48·50				
	" " "	" 17		W, E	43·49	5·23	48·72				
	" " "	" 18		E, W	43·48	4·63	48·11	48·52	0·8	0·12	0·0115
27	374 & 391 Newcomb	Dec. 16	14 44	W, E	65 37 6·79	− 18 18·00	48·79				
	" " "	" 17		E, W	6·79	17·62	49·17				
	" " "	" 18		W, E	6·79	18·14	48·65	48·95	1·2	0·31	0·1153

126. Andhiari—*Co-latitude* 65° 18′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
28	1035 & 1046 Gr. 80	Dec. 16	35 48	E, W	65 20 0·37	− 1 11·20	49·17	49·17	0·7	0·53	0·1966
29	1058 Gr. 80 & 419 Newc.	Dec. 16	4 38	W, E	65 5 55·80	+ 12 52·56	48·36				
	,, ,, ,, ,,	,, 17		E, W	55·80	52·61	48·41				
	,, ,, ,, ,,	,, 18		W, E	55·80	52·69	48·49	48·42	1·2	0·22	0·0581
30	424 & 430 Newcomb	Dec. 16	14 45	E, W	65 16 18·29	+ 2 30·66	48·95				
	,, ,, ,,	,, 17		W, E	18·30	30·28	48·58				
	,, ,, ,,	,, 18		E, W	18·32	30·17	48·49	48·65	1·2	0·01	0·0001
31	431 Newc. & 1197 Gr. 80	Dec. 16	0 26	W, E	65 12 44·51	+ 6 3·61	48·12				
	,, ,, ,, ,,	,, 17		E, W	44·52	4·20	48·72				
	,, ,, ,, ,,	,, 18		W, E	44·54	3·81	48·35	48·48	0·8	0·16	0·0205
32	1186 & 1197 Gr. 80	Dec. 16	0 35	W, E	65 4 39·20	+ 14 9·26	48·46				
	,, ,, ,,	,, 17		E, W	39·22	9·46	48·68				
	,, ,, ,,	,, 18		W, E	39·24	9·56	48·80	48·66	0·8	0·02	0·0003
33	1227 Gr. 80 & 2177 Gr. 90	Dec. 16	0 23	E, W	65 19 51·18	− 1 3·09	48·09				
	,, ,, ,, ,,	,, 18		W, E	51·23	2·61	48·62	48·36	1·0	0·28	0·0784
34	468 & 479 Newcomb	Dec. 16	16 17	W, E	65 13 58·19	+ 4 50·46	48·65				
	,, ,, ,,	,, 18		E, W	58·26	49·91	48·17	48·41	1·0	0·23	0·0529
35	493 & 494 Newcomb	Dec. 17	34 8	E, W	65 11 48·49	+ 7 0·57	49·06				
	,, ,, ,,	,, 18		W, E	48·52	0·25	48·77	48·92	1·0	0·28	0·0784
36	505 & 521 Newcomb	Dec. 16	2 35	E, W	65 33 47·61	− 14 59·00	48·61				
	,, ,, ,,	,, 17		W, E	47·66	59·36	48·30				
	,, ,, ,,	,, 18		E, W	47·71	58·65	49·06	48·57	0·8	0·07	0·0039
37	521 & 531 Newcomb	Dec. 16	2 51	W, E	65 18 21·10	+ 0 27·91	49·01				
	,, ,, ,,	,, 17		E, W	21·16	27·73	48·89				
	,, ,, ,,	,, 18		W, E	21·22	27·97	49·19	49·00	0·8	0·36	0·1037
								Σ P = 35·9		Σ Pvv = 1·8623	

Summary.

No. of pairs 37
No. of observations 103

Mean difference between observations taken E, W and those taken W, E = + 0″·04

Observed Co-latitude (weighted mean) 65° 18′ 48″·64 ± 0″·026

Correction for Height above Sea-level + 0″·05

Final Co-latitude 65° 18′ 48″·69

		°	′	″
Astronomical Latitude (A)	=	24	41	11·31 ± 0·026
Geodetic Latitude (G)	=	24	41	6·78
Deflection of plumb-line (A − G)	=			+ 4·53

127. Ankora—*Co-latitude* 70° 35′ +

Ldtitude ... 19° 25′	*Maximum recorded Height of Barometer*	=	in. 28·676
Longitude ... 79 39	*Minimum* „ „ „	=	28·528
Height . 1463 feet	*Maximum* „ *Reading of Thermometer*	=	75°·0
Instrument—Zenith Sector No. 2	*Minimum* „ „ „	=	65 ·5

Observer—J. Eccles, M.A.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
1	321 Gr. 72	Jan. 12	N	E, W	3 0 46·0	67 34 48·2	34·2				
	„ „	„ 13	„	W, E	46·3	48·2	34·5	34·4	...	0·6	0·36
2	328 Gr. 72	Jan. 12	N	W, E	1 56 25·2	72 32 0·2	35·0				
	„ „	„ 13	„	E, W	26·6	0·2	33·6	...	34·3	1·5	2·25
3	335 Gr. 72	Jan. 17	S	E, W	5 33 43·2	65 1 51·2	34·4				
	„ „	„ 18	„	W, E	42·7	51·2	33·9	34·2	...	0·4	0·16
4	338 Gr. 72	Jan. 12	N	E, W	0 3 51·0	70 39 25·0	34·0				
	„ „	„ 13	„	W, E	51·8	25·0	33·2	...	33·6	0·8	0·64
5	349 Gr. 72	Jan. 17	S	W, E	4 21 12·4	66 14 22·1	34·5				
	„ „	„ 18	„	E, W	11·8	22·1	33·9	34·2	...	0·4	0·16
6	351 Gr. 72	Jan. 12	N	W, E	4 18 19·2	66 17 14·9	34·1				
	„ „	„ 13	„	E, W	18·6	14·9	33·5	33·8	...	0·0	0·00
7	362 Gr. 72	Jan. 12	N	E, W	3 26 40·4	67 8 53·4	33·8				
	„ „	„ 13	„	W, E	40·5	53·4	33·9				
	„ „	„ 17	S	E, W	41·1	53·4	34·5				
	„ „	„ 18	„	W, E	39·8	53·4	33·2	33·9	...	0·1	0·01
8	370 Gr. 72	Jan. 12	N	W, E	4 23 30·3	66 12 3·7	34·0				
	„ „	„ 13	„	E, W	30·3	3·7	34·0	34·0	...	0·2	0·04
9	373 Gr. 72	Jan. 17	S	W, E	2 22 11·8	68 13 23·4	35·2				
	„ „	„ 18	„	E, W	10·5	23·4	33·9	34·6	...	0·8	0·64
10	381 Gr. 72	Jan. 12	N	E, W	6 46 57·4	63 48 35·9	33·3				
	„ „	„ 13	„	W, E	57·5	35·8	33·3	33·3	..	0·5	0·25
11	388 Gr. 72	Jan. 17	S	E, W	4 17 11·2	74 52 45·6	34·4				
	„ „	„ 18	„	W, E	12·4	45·6	33·2	...	33·8	1·0	1·00
12	399 Gr. 72	Jan. 12	N	W, E	4 2 59·7	74 38 32·6	32·9				
	„ „	„ 13	„	E, W	60·0	32·6	32·6	...	32·8	0·0	0·00
13	419 Gr. 72	Jan. 12	N	E, W	0 28 30·9	71 4 3·5	32·6				
	„ „	„ 13	„	W, E	30·6	3·5	32·9				
	„ „	„ 14	„	E, W	30·7	3·5	32·8				
	„ „	„ 16	S	W, E	30·5	3·6	33·1				
	„ „	„ 17	„	W, E	29·8	3·6	33·8				
	„ „	„ 18	„	E, W	31·0	3·6	32·6	...	33·0	0·2	0·04

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

127. Ankora—*Co-latitude* 70° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
14	429 Gr. 72	Jan. 12	N	W, E	3 7 24·7	73 42 56·9	32·2				
	" "	" 13	"	E, W	24·4	56·9	32·5				
	" "	" 14	"	W, E	25·4	57·0	31·6				
	" "	" 16	S	E, W	25·2	57·0	31·8				
	" "	" 17	"	E, W	24·7	57·0	32·3				
	" "	" 18	"	W, E	25·5	57·0	31·5	...	32·0	0·8	0·64
15	441 Gr. 72	Jan. 12	N	E, W	3 20 6·6	67 15 27·8	34·4				
	" "	" 13	"	W, E	6·3	27·8	34·1				
	" "	" 17	S	W, E	7·7	27·8	35·5				
	" "	" 18	"	E, W	6·7	27·7	34·4	34·6	...	0·8	0·64
16	449 Gr. 72	Jan. 12	N	W, E	0 45 29·9	71 21 4·1	34·2				
	" "	" 13	"	E, W	30·7	4·2	33·5				
	" "	" 14	"	E, W	30·9	4·2	33·3				
	" "	" 16	S	W, E	30·5	4·2	33·7				
	" "	" 17	"	E, W	30·0	4·2	34·2				
	" "	" 18	"	W, E	30·4	4·2	33·8	...	33·8	1·0	1·00
17	460 Gr. 72	Jan. 12	N	E, W	5 28 12·5	65 7 21·8	34·3				
	" "	" 13	"	W, E	12·4	21·8	34·2				
	" "	" 14	"	W, E	13·0	21·7	34·7				
	" "	" 16	S	E, W	12·4	21·7	34·1	34·3	...	0·5	0·25
18	468 Gr. 72	Jan. 17	S	W, E	2 1 20·7	68 34 14·0	34·7				
	" "	" 18	"	E, W	20·2	14·0	34·2	34·5	...	0·7	0·49
19	472 Gr. 72	Jan. 12	N	W, E	0 54 48·0	71 30 20·9	32·9				
	" "	" 13	"	E, W	48·0	20·9	32·9				
	" "	" 14	"	E, W	48·8	20·9	32·1				
	" "	" 16	S	W, E	47·9	21·0	33·1	...	32·8	0·0	0·00
20	500 Gr. 72	Jan. 12	N	E, W	2 7 45·1	72 43 18·1	33·0				
	" "	" 13	"	W, E	46·5	18·1	31·6				
	" "	" 14	"	W, E	47·3	18·1	30·8				
	" "	" 16	S	E, W	46·5	18·2	31·7				
	" "	" 17	"	E, W	45·4	18·2	32·8				
	" "	" 18	"	W, E	45·5	18·2	32·7	...	32·1	0·7	0·49
21	523 Gr. 72	Jan. 12	N	W, E	0 56 54·0	71 32 26·8	32·8				
	" "	" 13	"	E, W	54·8	26·8	32·0	...	32·4	0·4	0·16
22	530 Gr. 72	Jan. 14	N	E, W	1 39 57·4	68 55 38·1	35·5				
	" "	" 16	S	W, E	56·3	38·1	34·4				
	" "	" 17	"	W, E	56·5	38·1	34·6				
	" "	" 18	"	E, W	56·9	38·1	35·0	34·9	...	1·1	1·21
23	551 Gr. 72	Jan. 12	N	E, W	5 7 15·6	65 28 17·1	32·7				
	" "	" 13	"	W, E	15·3	17·0	32·3				
	" "	" 14	"	W, E	15·3	17·0	32·3				
	" "	" 16	S	E, W	16·2	17·0	33·2				
	" "	" 17	"	E, W	15·8	16·9	32·7				
	" "	" 18	"	W, E	15·7	16·9	32·6	32·6	...	1·2	1·44
24	566 Gr. 72	Jan. 13	N	E, W	12 1 24·7	82 36 57·8	33·1				
	" "	" 14	"	E, W	24·4	57·9	33·5				
	" "	" 16	S	W, E	24·6	58·0	33·4				
	" "	" 17	"	W, E	25·2	58·0	32·8				
	" "	" 18	"	E, W	24·5	58·1	33·6	...	33·3	0·5	0·25
25	577 Gr. 72	Jan. 12	N	E, W	0 16 58·4	70 18 34·8	33·2				
	" "	" 13	"	W, E	59·3	34·8	34·1	33·7	...	0·1	0·01

127. Ankora—*Co-latitude* 70° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
26	579 Gr. 72	Jan. 17	S	E, W	3 51 36·5	66 43 57·5	34·0				
	" "	" 18	"	W, E	36·3	57·4	33·7	33·9	...	0·1	0·01
27	581 Gr 72	Jan. 14	N	W E	4 14 22·8	66 21 11·6	34·4				
	" "	" 16	S	E, W	22·5	11·5	34·0	34·2	.	0·4	0·16
28	589 Gr. 72	Jan. 12	N	W, E	3 43 20·1	66 52 14·1	34·2				
	" "	" 13	"	E, W	20·8	14·0	34·8	34·5	...	0·7	0·49
29	593 Gr. 72	Jan. 17	S	W, E	3 31 28·2	67 4 6·6	34·8				
	" "	" 18	"	E, W	27·0	6·6	33·6	34·2	...	0·4	0·16
30	600 Gr. 72	Jan. 12	N	E, W	3 7 47·0	67 27 46·6	33·6				
	" "	" 13	"	W, E	47·8	46·6	34·4				
	" "	" 14	"	E, W	47·3	46·5	33·8				
	" "	" 16	S	W, E	47·3	46·5	33·8	33·9	...	0·1	0·01
31	610 Gr. 72	Jan. 12	N	W, E	3 9 40·3	67 25 53·3	33·6				
	" "	" 13	"	E, W	41·0	53·3	34·3	34·0	...	0·2	0·04
32	618 Gr. 72	Jan. 17	S	E, W	1 26 53·7	69 8 39·2	32·9				
	" "	" 18	"	W, E	52·4	39·2	31·6	32·3	...	1·5	2·25
33	623 Gr. 72	Jan. 12	N	E, W	0 52 22·9	69 43 10·5	33·4				
	" "	" 13	"	W, E	23·8	10·5	34·3				
	" "	" 14	"	W, E	22·4	10·5	32·9				
	" "	" 16	S	E, W	22·8	10·5	33·3	33·5	...	0·3	0·09
34	645 Gr. 72	Jan. 12	N	W, E	2 54 57·0	73 30 28·9	31·9				
	" "	" 13	"	E, W	56·4	28·9	32·5				
	" "	" 14	"	E, W	55·8	28·9	33·1				
	" "	" 16	S	W, E	56·9	29·0	32·1				
	" "	" 17	"	W, E	55·5	29·0	33·5				
	" "	" 18	"	E, W	56·3	29·0	32·7	...	32·6	0·2	0·04
35	676 Gr. 73	Jan. 12	N	E, W	6 48 62·1	63 46 30·5	32·6				
	" "	" 13	"	W, E	64·3	30·4	34·7	33·7	...	0·1	0·01
36	679 Gr. 72	Jan. 17	S	E, W	6 39 20·2	63 56 13·3	33·5				
	" "	" 18	"	W, E	19·3	13·2	32·5	33·0	...	0·8	0·64
37	690 Gr. 72	Jan. 12	N	W, E	3 18 6·0	73 53 38·3	32·3				
	" "	" 13	"	E, W	6·9	38·4	31·5				
	" "	" 17	S	W, E	6·6	38·5	31·9				
	" "	" 18	"	E, W	6·0	38·5	32·5	...	32·1	0·7	0·49
38	697 Gr. 72	Jan. 14	N	E, W	4 54 16·7	65 41 16·1	32·8				
	" "	" 16	S	W, E	17·2	16·0	33·2	33·0	...	0·8	0·64
39	706 Gr. 72	Jan. 12	N	E, W	2 40 8·3	73 15 41·3	33·0				
	" "	" 13	"	W, E	7·7	41·4	33·7				
	" "	" 14	"	W, E	10·3	41·4	31·1				
	" "	" 16	S	E, W	8·0	41·5	33·5				
	" "	" 17	"	E, W	8·5	41·5	33·0				
	" "	" 18	"	W, E	9·5	41·5	32·0	...	32·7	0·1	0·01

127. Ankora—*Co-latitude* 70° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
40	728 Gr. 72	Jan. 12	N	W, E	10 53 47·6	81 29 20·3	32·7				
	„ „	„ 13	„	E, W	48·0	20·3	32·3				
	„ „	„ 14	„	E, W	47·8	20·4	32·6				
	„ „	„ 16	S	W, E	48·2	20·6	32·4				
	„ „	„ 17	„	W, E	47·6	20·7	33·1				
	„ „	„ 18	„	E, W	47·9	20·7	32·8	...	32·7	0·1	0·01
41	737 Gr. 72	Jan. 12	N	E, W	3 20 39·1	73 56 11·8	32·7				
	„ „	„ 13	„	W, E	40·1	11·8	31·7				
	„ „	„ 14	„	W, E	41·1	11·9	30·8				
	„ „	„ 16	S	E, W	40·0	11·9	31·9				
	„ „	„ 17	„	E, W	39·3	12·0	32·7				
	„ „	„ 18	„	W, E	40·1	12·0	31·9	...	32·0	0·8	0·64
42	758 Gr. 72	Jan. 17	S	W, E	6 38 20·7	63 57 12·8	33·5				
	„ „	„ 18	„	E, W	20·9	12·8	33·7	33·6	...	0·2	0·04
43	759 Gr. 72	Jan. 12	N	W, E	5 15 17·0	65 20 16·2	33·2				
	„ „	„ 13	„	E, W	17·7	16·1	33·8				
	„ „	„ 14	„	E, W	18·3	16·1	34·4				
	„ „	„ 16	S	W, E	16·6	16·1	32·7	33·5	...	0·3	0·09
44	777 Gr. 72	Jan. 12	N	E, W	3 19 21·3	73 54 54·9	33·6				
	„ „	„ 13	„	W, E	24·0	55·0	31·0				
	„ „	„ 14	„	W, E	22·9	55·0	32·1				
	„ „	„ 16	S	E, W	22·6	55·1	32·5				
	„ „	„ 17	„	E, W	22·0	55·1	33·1				
	„ „	„ 18	„	W, E	22·7	55·2	32·5	...	32·5	0·3	0·09
45	792 Gr. 72	Jan. 12	N	W, E	2 29 40·9	68 5 52·1	33·0				
	„ „	„ 13	„	E, W	41·5	52·2	33·7				
	„ „	„ 17	S	W, E	42·1	52·2	34·3				
	„ „	„ 18	„	E, W	41·6	52·2	33·8	33·7	...	0·1	0·01
46	795 Gr. 72	Jan. 14	N	E, W	6 25 65·9	64 9 28·0	33·9				
	„ „	„ 16	S	W, E	64·9	27·9	32·8	33·4	...	0·4	0·16
47	807 Gr. 72	Jan. 12	N	E, W	9 52 53·4	80 28 27·1	33·7				
	„ „	„ 13	„	W, E	53·6	27·2	33·6				
	„ „	„ 17	S	E, W	54·6	27·5	32·9				
	„ „	„ 18	„	W, E	54·7	27·6	32·9	...	33·3	0·5	0·25
48	811 Gr. 72	Jan. 16	S	E, W	4 57 45·1	65 37 49·3	34·4	34·4	...	0·6	0·36
49	812 Gr. 72	Jan. 12	N	W, E	0 43 14·9	71 18 47·9	33·0				
	„ „	„ 13	„	E, W	15·2	47·9	32·7				
	„ „	„ 17	S	W, E	15·0	48·1	33·1				
	„ „	„ 18	„	E, W	15·4	48·1	32·7	...	32·9	0·1	0·01
50	819 Gr. 72	Jan. 14	N	E, W	7 53 14·6	62 42 18·2	32·8				
	„ „	„ 16	S	W, E	15·1	18·2	33·3	33·1	...	0·7	0·49
51	833 Gr. 72	Jan. 12	N	E, W	5 2 46·5	65 32 48·0	34·5				
	„ „	„ 13	„	W, E	46·3	48·0	34·3	34·4	...	0·6	0·36
52	837 Gr. 72	Jan. 17	S	E, W	1 24 32·7	69 11 1·3	34·0				
	„ „	„ 18	„	W, E	32·3	1·3	33·6	33·8	...	0·0	0·00
53	839 Gr. 72	Jan. 14	N	W, E	5 3 10·5	65 32 22·3	32·8				
	„ „	„ 16	S	E, W	10·8	22·3	33·1	33·0	...	0·8	0·64

127. Ankora—*Co-latitude* 70° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″			
54	850 Gr 72	Jan. 12	N	W, E	0 59 24.8	69 36 8.6	33.4				
	„ „	„ 13	„	E, W	25.8	8.6	34.4	33.9	...	0.1	0.01
55	852 Gr. 72	Jan. 17	S	W, E	0 42 11.2	69 53 22.4	33.6				
	„ „	„ 18	„	E, W	10.6	22.4	33.0	33.3	.	0.5	0.25
56	855 Gr. 72	Jan. 16	S	W, E	2 27 30.6	68 8 2.7	33.3	33.3	..	0.5	0.25
57	873 Gr. 72	Jan. 17	S	E, W	7 21 32.3	77 57 6.1	33.8				
	„ „	„ 18	„	W, E	33.0	6.1	33.1	..	33.5	0.7	0.49
58	878 Gr. 72	Jan. 14	N	W, E	7 7 19.0	77 42 51.2	32.2				
	„ „	„ 16	„	E, W	18.6	51.4	32.8	..	32.5	0.3	0.09
59	881 Gr. 72	Jan. 17	S	W, E	5 28 50.2	65 6 44.3	34.5				
	„ „	„ 18	„	E, W	48.9	44.4	33.3	33.9	..	0.1	0.01
60	889 Gr. 72	Jan. 14	N	E, W	3 4 67.3	67 30 26.9	34.2				
	„ „	„ 16	S	W, E	66.8	26.9	33.7	34.0	..	0.2	0.04
61	894 Gr. 72	Jan. 17	S	E, W	0 54 38.2	71 30 10.3	32.1				
	„ „	„ 18	„	W, E	38.1	10.3	32.2	..	32.2	0.6	0.36
62	901 Gr. 72	Jan. 14	N	W, E	1 13 59.3	71 49 33.3	34.0				
	„ „	„ 16	S	E, W	60.1	33.4	33.3				
	„ „	„ 17	„	W, E	60.3	33.5	33.2				
	„ „	„ 18	„	E, W	60.5	33.5	33.0	...	33.4	0.6	0.36
63	918 Gr. 72	Jan. 14	N	E, W	4 2 54.6	66 32 40.2	34.8				
	„ „	„ 16	S	W, E	53.3	40.3	33.6				
	„ „	„ 17	„	E, W	54.3	40.3	34.6				
	„ „	„ 18	„	W, E	53.9	40.4	34.3	34.3	.	0.5	0.25
64	923 Gr. 72	Jan. 17	S	W, E	2 28 26.7	73 3 58.1	31.4				
	„ „	„ 18	„	E, W	26.8	58.2	31.4	...	31.4	1.4	1.96
65	927 Gr. 72	Jan. 14	N	W, E	1 23 21.3	69 12 12.5	33.8				
	„ „	„ 16	S	E, W	20.5	12.6	33.1	33.5	...	0.3	0.09
66	939 Gr. 72	Jan. 14	N	E, W	4 52 34.7	65 42 59.8	34.5				
	„ „	„ 16	S	W, E	33.2	59.8	33.0	33.8	...	0.0	0.00
67	948 Gr. 72	Jan. 14	N	W, E	6 26 5.2	77 1 37.3	32.1				
	„ „	„ 16	S	E, W	5.3	37.5	32.2	...	32.2	0.6	0.36
68	955 Gr. 72	Jan. 14	N	E, W	2 6 18.2	72 41 51.2	33.0				
	„ „	„ 16	S	W, E	19.5	51.4	31.9	...	32.5	0.3	0.09
69	967 Gr. 72	Jan. 14	N	W, E	1 6 59.0	71 42 32.3	33.3				
	„ „	„ 16	S	E, W	59.9	32.5	32.6	...	33.0	0.2	0.04

127. Ankora—*Co-latitude* 70° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	$v v$
		1889									
70	980 Gr. 72	Jan. 14	N	E, W	3 52 24·6	74 27 57·8	33·2				
	" "	" 16	S	W, E	26·3	58·0	31·7	...	32·5	0·3	0·09
71	989 Gr. 72	Jan. 14	N	W, E	4 29 53·1	75 5 27·0	33·9				
	" "	" 16	S	E, W	53·5	27·2	33·7	...	33·8	1·0	1·00
								Σ vv by N. Stars = 13·21			
								Σ vv by S. Stars = 12·85			

Summary.

No. of North Stars 42 No. of South Stars 29

No. of observations 212

	°	′	″	″
Co-latitude by North Stars	70	35	33·81	± 0·059
" " South "	70	35	32·82	± 0·085
Mean Co-latitude	70	35	33·32	± 0·052
Correction for Height above Sea-level			+ 0·05	

Final Co-latitude 70° 35′ 33″·37

		°	′	″	″
Astronomical Latitude (A)	=	19	24	26·63	± 0·052
Geodetic Latitude (G)	=	19	24	34·75	
Deflection of plumb-line (A – G)	=			– 8·12	

128. **Bahak**—*Co-latitude* 59° 15′ +

Latitude ... 30° 45′   *Instrument*—Zenith Telescope

Longitude .. 78 16   *Mean Height of Barometer* 21·08 in.

Height ... 9715 feet   *Mean Temperature* 35°·6

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
1	1540 Newc. & 3927 Gr. 80	Dec 4	28 26	E, W	58 48 52·22	+ 26 29·61	21·83				
	" " " "	" 5		W, E	52·23	29·17	21·40	21·62	0·5	0·34	0·0578
2	1568 & 1583 Newcomb	Dec 4	12 5	E, W	59 20 5·87	− 4 43·60	22·27				
	" " "	" 5		W, E	5·88	43·83	22·05	22·16	1·0	0·20	0·0400
3	4029 Gr 80 & 1592 Newc	Dec. 4	24 25	W, E	59 14 44·50	+ 0 38·64	23·14				
	" " " "	" 5		E, W	44·50	38·01	22·51	22·83	1·0	0·87	0·7569
4	11 Newc. & 56 Gr. 80	Dec. 5	22 7	W, E	59 35 46·37	− 20 23·76	22·61	22·61	0·7	0·65	0·2958
5	22 & 27 Newcomb	Dec. 4	31 30	E, W	59 5 14·79	+ 10 6·20	20·99				
	" " "	" 5		E, W	14·76	6·25	21·01	21·00	1·0	0·96	0·9216
6	32 & 35 Newcomb	Dec 4	2 12	W, E	59 0 24·42	+ 14 57·14	21·56				
	" " "	" 5		W, E	24·40	57·46	21·86	21·71	0·5	0·25	0·0313
7	51 & 53 Newcomb	Dec. 4		E, W	58 58 6·40	+ 17 14·56	20·96				
	" " "	" 5	32 42	E, W	6·37	14·56	20·93	20·95	0·5	1·01	0·5101
8	61 & 65 Newcomb	Dec. 3		E, W	59 5 12·27	+ 10 9·08	21·35				
	" " "	" 4	23 33	W, E	12·23	9·14	21·37				
	" " "	" 5		W, E	12·19	9·41	21·60	21·42	0·6	0·54	0·1750
9	71 & 80 Newcomb	Dec. 3	4 11	W, E	59 3 45·19	+ 11 36·76	21·95				
	" " "	" 4		E, W	45·15	36·38	21·53				
	" " "	" 5		E, W	45·11	36·55	21·66	21·78	0·5	0·18	0·0162
10	98 & 105 Newcomb	Dec. 3	19 17	E, W	59 4 15·14	+ 11 6·56	21·70				
	" " "	" 4		W, E	15·09	7·18	22·27				
	" " "	" 5		W, E	15·04	7·15	22·19	21·97	0·5	0·01	0·0001
11	98 & 115 Newcomb	Dec. 3	19 20	E, W	59 0 51·97	+ 14 30·10	22·07				
	" " "	" 4		W, E	51·91	30·63	22·54				
	" " "	" 5		W, E	51·85	30·06	21·91	22·15	0·5	0·19	0·0181

128. Bahak—*Co-latitude* 59° 15′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
12	228 Gr. 80 & 131 Newc.	Dec. 3	11 32	W, E	59 39 5·97	− 23 43·87	22·10				
	" " " "	" 4		E, W	5·92	43·20	22·72				
	" " " "	" 5		E, W	5·86	42·56	23·30	22·56	0·8	0·60	0·2880
13	119 & 131 Newcomb	Dec. 3	11 32	W, E	59 39 10·09	− 23 48·12	21·97				
	" " "	" 4		E, W	10·04	47·70	22·34				
	" " "	" 5		E, W	9·98	47·30	22·68	22·24	0·8	0·28	0·0627
14	137 & 147 Newcomb	Dec. 4	20 14	W, E	59 36 5·26	− 20 42·60	22·66	22·66	0·7	0·70	0·3430
15	159 & 177 Newcomb	Dec. 4	24 32	E, W	59 2 12·80	+ 13 8·30	21·10	21·10	0·7	0·86	0·5177
16	186 & 190 Newcomb	Dec. 4	22 19	W, E	59 10 20·10	+ 5 1·00	21·10	21·10	0·5	0·86	0·3698
17	195 & 203 Newcomb	Dec. 4	9 57	E, W	59 21 46·21	− 6 23·93	22·28	22·28	0·5	0·32	0·0512
18	195 & 209 Newcomb	Dec. 4	9 54	E, W	59 18 24·14	− 3 1·68	22·46	22·46	0·5	0·50	0·1250
								Σ P = 11·8		ΣPvv = 4·5803	

Summary.

No. of pairs 18

No. of observations 36

Mean difference between observations taken E, W and those taken W, E = − 0″·14

Observed Co-latitude (weighted mean) 59° 15′ 21″·96 ± 0″·102

Correction for Height above Sea-level + 0″·44

Final Co-latitude 59° 15′ 22″·40

		°	′	″	″
Astronomical Latitude (A)	=	30	44	37·60	± 0·102
Geodetic Latitude (G)	=	30	45	5·22	
Deflection of plumb-line (A−G)	=			− 27·62	

129. Bajamara—*Co-latitude* 59° 14′ +

Latitude	... 30° 46′	*Instrument*—Zenith Telescope	
Longitude	... 77 56	*Mean Height of Barometer*	in. 21·19
Height	... 9681 feet	*Mean Temperature*	39°·2

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
1	1352 & 1356 Newcomb	Nov. 11	14 35	W, E	59 38 13·41	− 23 41·26	32·15	32·15	0·7	0·38	0·1011
2	1394 Newc. & 3592 Gr. 80 " " " "	Nov. 10 " 11	7 54	E, W W, E	58 53 23·52 23·52	+ 21 7·50 7·67	31·02 31·19	31·11	0·5	0·66	0·2178
3	3592 Gr. 80 & 1414 Newc. " " " "	Nov. 10 " 11	7 27	W, E E, W	59 20 3·77 3·77	− 5 32·16 32·28	31·61 31·49	31·55	0·7	0·22	0·0339
4	1430 & 1443 Newcomb " " "	Nov. 10 " 11	30 16	E, W W, E	59 35 5·89 5·87	− 20 33·75 34·58	32·14 31·29	31·72	1·0	0·05	0·0025
5	1449 & 1452 Newcomb " " "	Nov. 10 " 11	31 33	W, E E, W	59 13 50·09 50·06	+ 0 41·70 41·87	31·79 31·93	31·86	1·0	0·09	0·0081
6	1540 Newc. & 3927 Gr. 80 " " " "	Nov. 10 " 11	28 26	E, W W, E	58 48 52·87 52·79	+ 25 38·47 39·03	31·34 31·82	31·58	0·5	0·19	0·0181
7	1550 & 1552 Newcomb " " "	Nov. 10 " 11	30 31	W, E E, W	58 45 15·24 15·16	+ 29 16·03 16·22	31·27 31·38	31·33	0·5	0·44	0·0968
8	1468 & 1583 Newcomb " " "	Nov. 10 " 11	12 5	W, E E, W	59 20 6·69 6·61	− 5 35·00 34·13	31·69 32·48	32·09	1·0	0·32	0·1024
9	4029 Gr. 80 & 1592 Newc. " " " "	Nov. 10 " 11	24 26	E, W W, E	59 14 45·56 45·47	− 0 13·30 13·40	32·26 32·07	32·17	1·0	0·40	0·1600
10	11 Newc. & 56 Gr. 80 " " " "	Nov. 10 " 11	22 7	W, E E, W	59 35 47·71 47·60	− 21 14·55 15·09	33·16 32·51	32·84	1·0	1·07	1·1449
11	22 & 27 Newcomb " " "	Nov. 10 " 11	31 30	E, W W, E	59 5 16·25 16·15	+ 9 14·97 16·42	31·22 32·57	31·90	1·0	0·13	0·0169
12	32 & 35 Newcomb " " "	Nov. 10 " 11	2 12	W, E E, W	59 0 25·95 25·85	+ 14 6·37 5·43	32·32 31·28	31·80	0·5	0·03	0·0005

129. Bajamara—*Co-latitude* 59° 14′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1903	° ′		° ′ ″	′ ″	″	″			
13	51 & 53 Newcomb	Nov. 10	32 42	W, E	58 58 8·02	+ 16 23·28	31·30				
	" " "	" 11		E, W	7·91	23·08	30·99	31·15	0·5	0·62	0·1922
14	61 & 65 Newcomb	Nov. 10	23 32	E, W	59 5 13·94	+ 9 17·64	31·58				
	" " "	" 11		W, E	13·83	17·02	30·85	31·22	0·5	0·55	0·1513
15	71 & 80 Newcomb	Nov. 10	4 11	W, E	59 3 47·02	+ 10 44·15	31·17				
	" " "	" 11		E, W	46·90	44·92	31·82	31·50	0·5	0·27	0·0365
16	98 & 105 Newcomb	Nov. 10	19 17	E, W	59 4 17·10	+ 10 13·82	30·92	30·92	0·5	0·85	0·3613
17	98 & 115 Newcomb	Nov. 10	19 20	E, W	59 0 53·99	+ 13 37·86	31·85	31·85	0·5	0·08	0·0032
18	119 & 131 Newcomb	Nov. 11	11 31	E, W	59 39 11·98	− 24 40·66	31·32	31·32	0·7	0·45	0·1418
								Σ P = 12·6		Σ Pvv = 2·7893	

Summary.

No. of pairs 18

No. of observations 32

Mean difference between observations taken E, W and those taken W, E = − 0″·13

Observed Co-latitude (weighted mean) 59° 14′ 31″·77 ± 0″·077

Correction for Height above Sea-level + 0″·44

Final Co-latitude 59° 14′ 32″·21

		°	′	″	″
Astronomical Latitude (A)	=	30	45	27·79	± 0·077
Geodetic Latitude (G)	=	30	45	56·20	
Deflection of plumb-line (A − G)	=		−	28·41	

130. Bansgopal—*Co-latitude* 61° 26′ +

Latitude ... 28° 33′ — *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude .. 78 34 — *Mean Height of Barometer* 29·35 in.

Height ... 677 feet — *Mean Temperature* 50°·5

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	44 & 55 Gr. 80	Dec. 24	14 45	E, W	61 29 50·17	− 3 12·23	37·94				
	” ” ”	” 26		W, E	50·29	13·28	37·01	37·48	1·0	0·79	0·6241
2	85 & 114 Gr. 80	Dec. 24	4 44	E, W	61 32 58·99	− 6 22·31	36·68				
	” ” ”	” 26		W, E	59·05	22·85	36·20	36·44	1·0	0·25	0·0625
3	136 & 145 Gr. 80	Dec. 24	9 40	W, E	61 41 39·69	− 15 3·42	36·27				
	” ” ”	” 26		E, W	39·75	3·49	36·26	36·26	1·0	0·43	0·1849
4	177 & 210 Gr. 80	Dec. 24	16 18	E, W	61 17 1·90	+ 9 35·75	37·65				
	” ” ”	” 26		W, E	1·94	34·66	36·60				
	177 & 222 Gr. 80	” 24	16 14	E, W	20 27·30	6 10·57	37·87				
	” ” ”	” 26		W, E	27·33	9·35	36·68	37·21	1·5	0·52	0·4056
5	264 & 291 Gr. 80	Dec. 24	8 30	E, W	61 42 40·61	− 16 5·23	35·38				
	” ” ”	” 26		W, E	40·72	3·65	37·07	36·23	1·0	0·46	0·2116
6	300 & 329 Gr. 80	Dec. 24	5 43	W, E	61 11 6·30	+ 15 30·94	37·24				
	” ” ”	” 26		E, W	6·29	30·84	37·13				
	329 & 326 Gr. 80	” 24	5 46	E, W	14 39·94	11 56·85	36·79				
	” ” ”	” 26		W, E	39·91	56·87	36·78	36·99	1·5	0·30	0·1350
7	353 & 368 Gr. 80	Dec. 24	0 31	W, E	61 17 40·53	+ 8 54·84	35·37				
	” ” ”	” 26		E, W	40·52	55·46	35·98	35·67	1·0	1·02	1·0404
8	376 & 394 Gr. 80	Dec. 27	7 6	W, E	61 22 49·41	+ 3 47·35	36·76				
	” ” ”	” 28		E, W	49·41	47·35	36·76	36·76	1·0	0·07	0·0049
9	401 & 418 Gr. 80	Dec. 27	11 22	E, W	61 35 14·50	− 8 37·59	36·91				
	” ” ”	” 28		W, E	14·49	37·55	36·94	36·93	1·0	0·24	0·0576
10	431 & 438 Gr. 80	Dec. 27	10 41	W, E	61 24 9·33	+ 2 27·26	36·59				
	” ” ”	” 28		E, W	9·33	27·03	36·36				
	438 & 467 Gr. 80	” 27	10 54	E, W	37 8·15	− 10 31·24	36·91				
	” ” ”	” 28		W, E	8·14	31·42	36·72				
	467 & 472 Gr. 80	” 27	10 53	W, E	38 4·10	11 27·13	36·97				
	” ” ”	” 28		E, W	4·08	27·30	36·78				
	472 & 431 Gr. 80	” 27	10 40	E, W	25 5·28	+ 1 31·44	36·72				
	” ” ”	” 28		W, E	5·27	31·17	36·44	36·69	2·0	0·00	0·0000
11	523 & 551 Gr. 80	Dec. 27	19 36	E, W	61 43 45·44	− 17 8·21	37·23				
	” ” ”	” 28		W, E	45·40	7·99	37·41				
	551 & 546 Gr. 80	” 27	19 25	W, E	33 0·53	6 23·07	37·46				
	” ” ”	” 28		E, W	0·50	23·19	37·31	37·36	1·5	0·67	0·6734
12	562 & 571 Gr. 80	Dec. 28	3 29	E, W	61 30 32·48	− 3 55·58	36·90				
	” ” ”	” 29		W, E	32·45	56·00	36·45	36·68	1·0	0·01	0·0001

130. Bansgopal—*Co-latitude* 61° 26′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
13	602 & 610 Gr. 80	Dec. 27	11 21	W, E	61 37 22·63	− 10 46·23	36·40				
	„ „ „	„ 28		E, W	22·63	45·55	37·08				
	660 & 602 Gr. 80	„ 27	11 37	E, W	22 6·17	+ 4 30·62	36·79				
	„ „ „	„ 28		W, E	6·14	30·68	36·82	36·77	1·5	0·08	0·0096
14	693 & 704 Gr. 80	Dec. 24	5 40	W, E	61 45 20·52	− 18 43·45	37·07				
	„ „ „	„ 27		E, W	20·42	43·15	37·27				
	707 & 693 Gr. 80	„ 24	5 34	E, W	39 48·76	13 12·34	36·42				
	„ „ „	„ 27		W, E	48·66	11·93	36·73	36·88	1·5	0·19	0·0542
15	720 & 727 Gr. 80	Dec. 24	14 6	E, W	61 16 18·13	+ 10 19·81	37·94				
	„ „ „	„ 26		W, E	18·06	18·77	36·83	37·38	1·0	0·69	0·4761
16	785 & 809 Gr. 80	Dec. 24	9 32	W, E	61 47 41·94	− 21 6·06	35·88				
	„ „ „	„ 26		E, W	41·87	4·48	37·39	36·63	1·0	0·06	0·0036
17	816 & 846 Gr. 80	Dec. 24	12 44	E, W	61 47 58·14	− 21 23·20	34·94				
	„ „ „	„ 26		W, E	58·08	21·54	36·54				
	846 & 828 Gr. 80	„ 24	12 49	W, E	42 53·42	16 17·98	35·44				
	„ „ „	„ 26		E, W	53·35	16·53	36·82	35·94	1·5	0·75	0·8438
18	872 & 892 Gr. 80	Dec. 24	11 22	W, E	61 20 56·94	+ 5 38·70	35·64				
	„ „ „	„ 26		E, W	56·87	39·09	35·96	35·80	1·0	0·89	0·7921
19	916 & 978 Gr. 80	Dec. 24	10 19	E, W	61 9 59·71	+ 16 37·00	36·71				
	„ „ „	„ 26		W, E	59·65	36·39	36·04				
	984 & 916 Gr. 80	„ 24	10 18	W, E	10 50·29	15 46·23	36·52				
	„ „ „	„ 26		E, W	50·23	45·56	35·79	36·27	1·5	0·42	0·2646
20	999 & 1014 Gr. 80	Dec. 24	8 45	W, E	61 31 57·09	− 5 20·52	36·57				
	„ „ „	„ 26		E, W	57·03	19·13	37·90	37·24	1·0	0·55	0·3025
21	1023 & 1037 Gr. 80	Dec. 24	14 7	E, W	61 6 56·63	+ 19 40·59	37·22				
	„ „ „	„ 26		W, E	56·58	40·35	36·93				
	1053 & 1023 Gr. 80	„ 24	14 23	W, E	23 25·53	3 11·12	36·65				
	„ „ „	„ 26		E, W	25·48	11·65	37·13	36·98	1·5	0·29	0·1262
22	1058 & 1127 Gr. 80	Dec. 24	0 44	W, E	61 10 59·99	+ 15 38·05	38·04				
	„ „ „	„ 26		E, W	59·94	35·66	35·60				
	1127 & 1138 Gr. 80	„ 24	0 30	E, W	24 57·16	+ 1 39·67	36·83				
	„ „ „	„ 26		W, E	57·12	39·02	36·14	36·66	1·5	0·03	0·0014
23	1145 & 1161 Gr. 80	Dec. 24	0 24	W, E	61 19 14·03	+ 7 22·29	36·32				
	„ „ „	„ 26		E, W	14·00	22·27	36·27	36·29	1·0	0·40	0·1600
24	1193 & 1221 Gr. 80	Dec. 27	2 6	W, E	61 41 26·97	− 14 49·75	37·22				
	„ „ „	„ 28		E, W	26·95	49·98	36·97	37·10	1·0	0·41	0·1681
25	1233 & 1245 Gr. 80	Dec. 27	12 22	E, W	61 18 25·80	+ 8 11·35	37·15				
	„ „ „	„ 28		W, E	25·78	10·55	36·33				
	1245 & 1250 Gr. 80	„ 27	12 10	W, E	6 39·87	19 57·51	37·38				
	„ „ „	„ 28		E, W	39·86	56·52	36·38	36·81	1·5	0·12	0·0216
26	1265 & 1284 Gr. 80	Dec. 27	3 22	E, W	61 23 20·18	+ 3 16·16	36·34				
	„ „ „	„ 28		W, E	20·18	15·73	35·91				
	1284 & 1323 Gr. 80	„ 27	3 40	W, E	41 29·60	− 14 52·83	36·77				
	„ „ „	„ 28		E, W	29·60	53·42	36·18				
	1323 & 1299 Gr. 80	„ 27	3 44	E, W	37 45·85	11 8·69	37·16				
	„ „ „	„ 28		W, E	45·85	9·55	36·30				
	1299 & 1265 Gr. 80	„ 27	3 26	W, E	19 36·43	+ 6 60·55	36·98				
	„ „ „	„ 28		E, W	36·43	59·58	36·01	36·46	2·0	0·23	0·1058

130. Bansgopal—*Co-latitude* 61° 26′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
27	1343 & 1397 Gr. 80	Dec. 27	1 28	E, W	61 30 43·92	− 4 7·40	36·52				
	" " "	" 28		W, E	43·93	7·46	36 47				
	1397 & 1405 Gr. 80	" 27	1 13	W, E	15 14·19	+ 11 21 81	36·00				
	" " "	" 28		E, W	14 21	22·36	36·57	36·39	1·5	0·30	0·1350
28	1425 & 1450 Gr. 80	Dec. 27	4 20	W, E	61 11 21·89	+ 15 15·04	36·93				
	" " "	" 28		E, W	21·92	15·30	37·22				
	1450 & 1432 Gr 80	" 27	4 22	E, W	13 7·04	13 30·07	37 11				
	" " "	" 28		W, E	7·08	29·72	36 80				
	1432 & 1452 Gr. 80	" 27	4 20	W, E	15 13 93	11 22·75	36 68				
	" " "	" 28		E, W	13·96	22·63	36 59				
	1452 & 1425 Gr. 80	" 27	4 18	E, W	13 28·77	13 7·72	36 49				
	" " "	" 28		W, E	28·80	8·21	37·01	36·86	2·0	0·17	0·0578
29	1473 & 1508 Gr. 80	Dec. 27	0 25	E, W	61 17 32·48	+ 9 4·72	37·20				
	" " "	" 28		W, E	32·53	3·98	36·51				
	1508 & 1486 Gr. 80	" 27	0 13	W, E	29 56·08	− 3 19 33	36 75				
	" " "	" 28		E, W	56·13	19·38	36·75	36·80	1·5	0·11	0·0182
30	1529 & 1539 Gr. 80	Dec. 29	6 20	E, W	61 16 46·11	+ 9 51·34	37·45				
	" " "	" 30		W, E	46·17	49·85	36·02				
	1550 & 1529 Gr. 80	" 29	6 13	W, E	23 41·50	2 55 72	37·22				
	" " "	" 30		E, W	41·56	54·48	36·04	36·68	1·5	0·01	0·0002
31	1595 & 1599 Gr. 80	Dec. 29	2 2	E, W	61 36 11·11	− 9 33·95	37·16				
	" " "	" 30		W, E	11·19	34 55	36·64	36·90	1 0	0·10	0·0100
32	1617 & 1646 Gr. 80	Dec. 29	7 3	W, E	61 18 55·82	+ 7 40·82	36·64				
	" " "	" 30		E, W	55·91	39·70	35·61	36·12	1·0	0·19	0·0361
								Σ P = 41·5		Σ Pvv = 6 9870	

Summary.

No. of pairs 32

No. of observations 108

Mean difference between observations taken E, W and those taken W, E = + 0″·09

Observed Co-latitude (weighted mean) 61° 26′ 36″·69 ± 0″·050

Correction for Height above Sea-level + 0″·03

Final Co-latitude 61° 26′ 36″·72

		°	′	″	″
Astronomical Latitude (A)	=	28	33	23·28	± 0·050
Geodetic Latitude (G)	=	28	33	28·08	
Deflection of plumb-line (A − G)	=		−	4·80	

131. Bhaorasa—*Co-latitude* 65° 51′ +

Latitude ... 24° 8′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 78 3 *Mean Height of Barometer* 28·63 in.

Height ... 1387 feet *Mean Temperature* 67°·0

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	553 & 562 Gr. 80 ,, ,, ,,	Dec. 9 ,, 12	1 4	E, W W, E	66 3 27·02 26·95	− 11 35·71 32·80	51·31 54·15	52·73	1·0	2·09	4·3681
2	577 & 584 Gr. 80	Dec. 12	0 11	E, W	66 1 33·03	− 9 40·58	52·45	52·45	0·5	2·37	2·8085
3	590 & 577 Gr. 80	Dec. 12	0 12	W, E	66 3 0·39	− 11 7·40	52·99	52·99	0·5	1·83	1·6745
4	613 & 620 Gr. 80 ,, ,, ,,	Dec. 9 ,, 12	11 39	E, W W, E	66 8 42·13 42·06	− 16 48·78 47·08	53·35 54·98	54·17	1·0	0·65	0·4225
5	630 & 648 Gr. 80 ,, ,, ,,	Dec. 9 ,, 12	2 13	W, E E, W	65 59 10·51 10·45	− 7 17·11 16·45	53·40 54·00	53·70	0·7	1·12	0·8781
6	633 & 648 Gr. 80 ,, ,, ,,	Dec. 9 ,, 12	2 15	W, E E, W	66 1 15·85 15·82	− 9 21·73 21·30	54·12 54·52	54·32	0·7	0·50	0·1750
7	686 & 704 Gr. 80	Dec. 9	1 25	E, W	66 0 37·68	− 8 43·61	54·07	54·07	0·5	0·75	0·2813
8	707 & 686 Gr. 80	Dec. 9	1 19	W, E	65 55 5·89	− 3 11·54	54·35	54·35	0·5	0·47	0·1105
9	721 & 789 Gr. 80 ,, ,, ,,	Dec. 9 ,, 12	18 43	W, E E, W	65 51 29·04 28·99	+ 0 30·99 24·75	60·03 53·74	56·89	1·0	2·07	4·2849
10	800 & 846 Gr. 80 ,, ,, ,,	Dec. 9 ,, 12	8 46	E, W W, E	65 45 40·71 40·66	+ 6 17·88 9·84	58·59 50·50	54·54	1·0	0·28	0·0784
11	3959 & 3972 Gr. 80 ,, ,, ,,	Dec. 10 ,, 11	6 28	E, W W, E	65 41 29·75 29·79	+ 10 25·03 26·89	54·78 56·68	55·73	1·0	0·91	0·8281
12	3977 & 3980 Gr. 80 ,, ,, ,,	Dec. 10 ,, 11	19 21	W, E E, W	65 34 9·80 9·83	+ 17 44·26 46·35	54·06 56·18	55·12	0·9	0·30	0·0810
13	3991 & 4010 Gr. 80 ,, ,, ,,	Dec. 10 ,, 11	21 45	E, W W, E	65 52 54·66 54·69	− 0 59·87 58·91	54·79 55·78	55·29	1·0	0·47	0·2209
14	5 & 27 Gr. 80 ,, ,, ,,	Dec. 10 ,, 11	4 27	W, E E, W	65 54 25·32 25·35	− 2 30·21 27·02	55·11 58·33	56·72	1·0	1·90	3·6100
15	68 & 75 Gr. 80 ,, ,, ,,	Dec. 10 ,, 11	4 44	E, W W, E	65 31 45·87 45·87	+ 20 10·74 8·12	56·61 53·99	55·30	0·9	0·48	0·2074
16	92 & 113 Gr. 80 ,, ,, ,,	Dec. 10 ,, 11	4 52	W, E E, W	66 6 3·62 3·63	− 14 10·62 8·88	53·00 54·75	53·87	1·0	0·95	0·9025

131. Bhaorasa—*Co-latitude* 65° 51′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
17	121 & 162 Gr. 80	Dec. 10	16 36	E, W	66 3 30·49	− 11 34·16	56·33				
	” ” ”	” 11		W, E	30·50	34·75	55·75	56·04	1·0	1·22	1·4884
18	168 & 179 Gr. 80	Dec. 10	19 9	W, E	65 44 12·10	+ 7 42·05	54·15				
	” ” ”	” 11		E, W	12·09	41·91	54·00	54·08	1·0	0·74	0·5476
19	185 & 195 Gr. 80	Dec. 10	22 24	E, W	65 41 25·69	+ 10 31·81	57·50				
	” ” ”	” 11		W, E	25·70	29·33	55·03	56·26	1·0	1·44	2·0736
20	204 & 210 Gr. 80	Dec. 10	20 58	W, E	65 57 19·58	− 5 24·13	55·45				
	” ” ”	” 11		E, W	19·57	23·63	55·94	55·70	0·7	0·88	0·5421
21	222 & 204 Gr. 80	Dec. 10	20 54	E, W	66 0 44·85	− 8 50·47	54·38				
	” ” ”	” 11		W, E	44·83	50·53	54·30	54·34	0·7	0·48	0·1613
22	869 & 888 Gr. 80	Dec. 10	13 2	E, W	65 44 22·93	+ 7 32·83	55·76				
	” ” ”	” 11		W, E	22·92	27·66	50·58	53·17	1·0	1·65	2·7225
23	948 & 977 Gr. 80	Dec. 10	6 23	W, E	65 56 14·47	− 4 22·25	52·22				
	” ” ”	” 11		E, W	14·47	19·49	54·98	53·60	1·0	1·22	1·4884
24	994 & 998 Gr. 80	Dec. 10	3 40	E, W	66 4 36·06	− 12 41·56	54·50				
	” ” ”	” 11		W, E	36·07	38·85	57·22	55·86	1·0	1·04	1·0816
25	1010 & 1021 Gr. 80	Dec. 10	1 46	W, E	65 49 47·69	+ 2 7·31	55·00				
	” ” ”	” 11		E, W	47·69	8·59	56·28	55·64	1·0	0·82	0·6724
26	1104 & 1127 Gr. 80	Dec. 10	3 55	E, W	65 48 41·43	+ 3 12·86	54·29				
	” ” ”	” 11		W, E	41·45	11·96	53·41	53·85	1·0	0·97	0·9409
27	1181 & 1193 Gr. 80	Dec. 10	2 10	W, E	65 57 12·63	− 5 17·94	54·69				
	” ” ”	” 11		E, W	12·66	17·16	55·50	55·10	1·0	0·28	0·0784
28	1206 & 1240 Gr. 80	Dec. 10	3 41	W, E	65 36 17·98	+ 15 38·87	56·85				
	” ” ”	” 11		E, W	18·01	36·52	54·53	55·69	0·9	0·87	0·6812
29	256 & 268 Gr. 80	Dec. 12	15 43	E, W	65 38 19·47	+ 13 31·76	51·23				
	” ” ”	” 13		W, E	19·47	35·89	55·36	53·30	1·0	1·52	2·3104
30	285 & 288 Gr. 80	Dec. 12	5 9	W, E	66 3 8·74	− 11 14·40	54·34				
	” ” ”	” 13		E, W	8·74	13·55	55·19	54·76	0·9	0·06	0·0032
31	331 & 334 Gr. 80	Dec. 12	5 24	E, W	65 34 10·74	+ 17 46·64	57·38				
	” ” ”	” 13		W, E	10·73	44·72	55·45	56·42	1·0	1·60	2·5600
32	368 & 373 Gr. 80	Dec. 12	4 54	E, W	65 41 2·00	+ 10 48·39	50·39				
	” ” ”	” 13		W, E	1·98	52·09	54·07	52·23	1·0	2·59	6·7081
33	394 & 396 Gr. 80	Dec. 12	2 33	E, W	65 55 15·00	− 3 17·95	57·05				
	” ” ”	” 13		W, E	14·98	20·11	54·87	55·96	1·0	1·14	1·2996

131. Bhaorasa—*Co-latitude* 65° 51′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
34	403 & 414 Gr. 80	Dec. 12	4 38	W, E	65 47 32·67	+ 4 21·12	53·79				
	" " "	" 13		E, W	32·65	22·69	55·34	54·57	1·0	0·25	0·0625
35	418 & 434 Gr. 80	Dec. 12	7 15	E, W	65 42 39·76	+ 9 11·65	51·41				
	" " "	" 13		W, E	39·74	15·04	54·78	53·09	1·0	1·73	2·9929
36	455 & 468 Gr. 80	Dec. 12	20 24	W, E	65 54 46·99	− 2 51·56	55·43				
	" " "	" 13		E, W	46·97	50·20	56·71	56·07	1·0	1·25	1·5625
37	471 & 475 Gr. 80	Dec. 12	4 41	E, W	65 58 44·72	− 6 49·11	55·61				
	" " "	" 13		W, E	44·70	50·07	54·63	55·12	1·0	0·30	0·0900
38	483 & 513 Gr. 80	Dec. 12	25 32	W, E	66 2 0·40	− 10 4·08	56·32				
	" " "	" 13		E, W	0·37	4·81	55·56	55·94	0·7	1·12	0·8781
39	500 & 513 Gr. 80	Dec. 12	25 24	W, E	65 53 44·08	− 1 48·06	56·02				
	" " "	" 13		E, W	44·04	49·07	54·97	55·49	0·7	0·67	0·3142
40	549 Gr. 80	Dec. 13	0 23	W, E	65 52 18·76	− 0 22·20	56·56	56·56	0·7	1·74	2·1193
								ΣP = 35·5		ΣPvv = 54·3109	

Summary,

No. of pairs 40
No. of observations 75

Mean difference between observations taken E, W and those taken W, E = + 0″·21

Observed Co-latitude (weighted mean) 65° 51′ 54″·82 ±0″·134

Correction for Height above Sea-level + 0″·05

Final Co-latitude 65° 51′ 54″·87

		°	′	″	″
Astronomical Latitude (A)	=	24	8	5·13*	±0·134
Geodetic Latitude (G)	=	24	8	3·74	
Deflection of plumb-line (A—G)	=		+	1·39	

132. Bhimsain—*Co-latitude* 69° 2′ +

Latitude	... 20° 58′	*Maximum recorded Height of Barometer*	= 28·716 in.
Longitude	... 79 49	*Minimum* „ „ „	= 28·663
Height	... 1490 feet	*Maximum* „ *Reading of Thermometer*	= 76°·8
Instrument—Zenith Sector No. 2		*Minimum* „ „ „	= 62 ·0

Observer—Lieut. S. G. Burrard, R.E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean by North Star	Seconds of Co-latitude: Mean by South Star	v	v v
		1887			° ′ ″	° ′ ″	″	″	″		
1	419 Gr. 72	Feb. 10	N	W, E	2 1 52·95	71 4 23·61	30·66				
	„ „	„ 12	„	E, W	52·11	23·65	31·54	...	31·10	0·45	0·2025
2	421 Gr. 72	Feb. 11	N	W, E	5 20 27·87	74 23 0·06	32·19				
	„ „	„ 13	„	E, W	27·33	0·11	32·78	...	32·48	0·93	0·8649
3	429 Gr. 72	Feb. 10	N	E, W	4 40 44·67	73 43 15·91	31·24				
	„ „	„ 12	„	W, E	44·74	15·96	31·22	...	31·23	0·32	0·1024
4	440 Gr. 72	Feb. 11	N	E, W	7 26 8·56	61 36 22·31	30·87				
	„ „	„ 13	„	W, E	9·40	22·31	31·71	31·29	...	0·03	0·0009
5	441 Gr. 72	Feb. 12	N	E, W	1 46 46·16	67 15 45·58	31·74	31·74	...	0·48	0·2304
6	449 Gr. 72	Feb. 11	N	W, E	2 18 49·31	71 21 20·83	31·52				
	„ „	„ 13	„	E, W	47·79	20·86	33·07	...	32·29	0·74	0·5476
7	456 Gr. 72	Feb. 10	N	E, W	12 1 37·56	57 0 53·01	30·57				
	„ „	„ 12	„	W, E	38·22	52·97	31·19	30·88	...	0·38	0·1444
8	459 Gr. 72	Feb. 11	N	E, W	3 59 5·08	73 1 37·35	32·27				
	„ „	„ 13	„	W, E	6·26	37·38	31·12	...	31·69	0·14	0·0196
9	468 Gr. 72	Feb. 10	N	W, E	0 28 3·63	68 34 28·68	32·31				
	„ „	„ 12	„	E, W	3·68	28·69	32·37	32·34	...	1·08	1·1664
10	472 Gr. 72	Feb. 11	N	W, E	2 28 4·26	71 30 35·31	31·05				
	„ „	„ 13	„	E, W	3·77	35·33	31·50	...	31·31	0·24	0·0576
11	498 Gr. 72	Feb. 10	N	E, W	6 52 55·56	62 9 36·37	31·93				
	„ „	„ 12	„	W, E	56·09	36·33	32·42	32·17	...	0·91	0·8281
12	500 Gr. 72	Feb. 11	N	E, W	3 40 59·01	72 43 29·91	30·90				
	„ „	„ 13	„	W, E	58·37	29·93	31·56	...	31·23	0·32	0·1024
13	506 Gr. 72	Feb. 10	N	W, E	7 33 4·86	61 29 26·34	31·20				
	„ „	„ 12	„	E, W	6·09	26·29	32·38	31·79	...	0·53	0·2809
14	519 Gr. 72	Feb. 11	N	W, E	2 27 4·33	72 29 35·65	31·32				
	„ „	„ 13	„	E, W	3·20	35·66	32·46	...	31·89	0·34	0·1156
15	523 Gr. 72	Feb. 10	N	E, W	2 30 5·87	71 32 37·12	31·25				
	„ „	„ 12	„	W, E	5·71	37·13	31·42	...	31·34	0·21	0·0441

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

132. Bhimsain—*Co-latitude* 69° 2′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1887			° ′ ″	° ′ ″	″	″	″		
16	530 Gr. 72	Feb. 11	N	E, W	0 6 45·45	68 55 47·23	32·68				
	" "	" 13	"	W, E	44·80	47·22	32·02	32·35	...	1·09	1·1881
17	534 Gr. 72	Feb. 10	N	W, E	4 52 22·08	64 10 8·67	30·75				
	" "	" 12	"	E, W	23·16	8·63	31·79	31·27	...	0·01	0·0001
18	547 Gr. 72	Feb. 11	N	W, E	6 30 53·97	75 33 26·75	32·78				
	" "	" 13	"	E, W	53·96	26·77	32·81	...	32·79	1·24	1·5376
19	551 Gr. 72	Feb. 10	N	E, W	3 34 7·37	65 28 23·96	31·33				
	" "	" 12	"	W, E	6·88	23·91	30·79	31·06	...	0·20	0·0400
20	559 Gr. 72	Feb. 11	N	E, W	6 37 28·52	62 25 2·62	31·14				
	" "	" 13	"	W, E	28·38	2·55	30·93	31·04	...	0·22	0·0484
21	566 Gr. 72	Feb. 10	N	W, E	13 34 34·88	82 37 5·82	30·94				
	" "	" 12	"	E, W	34·17	5·89	31·72	...	31·33	0·22	0·0484
22	569 Gr. 72	Feb. 11	N	W, E	4 58 43·07	64 3 47·56	30·63				
	" "	" 13	"	E, W	44·39	47·50	31·89	31·26	...	0·00	0·0000
23	577 Gr. 72	Feb. 10	N	E, W	1 16 7·98	70 18 39·92	31·94				
	" "	" 12	"	W, E	7·95	39·91	31·96	...	31·95	0·40	0·1600
24	579 Gr. 72	Feb. 11	N	E, W	2 18 29·65	66 44 1·91	31·56				
	" "	" 13	"	W, E	29·59	1·87	31·46	31·51	...	0·25	0·0625
25	589 Gr. 72	Feb. 10	N	W, E	2 10 13·85	66 52 17·64	31·49				
	" "	" 12	"	E, W	15·56	17·59	33·15	32·32	...	1·06	1·1236
26	592 Gr. 72	Feb. 11	N	W, E	1 8 45·33	70 11 16·76	31·43				
	" "	" 13	"	E, W	43·88	16·74	32·86	...	32·14	0·59	0·3481
27	600 Gr. 72	Feb. 10	N	E, W	1 34 41·80	67 27 49·37	31·17	31·17	...	0·09	0·0081
28	610 Gr. 72	Feb. 11	N	E, W	1 36 36·51	67 25 54·55	31·06				
	" "	" 13	"	W, E	37·47	54·50	31·97	31·51	...	0·25	0·0625
29	618 Gr. 72	Feb. 10	N	W, E	0 6 9·97	69 8 40·18	30·21				
	" "	" 12	"	E, W	9·45	40·14	30·69	...	30·45	1·10	1·2100
30	623 Gr. 72	Feb. 11	N	W, E	0 40 41·17	69 43 11·31	30·14				
	" "	" 13	"	E, W	40·30	11·29	30·99	...	30·57	0·98	0·9604
31	637 Gr. 72	Feb. 10	N	E, W	13 18 6·74	82 20 38·94	32·20				
	" "	" 12	"	W, E	6·62	39·01	32·39	...	32·29	0·74	0·5476
32	645 Gr. 72	Feb. 11	N	E, W	4 27 57·71	73 30 28·77	31·06				
	" "	" 13	"	W, E	57·26	28·77	31·51	...	31·29	0·26	0·0676

132. Bhimsain—*Co-latitude* 69° 2′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	
		1887			° ′ ″	° ′ ″	″	″	″		
33	652 Gr. 72	Feb. 10	N	W, E	4 16 53 31	64 45 37·05	30 36				
	" "	" 12	"	E, W	54·53	36 97	31 50	30 93	.	0 33	0 1089
34	664 Gr. 72	Feb. 10	N	E, W	13 8 12 08	55 54 18 58	30 66				
	" "	" 12	"	W, E	12·05	18·41	30 46	30 56		0 70	0 4900
35	669 Gr. 72	Feb. 11	N	W, E	7 38 27 09	76 40 57 53	30 44				
	" "	" 13	"	E, W	25 31	57 55	32 24	.	31 34	0 21	0 0441
36	676 Gr. 72	Feb. 10	N	W, E	5 16 5 15	63 46 25·75	30·90				
	" "	" 12	"	E, W	6 09	25 65	31·74	31·32	. .	0 06	0 0036
37	682 Gr. 72	Feb. 11	N	E, W	3 24 54 33	65 37 37 10	31 43				
	" "	" 13	"	W, E	55 12	37 02	32 14	31 78		0 52	0 2704
38	684 Gr. 72	Feb. 10	N	E, W	0 13 31·21	69 16 2 88	31 67				
	" "	" 12	"	W, E	31 68	2·83	31 15	. .	31 41	0 14	0 0196
39	690 Gr. 72	Feb. 10	N	W, E	4 51 2 54	73 53 33·24	30 70				
	" "	" 12	"	E, W	1 77	33 24	31 47	...	31 09	0 46	0 2116
40	697 Gr. 72	Feb. 11	N	W, E	3 21 21 77	65 41 9·19	30 96				
	" "	" 13	"	E, W	22 06	9 10	31 76	31 36		0 10	0 0100
41	698 Gr. 72	Feb. 10	N	E, W	4 36 40 44	73 39 10·73	30 20				
	" "	" 12	"	W, E	39 73	10 73	31 00	.	30 60	0 90	0 8100
42	706 Gr. 72	Feb. 11	N	E, W	4 13 2 07	73 15 34 71	31 74				
	" "	" 13	"	W, E	3 [illegible]	34 69	31 08	..	31 [illegible]	0 16	0 0256
43	711 Gr. 72	Feb. 10	N	W, E	1 13 43 58	67 48 47 29	30 87				
	" "	" 12	"	E, W	45 26	47 22	32 48	31 0[illegible]		0 41	0 [illegible]
44	724 Gr. 72	Feb. 11	N	W, E	7 3 30 18	61 58 49 88	29 06				
	" "	" 13	"	E, W	41 52	49 75	[illegible]	[illegible]		1 00	[illegible]
45	728 Gr. 72	Feb. 10	N	E, W	12 26 42 54	81 29 13 58	31 0[illegible]				
	" "	" 12	"	W, E	41 57	13 65	32 08	.	[illegible]	0 01	0·0001
46	737 Gr. 72	Feb. 10	N	W, E	4 53 31 04	73 56 2 04	31 0[illegible]				
	" "	" 12	"	E, W	31 33	2 94	31 0[illegible]		[illegible]	0 24	0 [illegible]
47	738 Gr. 72	Feb. 11	N	E, W	11 10 27·48	57 52 3 20	[illegible] 77				
	" "	" 13	"	W, E	28 31	3·12	31 43	31·10		0 16	0 0256
48	740 Gr. 72	Feb. 11	N	E, W	11 10 31·06	57 51 59 92	30 98				
	" "	" 13	"	W, E	31·06	59·75	30 81	30 90		0 36	0 1296
49	759 Gr. 72	Feb. 11	N	W, E	3 42 26 46	65 20 4 07	30 53				
	" "	" 13	"	E, W	27 88	3 97	31 85	31 10		0 07	0 0049

132. Bhimsain—*Co-latitude* 69° 2′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seco by each observation	Mean by North Star	Mean by South Star	v	v v
		1887			° ′ ″	° ′ ″	″	″	″		
50	760 Gr. 72	Feb. 10	N	E, W	7 20 16·39	61 42 15·05	31·44	31·16	...	0·10	0·0100
	,, ,,	,, 12	,,	W, E	15·97	14·91	30·88				
51	774 Gr. 72	Feb. 11	N	E, W	6 5 48·02	62 56 42·54	30·56	30·85	...	0·41	0·1681
	,, ,,	,, 13	,,	W, E	48·72	42·41	31·13				
52	777 Gr. 72	Feb. 10	N	W, E	4 52 10·81	73 54 42·44	31·63	...	31·90	0·35	0·1225
	,, ,,	,, 12	,,	E, W	10·26	42·44	32·18				
53	782 Gr. 72	Feb. 11	N	W, E	3 20 37·02	72 23 8·60	31·58	...	32·37	0·82	0·6724
	,, ,,	,, 13	,,	E, W	35·42	8·58	33·16				
54	786 Gr. 72	Feb. 10	N	E, W	7 8 58·59	61 53 31·96	30·55	30·78	...	0·48	0·2304
	,, ,,	,, 12	,,	W, E	59·18	31·82	31·00				
55	792 Gr. 72	Feb. 11	N	E, W	0 56 53·17	68 5 36·98	30·15	30·58	...	0·68	0·4624
	,, ,,	,, 13	,,	W, E	54·10	36·91	31·01				
56	795 Gr. 72	Feb. 10	N	W, E	4 53 19·10	64 9 11·30	30·40	30·81	...	0·45	0·2025
	,, ,,	,, 12	,,	E, W	20·03	11·18	31·21				
57	807 Gr. 72	Feb. 11	N	W, E	11 25 41·51	80 28 12·88	31·37	...	31·63	0·08	0·0064
	,, ,,	,, 13	,,	E, W	41·06	12·95	31·89				
58	809 Gr. 72	Feb. 10	N	E, W	6 37 19·87	62 25 11·11	30·98	31·13	...	0·13	0·0169
	,, ,,	,, 12	,,	W, E	20·31	10·97	31·28				
59	812 Gr. 72	Feb. 11	N	E, W	2 15 59·10	71 18 31·21	32·11	...	30·69	0·86	0·7396
	,, ,,	,, 13	,,	W, E	61·91	31·17	29·26				
60	817 Gr. 72	Feb. 10	N	W, E	3 32 35·63	72 35 5·96	30·33	...	30·89	0·66	0·4356
	,, ,,	,, 12	,,	E, W	34·49	5·94	31·45				
61	833 Gr. 72	Feb. 11	N	W, E	3 30 1·76	65 32 28·98	30·74	31·58	...	0·32	0·1024
	,, ,,	,, 13	,,	E, W	3·54	28·88	32·42				
62	837 Gr. 72	Feb. 10	N	E, W	0 8 11·14	69 10 42·74	31·60	...	31·55	0·00	0·0000
	,, ,,	,, 12	,,	W, E	11·19	42·68	31·49				
63	850 Gr. 72	Feb. 11	N	E, W	0 33 17·41	69 35 49·30	31·89	...	31·73	0·18	0·0324
	,, ,,	,, 13	,,	W, E	17·67	49·25	31·58				
64	855 Gr. 72	Feb. 10	N	W, E	0 54 47·50	68 7 42·68	30·18	30·66	...	0·60	0·3600
	,, ,,	,, 12	,,	E, W	48·53	42·61	31·14				
65	859 Gr. 72	Feb. 11	N	W, E	2 23 32·25	71 26 2·80	30·55	...	31·55	0·00	0·0000
	,, ,,	,, 13	,,	E, W	30·23	2·78	32·55				
66	868 Gr. 72	Feb. 11	N	E, W	7 43 18·35	61 19 12·33	30·68	30·76	...	0·50	0·2500
	,, ,,	,, 13	,,	W, E	18·67	12·17	30·84				

132. Bhimsain—*Co-latitude* 69° 2′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	vv
		1887			° ′ ″	° ′ ″	″	″	″		
67	873 Gr. 72	Feb. 10	N	E, W	8 54 13·80	77 56 45·70	31·90				
	,, ,,	,, 12	,,	W, E	13·45	45·74	32·29	...	32·09	0·54	0·2916
68	878 Gr. 72	Feb. 11	N	W, E	8 39 59·33	77 42 30·72	31·39				
	,, ,,	,, 13	,,	E, W	58·67	30·76	32·09	.	31·74	0·19	0·0361
								Σ vv by N Stars =			9·3863
								Σ vv by S Stars =			10·4416

Summary.

No. of North Stars 34 • No. of South Stars 34

No. of observations 134

	°	′	″	″
Co-latitude by North Stars	69	2	31·264	± 0·062
,, ,, South ,,	69	2	31·546	± 0·065
Mean Co-latitude	69	2	31·405	± 0·045
Correction for Height above Sea-level		+	0·05	

Final Co-latitude 69° 2′ 31″·455

		°	′	″	″
Astronomical Latitude (A)	=	20	57	28·545	± 0·045
Geodetic Latitude (G)	=	20	57	35·96	
Deflection of plumb-line (A−G)	=		−	7·42	

133. Birond—*Co-latitude* 60° 45′ +

Latitude	... 29° 15′	*Instrument*—Zenith Telescope	
Longitude	... 79 45	*Mean Height of Barometer*	in. 22·90
Height	... 6967 feet	*Mean Temperature*	45°·8

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1903	° ′		° ′ ″	′ ″	″	″			
1	355 & 869 Newcomb	Mar. 14	20 11	W, E	60 23 50·59	+ 21 39·77	30·36				
	„ „ „	„ 15		E, W	50·60	40·08	30·68	30·52	1·0	0·55	0·3025
2	374 Newc. & 999 Gr. 80	Mar. 14	9 42	E, W	60 34 33·50	+ 10 56·69	30·19				
	„ „ „ „	„ 15		W, E	33·50	57·16	30·66	30·43	1·0	0·46	0·2116
3	398 & 410 Newcomb	Mar. 14	36 46	E, W	61 1 25·84	− 15 55·85	29·99				
	„ „ „	„ 15		W, E	25·84	56·19	29·65	29·82	1·0	0·15	0·0225
4	1099 & 1127 Gr. 80	Mar. 13	1 14	E, W	60 40 34·34	+ 4 55·91	30·25				
	„ „ „	„ 14		W, E	34·32	54·99	29·31				
	„ „ „	„ 15		E, W	34·30	55·48	29·78	29·67	1·2	0·30	0·1080
5	427 & 437 Newcomb	Mar. 13	12 42	W, E	60 48 46·82	− 3 17·08	29·74				
	„ „ „	„ 14		E, W	46·79	17·29	29·50				
	„ „ „	„ 15		W, E	46·77	17·19	29·58	29·58	1·2	0·39	0·1825
6	444 & 462 Newcomb	Mar. 13	29 27	E, W	60 53 35·07	− 8 5·65	29·42				
	„ „ „	„ 14		W, E	35·04	4·12	30·92				
	„ „ „	„ 15		E, W	35·02	5·76	29·26	30·13	1·2	0·16	0·0307
7	468 & 469 Newcomb	Mar. 13	12 11	W, E	61 6 60·16	− 21 29·20	30·96				
	„ „ „	„ 15		E, W	60·07	29·95	30·12				
	„ „ „	„ 17		W, E	59·98	30·53	29·45	30·17	1·2	0·20	0·0480
8	1270 Gr. 80 & 479 Newc.	Mar. 13	20 28	W, E	61 3 28·32	− 17 57·97	30·35				
	„ „ „ „	„ 14		E, W	28·27	58·20	30·07				
	„ „ „ „	„ 15		E, W	28·23	58·04	30·19				
	„ „ „ „	„ 17		E, W	28·13	58·26	29·87	30·20	1·3	0·23	0·0688
9	481 & 485 Newcomb	Mar. 13	2 26	E, W	60 27 28·05	+ 18 1·32	29·37				
	„ „ „	„ 14		W, E	28·00	1·15	29·15	29·26	0·7	0·71	0·3529
10	484 & 485 Newcomb	Mar. 13	2 30	E, W	60 23 45·09	+ 21 45·14	30·23				
	„ „ „	„ 14		W, E	45·03	44·63	29·66				
	„ „ „	„ 15		W, E	44·98	44·11	29·09				
	„ „ „	„ 17		E, W	44·86	45·05	29·91	29·72	0·9	0·25	0·0563
11	495 & 498 Newcomb	Mar. 13	4 31	W, E	60 51 37·01	− 6 6·38	30·63				
	„ „ „	„ 14		E, W	36·95	6·49	30·46				
	„ „ „	„ 15		E, W	36·89	6·92	29·97				
	„ „ „	„ 17		W, E	36·76	6·63	30·13	30·30	1·3	0·33	0·1416
12	517 Newc. & 1397 Gr. 80	Mar. 13	0 56	E, W	60 59 44·78	− 14 14·62	30·16				
	„ „ „ „	„ 14		W, E	44·70	14·80	29·90				
	„ „ „ „	„ 15		W, E	44·63	14·32	30·31				
	„ „ „ „	„ 17		E, W	44·49	15·01	29·48	29·96	1·3	0·01	0·0001

133. Birond—*Co-latitude* 60° 45′ +

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
13	533 & 538 Newcomb	Mar. 13	14 30	W, E	60 59 13·65	− 13 43·87	29 78				
	" " "	" 14		E, W	13·57	43 62	29 95				
	" " "	" 15		E, W	13·49	42·85	30·64	30·04	1·2	0·07	0·0059
14	565 Newc. & 1499 Gr. 80	Mar 13	0 57	W, E	60 20 56 84	+ 24 33·00	29·84				
	" " " "	" 14		E, W	56 75	33 23	29 98				
	" " " "	" 15		W, E	56·65	33 16	29 81				
	" " " "	" 17		E, W	56·47	33 26	29 73	29 84	1·3	0·13	0·0220
15	576 & 583 Newcomb	Mar. 13	18 15	E, W	60 42 13·20	+ 3 16·79	29·99				
	" " "	" 14		W, E	13·10	16 54	29 64				
	" " "	" 15		E, W	13·01	16 62	29·63				
	" " "	" 17		W, E	12·83	16 91	29·74	29·75	1·3	0·22	0·0629
16	587 Newc & 1541 Gr. 80	Mar 13	14 9	W, E	60 31 20·38	+ 14 9·42	29 80				
	" " " "	" 14		E, W	20·28	9·64	29 92				
	" " " "	" 15		E, W	20·18	9·74	29 92				
	" " " "	" 17		W, E	19 98	9·92	29 90	29 89	1·3	0·08	0·0083
									Σ P = 18 4		Σ Pvv = 1·7139

Summary.

No. of pairs 16

No. of observations 51

Mean difference between observations taken E, W and those taken W, E = + 0″·02

Observed Co-latitude (weighted mean) 60° 45′ 29″·97 ± 0″·052

Correction for Height above Sea-level + 0″·31

Final Co-latitude 60° 45′ 30″·28

		°	′	″	″
Astronomical Latitude (A)	=	29	14	29·72	± 0·052
Geodetic Latitude (G)	=	29	15	14·15	
Deflection of plumb-line (A−G)	=		−	44·43	

134. Bithnok—*Co-latitude* 62° 6′ +

Latitude ... 27° 53′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 72 42 *Mean Height of Barometer* 29·18 in.

Height ... 774 feet *Mean Temperature* 62°·9

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	167 & 178 Gr. 80 " " "	Dec. 6 " 9	26 48	E, W W, E	62 23 54·46 54·37	− 17 19·98 19·36	34·48 35·01	34·74	1·0	0·26	0·0676
2	190 & 194 Gr. 80 " " "	Dec. 6 " 9	26 22	W, E E, W	61 45 50·88 50·77	+ 20 42·68 45·21	33·56 35·98	34·77	1·0	0·23	0·0529
3	219 & 237 Gr. 80 " " "	Dec. 6 " 9	9 2	E, W W, E	62 20 25·07 24·97	− 13 48·73 51·47	36·34 33·50	34·92	0·7	0·08	0·0045
4	220 & 237 Gr. 80 " " "	Dec. 6 " 9	9 0	E, W W, E	62 18 17·92 17·82	− 11 43·16 44·46	34·76 33·36	34·06	0·7	0·94	0·6185
5	254 Gr. 80 & 169 Gr. 72 " " " "	Dec. 6 " 9	39 21	W, E E, W	61 50 59·74 59·60	+ 15 35·76 36·48	35·50 36·08	35·79	1·0	0·79	0·6241
6	300 & 317 Gr. 80 " " "	Dec. 6 " 9	4 51	E, W W, E	62 4 16·84 16·70	+ 2 18·90 17·46	35·74 34·16	34·95	0·7	0·05	0·0018
7	301 & 317 Gr. 80 " " "	Dec. 6 " 9	4 51	E, W W, E	62 4 4·03 3·89	+ 2 29·94 31·39	33·97 35·28	34·62	0·7	0·38	0·1011
8	329 & 339 Gr. 80 " " "	Dec. 6 " 9	6 53	W, E E, W	62 23 53·24 53·09	− 17 17·50 18·72	35·74 34·37	35·05	1·0	0·05	0·0025
9	382 & 394 Gr. 80 " " "	Dec. 6 " 9	6 22	E, W W, E	62 7 60·01 59·80	− 1 24·51 26·93	35·50 32·87	34·18	1·0	0·82	0·6724
10	259 Gr. 72 & 395 Gr. 80	Dec. 9	27 48	W, E	62 20 3·10	− 13 29·36	33·74	33·74	0·7	1·26	1·1113
11	418 & 438 Gr. 80 " " "	Dec. 6 " 9	11 7	E, W W, E	61 51 59·65 59·47	+ 14 36·91 35·24	36·56 34·71	35·63	1·0	0·63	0·3969
12	460 & 467 Gr. 80 " " "	Dec. 6 " 9	10 29	W, E E, W	62 2 50·02 49·85	+ 3 45·69 45·96	35·71 35·81	35·76	1·0	0·76	0·5776
13	471 & 477 Gr. 80	Dec. 6	0 55	E, W	62 13 58·16	− 7 23·77	34·39	34·39	0·7	0·61	0·2605
14	523 & 551 Gr. 80 " " "	Dec. 6 " 9	19 36	W, E E, W	61 44 59·17 58·98	+ 21 37·08 37·20	36·25 36·18	36·21	1·0	1·21	1·4641
15	571 & 576 Gr. 80 " " "	Dec. 6 " 9	4 5	E, W W, E	62 7 52·94 52·76	− 1 16·61 17·54	36·33 35·22	35·77	0·7	0·77	0·4150

134. Bithnok—*Co-latitude* 62° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
16	571 & 577 Gr. 80	Dec. 6	3 55	E, W	61 57 14·23	+ 9 20·84	35·07				
	,, ,, ,,	,, 9		W, E	14·04	20·16	34·20	34·63	0·7	0·37	0·0958
17	571 & 581 Gr. 80	Dec. 6	4 10	E, W	62 12 44·71	− 6 10·05	34·66				
	,, ,, ,,	,, 9		W, E	44·53	9·41	35·12	34·89	0·7	0·11	0·0085
18	583 & 603 Gr. 80	Dec. 6	3 54	W, E	62 19 8·53	− 12 33·51	35·02				
	,, ,, ,,	,, 9		E, W	8·35	34·33	34·02	34·52	0·7	0·48	0·1613
19	584 & 603 Gr. 80	Dec. 6	3 54	W, E	62 19 27·71	− 12 53·48	34·23				
	,, ,, ,,	,, 9		E, W	27·53	53·19	34·34	34·28	0·7	0·72	0·3629
20	590 & 603 Gr. 80	Dec. 6	3 55	W, E	62 20 54·49	− 14 19·53	34·96				
	,, ,, ,,	,, 9		E, W	54·31	19·60	34·71	34·83	0·7	0·17	0·0202
21	591 & 603 Gr. 80	Dec. 6	3 53	W, E	62 18 23·86	− 11 49·91	33·95				
	,, ,, ,,	,, 9		E, W	23·68	49·81	33·87	33·91	0·7	1·09	0·8317
22	11 & 38 Gr. 80	Dec. 8	10 14	W, E	62 8 24·63	− 1 49·24	35·39	35·39	0·7	0·39	0·1065
23	42 & 75 Gr. 80	Dec. 7	8 15	W, E	62 2 37·80	+ 3 57·26	35·06				
	,, ,, ,,	,, 8		E, W	37·80	58·34	36·14	35·60	1·0	0·60	0·3600
24	100 & 104 Gr. 80	Dec. 7	46 30	E, W	62 4 42·70	+ 1 54·10	36·80				
	,, ,, ,,	,, 8		W, E	42·66	51·53	34·19	35·49	1·0	0·49	0·2401
25	116 & 133 Gr. 80	Dec. 7	29 29	W, E	62 13 52·31	− 7 16·41	35·90				
	,, ,, ,,	,, 8		E, W	52·28	18·31	33·97	34·93	0·7	0·07	0·0034
26	117 & 133 Gr. 80	Dec 8	29 29	E, W	62 13 54·72	− 7 19·97	34·75	34·75	0·5	0·25	0·0313
27	157 & 170 Gr 80	Dec. 7	13 12	E, W	62 25 19·64	− 18 45·02	34·62				
	,, ,, ,,	,, 8		W, E	19·62	43·44	36·18	35·40	1·0	0·40	0·1600
28	177 & 179 Gr. 80	Dec. 7	15 30	W, E	62 6 54·74	− 0 19·32	35·42				
	,, ,, ,,	,, 8		E, W	54·71	21·18	33·53	34·47	1·0	0·53	0·2809
29	188 & 195 Gr 80	Dec. 7	7 18	E, W	62 13 57·90	− 7 21·67	36·23				
	,, ,, ,,	,, 8		W, E	57·86	22·95	34·91	35·57	1·0	0·57	0·3249
30	232 & 244 Gr. 80	Dec. 7	13 3	W, E	62 9 36·84	− 3 1·24	35·60				
	,, ,, ,,	,, 8		E, W	36·80	2·62	34·18	34·89	1·0	0·11	0·0121
31	253 & 256 Gr. 80	Dec. 7	12 6	E, W	62 2 36·39	+ 3 59·35	35·74				
	,, ,, ,,	,, 8		W, E	36·34	58·10	34·44	35·09	0·7	0·09	0·0057
32	256 & 275 Gr. 80	Dec. 7	11 49	W, E	61 45 48·67	+ 20 46·75	35·42				
	,, ,, ,,	,, 8		E, W	48·62	46·80	35·42	35·42	0·7	0·42	0·1235
33	286 & 291 Gr. 80	Dec. 7	8 59	E, W	62 13 53·59	− 7 19·60	33·99				
	,, ,, ,,	,, 8		W, E	53·54	16·63	36·91	35·45	0·7	0·45	0·1418
34	286 & 294 Gr. 80	Dec. 7	8 59	E, W	62 14 40·70	− 8 6·59	34·11				
	,, ,, ,,	,, 8		W, E	40·65	4·17	36·48	35·29	0·7	0·29	0·0589

134. Bithnok—*Co-latitude* 62° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
35	288 & 291 Gr. 80	Dec. 7	8 59	E, W	62 13 49·21	− 7 14·94	34·27				
	" " "	" 8		W, E	49·16	14·07	35·09	34·68	0·7	0·32	0·0717
36	288 & 294 Gr. 80	Dec. 7	8 59	E, W	62 14 36·32	− 8 1·94	34·38				
	" " "	" 8		W, E	36·27	1·62	34·65	34·51	0·7	0·49	0·1681
37	326 & 347 Gr. 80	Dec. 7	4 57	W, E	62 5 1·39	+ 1 31·98	33·37				
	" " "	" 8		E, W	1·33	35·26	36·59	34·98	1·0	0·02	0·0004
38	368 & 396 Gr. 80	Dec. 8	1 18	W, E	62 5 47·58	+ 0 47·91	35·49	35·49	0·7	0·49	0·1681
39	406 & 414 Gr. 80	Dec. 7	0 47	W, E	61 57 57·65	+ 8 37·26	34·91				
	" " "	" 8		E, W	57·59	36·13	33·72	34·31	0·7	0·69	0·3333
40	414 & 419 Gr. 80	Dec. 7	0 59	E, W	62 10 55·95	− 4 21·30	34·65				
	" " "	" 8		W, E	55·89	21·45	34·44	34·54	0·7	0·46	0·1481
41	428 & 431 Gr. 80	Dec. 7	10 0	W, E	62 5 36·93	+ 0 58·33	35·26				
	" " "	" 8		E, W	36·87	58·02	34·89	35·07	1·0	0·07	0·0049
42	485 Gr. 80 & 273 Gr. 72	Dec. 7	37 18	W, E	62 1 31·05	+ 5 3·36	34·41				
	" " " "	" 8		E, W	30·99	4·82	35·81	35·11	0·7	0·11	0·0085
43	494 & 497 Gr. 80	Dec. 7	37 14	W, E	61 58 20·42	+ 8 13·31	33·73				
	" " "	" 8		E, W	20·35	15·93	36·28	35·00	0·7	0·00	0·0000
44	494 Gr. 80 & 273 Gr. 72	Dec. 7	37 18	W, E	62 1 32·27	+ 5 2·42	34·69				
	" " " "	" 8		E, W	32·20	2·90	35·10	34·89	0·7	0·11	0·0085
45	485 & 497 Gr. 80	Dec. 7	37 14	W, E	61 58 19·20	+ 8 14·19	33·39				
	" " "	" 8		E, W	19·14	17·84	36·98	35·18	0·7	0·18	0·0227
									Σ P = 36·1	Σ Pvv = 10·6346	

Summary.

No. of pairs 45
No. of observations 85

Mean difference between observations taken E, W and those taken W, E = + 0″·29

Observed Co-latitude (weighted mean) 62° 6′ 35″·00 ± 0″·055

Correction for Height above Sea-level + 0″·03

Final Co-latitude 62° 6′ 35″·03

		°	′	″	
Astronomical Latitude (A)	=	27	53	24·97	± 0·055
Geodetic Latitude (G)	=	27	53	22·03	
Deflection of plumb-line (A − G)	=		+	2·94	

135. Bolarum—*Co-latitude* 72° 29′ +

Latitude ... 17° 30′ *Instrument*—Zenith Telescope

Longitude ... 78 34 *Mean Height of Barometer* 28·22 in.

Height ... 1971 feet *Mean Temperature* 53°·3

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	382 & 395 Gr. 80	Dec. 16	17 11	W, E	72 56 59·46	− 27 7·51	52·0				
	" " "	" 18		E, W	59·48	7·60	51·9	51·95	1·0	0·61	0·3721
2	417 & 418 Gr. 80	Dec. 16	0 25	E, W	72 33 54·94	− 4 2·13	52·8				
	" " "	" 18		W, E	54·96	1·93	53·0	52·90	0·7	0·34	0·0809
3	418 & 431 Gr. 80	Dec. 16	0 27	W, E	72 32 6·75	− 2 14·22	52·5				
	" " "	" 18		E, W	6·77	14·08	52·7	52·60	0·7	0·04	0·0011
4	434 & 455 Gr. 80	Dec. 16	13 55	E, W	72 24 26·13	+ 5 25·59	51·7				
	" " "	" 18		W, E	26·14	26·04	52·2	51·95	1·0	0·61	0·3721
5	467 Gr. 80	Dec. 16	0 2	W, E	72 31 37·55	− 1 44·33	53·2				
	" "	" 18		E, W	37·59	44·18	53·4	53·30	1·0	0·74	0·5476
6	477 & 523 Gr. 80	Dec. 16	9 6	E, W	72 14 28·80	+ 15 23·55	52·4				
	" " "	" 18		W, E	28·81	23·78	52·6	52·50	1·0	0·06	0·0036
7	531 & 539 Gr. 80	Dec. 18	4 56	E, W	72 29 30·41	+ 0 21·68	52·1	52·10	0·5	0·46	0·1058
8	539 & 553 Gr. 80	Dec. 16	5 8	E, W	72 16 51·13	+ 13 0·08	51·2				
	" " "	" 18		W, E	51·14	1·12	52·3	51·75	0·7	0·81	0·4593
9	561 & 571 Gr. 80	Dec. 16	14 37	W, E	72 39 56·26	− 10 3·49	52·8				
	" " "	" 18		E, W	56·38	3·37	53·0	52·90	1·0	0·34	0·1156
10	577 & 589 Gr. 80	Dec. 16	6 40	E, W	72 31 19·20	− 1 27·79	51·4				
	" " "	" 18		W, E	19·22	25·98	53·2	52·30	0·7	0·26	0·0473
11	589 & 591 Gr. 80	Dec. 16	6 30	W, E	72 40 58·84	− 11 6·47	52·4				
	" " "	" 18		E, W	58·86	5·59	53·3	52·85	0·7	0·29	0·0589
12	620 & 630 Gr. 80	Dec. 16	4 48	E, W	73 0 22·81	− 30 32·80	50·0				
	" " "	" 18		W, E	22·83	29·71	53·1	51·55	1·0	1·01	1·0201
13	637 & 661 Gr. 80	Dec. 16	9 56	W, E	72 37 5·98	− 7 11·96	54·0				
	" " "	" 18		E, W	6·00	13·69	52·3	53·15	1·0	0·59	0·3481
14	677 & 682 Gr. 80	Dec. 16	3 53	E, W	72 20 57·86	+ 8 54·28	52·1				
	" " "	" 18		W, E	57·88	54·40	52·3	52·20	1·0	0·36	0·1296
15	686 & 696 Gr. 80	Dec. 16	8 5	W, E	72 42 4·38	− 12 12·15	52·2				
	" " "	" 18		E, W	4·40	11·96	52·4	52·30	1·0	0·26	0·0676

135. Bolarum—*Co-latitude* 72° 29′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
16	712 & 719 Gr. 80 " " "	Dec. 16 " 18	1 44	E, W W, E	72 47 40·57 40·60	− 17 47·42 47·54	53·2 53·1	53·15	1·0	0·59	0·3481
17	740 & 754 Gr. 80 " " "	Dec. 16 " 18	5 14	W, E E, W	72 28 19·45 19·47	+ 1 33·44 33·90	52·9 53·4	53·15	1·0	0·59	0·3481
18	798 & 800 Gr. 80	Dec. 16	15 20	E, W	72 21 54·29	+ 7 58·29	52·6	52·60	0·5	0·04	0·0008
19	800 & 811 Gr. 80 " " "	Dec. 16 " 18	15 45	W, E E, W	72 43 22·92 22·96	− 13 30·24 30·84	52·7 52·1	52·40	0·7	0·16	0·0179
20	816 & 840 Gr. 80 " " "	Dec. 16 " 18	23 4	W, E W, E	72 8 56·43 56·46	+ 20 55·46 55·21	51·9 51·7	51·80	1·0	0·76	0·5776
21	856 & 861 Gr. 80 " " "	Dec. 16 " 18	14 55	E, W W, E	72 20 53·20 53·24	+ 8 59·71 59·96	52·9 53·2	53·05	1·0	0·49	0·2401
22	796 & 800 Gr. 80	Dec. 18	15 20	W, E	72 19 55·96	+ 9 55·81	51·8	51·80	0·5	0·76	0·2888
23	888 & 896 Gr. 80 " " "	Dec. 16 " 18	19 54	W, E E, W	72 36 7·20 7·25	− 6 15·22 15·31	52·0 51·9	51·95	1·0	0·61	0·3721
24	928 & 953 Gr. 80 " " "	Dec. 16 " 18	8 13	E, W W, E	72 22 13·41 13·46	+ 7 39·69 39·21	53·1 52·7	52·90	1·0	0·34	0·1156
25	948 & 955 Gr. 80	Dec. 20	13 11	E, W	72 45 9·04	− 15 17·48	51·6	51·60	0·7	0·96	0·6451
26	962 & 977 Gr. 80	Dec. 20	0 36	W, E	72 54 50·17	− 24 56·68	53·5	53·50	0·7	0·94	0·6185
27	992 & 998 Gr. 80	Dec. 21	3 3	W, E	72 47 51·05	− 17 59·12	51·9	51·90	0·5	0·66	0·2178
28	992 & 999 Gr. 80	Dec. 21	2 48	W, E	73 3 40·71	− 33 47·15	53·6	53·60	0·5	1·04	0·5408
29	1022 & 1037 Gr. 80 " " "	Dec. 20 " 21	2 28	W, E E, W	72 45 40·70 40·74	− 15 48·56 47·54	52·1 53·2	52·65	0·7	0·09	0·0057
30	1025 & 1037 Gr. 80 " " "	Dec. 20 " 21	2 41	W, E E, W	72 32 13·24 13·27	− 2 21·31 21·33	51·9 51·9	51·90	0·7	0·66	0·3049
31	1052 & 1062 Gr. 80 " " "	Dec. 19 " 20	5 19	W, E E, W	72 22 52·07 52·11	+ 7 0·95 0·40	53·0 52·5	52·75	0·7	0·19	0·0253
32	1062 & 1082 Gr. 80 " " "	Dec. 19 " 20	5 8	E, W W, E	72 33 47·80 47·84	− 3 55·42 55·73	52·4 52·1	52·25	0·7	0·31	0·0673
33	1099 & 1116 Gr. 80 " " "	Dec. 19 " 20	12 49	W, E E, W	72 15 10·27 10·31	+ 14 42·15 41·74	52·4 52·1	52·25	1·0	0·31	0·0961
34	1139 & 1155 Gr. 80 " " "	Dec. 19 " 20	0 38	E, W W, E	72 52 43·97 44·02	− 22 50·95 52·60	53·0 51·4	52·20	1·0	0·36	0·1296
35	1168 & 1181 Gr. 80 " " "	Dec. 19 " 20	4 26	W, E E, W	72 33 0·79 0·85	− 3 8·67 7·56	52·1 53·3	52·70	0·7	0·14	0·0137

135. Bolarum—*Co-latitude* 72° 29′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
36	1181 & 1184 Gr. 80 " " "	Dec. 19 " 20	4 17	E, W W, E	72 23 56·41 56·46	+ 5 55·18 56·51	51·6 53·0	52·30	0·7	0·26	0·0473
37	1256 & 1272 Gr. 80 " " "	Dec. 19 " 20	5 9	E, W W, E	72 58 16·12 16·19	− 28 23·15 23·18	53·0 53·0	53·00	0·7	0·44	0·1355
38	1266 & 1272 Gr. 80 " " "	Dec. 19 " 20	5 38	E, W W, E	72 29 7·46 7·53	+ 0 45·52 45·59	53·0 52·9	52·95	0·7	0·39	0·1065
39	1282 & 1303 Gr. 80 " " "	Dec. 19 " 20	9 19	W, E E, W	72 10 53·27 53·34	+ 18 58·34 59·22	51·6 52·6	52·10	1·0	0·46	0·2116
40	1327 & 1350 Gr. 80 " " "	Dec. 19 " 20	1 21	W, E E, W	72 34 40·22 40·30	− 4 46·06 47·37	53·3 52·9	53·10	1·0	0·54	0·2916
41	1365 & 1368 Gr. 80 " " "	Dec. 19 " 20	0 26	E, W W, E	72 49 31·69 31·79	− 19 37·04 39·24	54·7 52·6	53·65	0·7	1·09	0·8317
42	1368 & 1395 Gr. 80 " " "	Dec. 19 " 20	0 37	W, E E, W	72 38 28·97 29·06	− 8 35·76 36·96	53·2 52·1	52·65	0·7	0·09	0·0057
43	1395 & 1413 Gr. 80 " " "	Dec. 19 " 20	0 17	E, W W, E	72 19 3·56 3·66	+ 10 49·37 49·72	52·9 53·4	53·15	0·7	0·59	0·2437
44	1465 & 1466 Gr. 80	Dec. 19	4 24	E, W	72 32 37·42	− 2 43·55	53·9	53·90	0·7	1·34	1·2569
45	1474 & 1477 Gr. 80	Dec. 19	11 11	W, E	72 1 16·71	+ 28 34·80	51·5	51·50	0·5	1·06	0·5618
46	1474 & 1480 Gr. 80 " " "	Dec. 19 " 20	11 28	W, E E, W	72 18 38·40 38·51	+ 11 12·75 14·14	51·2 52·7	51·95	0·7	0·61	0·2605
47	1365 & 1413 Gr. 80	Dec. 20	0 6	W, E	72 30 6·39	− 0 12·58	53·8	53·80	0·5	1·24	0·7688
								Σ P = 37·2		Σ Pvv = 13·4252	

Summary.

No. of pairs 47
No. of observations 84

Mean difference between observations taken E, W and those taken W, E = − 0″·05

Observed Co-latitude (weighted mean) 72° 29′ 52″·56 ± 0″·060

Correction for Height above Sea-level + 0″·08

Final Co-latitude 72° 29′ 52″·64

		°	′	″
Astronomical Latitude (A)	=	17	30	7·36 ± 0·060
Geodetic Latitude (G)	=	17	30	13·41
Deflection of plumb-line (A − G)	=		−	6·05

136. Bolikonda—*Colatitude* 72° 17′ +

Latitude	... 17° 43′	*Maximum recorded Height of Barometer*		= in. 28·764
Longitude	... 79 50	*Minimum* ,,	,, ,,	= 28·520
Height	... 1363 feet	*Maximum* ,,	*Reading of Thermometer*	= 86°·0
Instrument—Zenith Sector No. 2		*Minimum* ,,	,, ,,	= 72 ·0

Observer—J. Eccles, M. A.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	$v\ v$
		1889			° ′ ″	° ′ ″	″	″	″		
1	684 Gr. 72	Mar. 1	N	E, W	3 1 24·8	69 16 6·9	31·7				
	" "	" 5	S	W, E	23·9	6·7	30·6	31·2	...	0·1	0·01
2	690 Gr. 72	Mar. 1	N	W, E	1 36 8·6	73 53 38·5	29·9				
	" "	" 5	S	E, W	8·9	38·4	29·5	...	29·7	0·7	0·49
3	697 Gr. 72	Mar. 2	N	E, W	6 36 17·2	65 41 14·2	31·4				
	" "	" 7	S	W, E	16·7	14·0	30·7	31·1	...	0·2	0·04
4	706 Gr. 72	Mar. 1	N	E, W	0 58 10·7	73 15 41·4	30·7				
	" "	" 5	S	W, E	11·4	41·3	29·9	...	30·3	0·1	0·01
5	711 Gr. 72	Mar. 2	N	W, E	4 28 37·6	67 48 53·6	31·2				
	" "	" 7	S	E, W	37·7	53·4	31·1	31·2	...	0·1	0·01
6	727 Gr. 72	Mar. 1	N	W, E	3 57 45·6	68 19 45·0	30·6				
	" "	" 5	S	E, W	45·7	44·9	30·6	30·6	...	0·7	0·49
7	728 Gr. 72	Mar. 2	N	E, W	9 11 51·7	81 29 22·5	30·8				
	" "	" 7	S	W, E	52·3	22·5	30·2	...	30·5	0·1	0·01
8	737 Gr. 72	Mar. 1	N	E, W	1 38 41·9	73 56 12·0	30·1				
	" "	" 5	S	W, E	42·1	11·9	29·8	...	30·0	0·4	0·16
9	742 Gr. 72	Mar. 2	N	W, E	9 25 59·2	62 51 31·9	31·1				
	" "	" 7	S	E, W	60·1	31·6	31·7	31·4	...	0·1	0·01
10	759 Gr. 72	Mar. 1	N	W, E	6 57 16·3	65 20 14·1	30·4				
	" "	" 2	"	E, W	17·3	14·1	31·4				
	" "	" 5	S	E, W	17·3	13·9	31·2				
	" "	" 7	"	W, E	16·9	13·8	30·7	30·9	...	0·4	0·16
11	777 Gr. 72	Mar. 1	N	E, W	1 37 25·0	73 54 55·2	30·2				
	" "	" 2	"	W, E	24·5	55·2	30·7				
	" "	" 5	S	W, E	24·6	55·1	30·5				
	" "	" 7	"	E, W	25·0	55·1	30·1	...	30·4	0·0	0·00
12	792 Gr. 72	Mar. 1	N	W, E	4 11 40·1	68 5 50·9	31·0				
	" "	" 5	S	E, W	39·9	50·7	30·6	30·8	...	0·5	0·25
13	795 Gr. 72	Mar. 2	N	E, W	8 7 65·5	64 9 25·6	31·1				
	" "	" 7	S	W, E	65·4	25·3	30·7	30·9	...	0·4	0·16

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

136. Bolikonda—*Co-latitude* 72° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance			N.P.D.			Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			°	′	″	°	′	″	″	″	″		
14	807 Gr. 72	Mar. 1	N	E, W	8	10	58·3	80	28	29·3	31·0				
	" "	" 2	"	W, E			59·0			29·3	30·3				
	" "	" 5	S	W, E			58·9			29·3	30·4				
	" "	" 7	"	E, W			58·5			29·3	30·8	...	30·6	0·2	0·04
15	812 Gr. 72	Mar. 1	N	W, E	0	58	43·9	71	18	47·6	31·5				
	" "	" 2	"	E, W			44·2			47·6	31·8				
	" "	" 5	S	E, W			43·8			47·5	31·3				
	" "	" 7	"	W, E			43·3			47·4	30·7	31·3	...	0·0	0·00
16	837 Gr. 72	Mar. 1	N	E, W	3	6	31·0	69	11	0·4	31·4				
	" "	" 2	"	W, E			31·3			0·3	31·6				
	" "	" 5	S	W, E			30·0			0·1	30·1				
	" "	" 7	"	E, W			30·9			0·0	30·9	31·0	..	0·3	0·09
17	850 Gr. 72	Mar. 1	N	W, E	2	41	23·7	69	36	7·9	31·6				
	" "	" 5	S	E, W			23·7			7·7	31·4	31·5	..	0·2	0·04
18	852 Gr. 72	Mar. 2	N	E, W	2	24	9·6	69	53	21·6	31·2				
	" "	" 7	S	W, E			9·3			21·3	30·6	30·9	..	0·4	0·16
19	873 Gr. 72	Mar. 1	N	E, W	5	39	36·9	77	57	7·5	30·6				
	" "	" 5	S	W, E			37·9			7·4	29·5	...	30·1	0·3	0·09
20	878 Gr. 72	Mar. 2	N	W, E	5	25	22·5	77	42	52·9	30·4				
	" "	" 7	S	E, W			21·4			52·8	31·4	..	30·9	0·5	0·25
21	881 Gr. 72	Mar. 1	N	W, E	7	10	48·5	65	6	42·5	31·0				
	" "	" 5	S	E, W			49·0			42·2	31·2	31·1	...	0·2	0·04
22	888 Gr. 72	Mar. 1	N	E, W	6	35	43·4	78	53	13·6	30·2				
	" "	" 5	S	W, E			43·5			13·6	30·1	..	30·2	0·2	0·04
23	889 Gr. 72	Mar. 2	N	E, W	4	47	6·4	67	30	25·7	32·1				
	" "	" 7	S	W, E			5·3			25·3	30·6	31·4	...	0·1	0·01
24	894 Gr. 72	Mar. 1	N	W, E	0	47	20·3	71	30	10·1	30·4				
	" "	" 5	S	E, W			21·0			9·9	30·9	30·7	...	0·6	0·36
25	895 Gr. 72	Mar. 2	N	W, E	4	1	51·1	68	15	40·7	31·8				
	" "	" 7	S	E, W			51·7			40·3	32·0	31·9	...	0·6	0·36
26	901 Gr. 72	Mar. 1	N	E, W	0	27	58·5	71	49	33·6	32·1				
	" "	" 2	"	E, W			58·3			33·6	31·9				
	" "	" 5	S	W, E			56·8			33·5	30·3				
	" "	" 7	"	W, E			58·3			33·4	31·7	31·5	...	0·2	0·04
27	918 Gr. 72	Mar. 1	N	W, E	5	44	53·2	66	32	39·1	32·3				
	" "	" 5	S	E, W			53·1			38·8	31·9	32·1	...	0·8	0·64
28	919 Gr. 72	Mar. 2	N	W, E	5	55	8·6	78	12	38·5	29·9				
	" "	" 7	S	E, W			7·5			38·4	30·9	...	30·4	0·0	0·00
29	923 Gr. 72	Mar. 1	N	E, W	0	46	28·3	73	3	58·6	30·3				
	" "	" 2	"	E, W			29·1			58·5	29·4				
	" "	" 5	S	W, E			29·7			58·4	28·7				
	" "	" 7	"	W, E			29·1			58·3	29·2	...	29·4	1·0	1·00

136. Bolikonda—*Co-latitude* 72° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
30	927 Gr. 72	Mar. 4	N	E, W	3 5 19·3	69 12 11·9	31·2				
	" "	" 8	S	W, E	17·9	11·7	29·6	30·4	...	0·9	0·81
31	930 Gr. 72	Mar. 3	N	E, W	7 18 46·3	79 36 16·9	30·6				
	" "	" 6	S	W, E	46·5	16·9	30·4	...	30·5	0·1	0·01
32	939 Gr. 72	Mar. 1	N	W, E	6 34 33·2	65 42 58·6	31·8				
	" "	" 2	"	W, E	33·8	58·5	32·3				
	" "	" 3	"	W, E	33·1	58·4	31·5				
	" "	" 4	"	W, E	33·1	58·4	31·5				
	" "	" 5	S	E, W	33·3	58·3	31·6				
	" "	" 6	"	E, W	33·3	58·2	31·5				
	" "	" 7	"	E, W	33·0	58·1	31·1				
	" "	" 8	"	E, W	33·1	58·0	31·1	31·6	...	0·3	0·09
33	944 Gr. 72	Mar. 3	N	E, W	8 49 12·9	63 28 18·5	31·4				
	" "	" 6	S	W, E	12·8	18·2	31·0	31·2	...	0·1	0·01
34	948 Gr. 72	Mar. 1	N	E, W	4 44 9·0	77 1 39·3	30·3				
	" "	" 2	"	E, W	9·4	39·3	29·9				
	" "	" 4	"	E, W	8·7	39·3	30·6				
	" "	" 5	S	W, E	9·5	39·2	29·7				
	" "	" 7	"	W, E	9·2	39·2	30·0				
	" "	" 8	"	W, E	9·4	39·2	29·8	...	30·1	0·3	0·09
35	950 Gr. 72	Mar. 3	N	W, E	9 7 60·4	81 25 30·7	30·3				
	" "	" 6	S	E, W	59·8	30·7	30·9	...	30·6	0·2	0·04
36	952 Gr. 72	Mar. 4	N	W, E	4 46 30·8	67 31 1·6	32·4				
	" "	" 8	S	E, W	29·5	1·3	30·8	31·6	...	0·3	0·09
37	955 Gr. 72	Mar. 1	N	W, E	0 24 22·0	72 41 52·2	30·2				
	" "	" 2	"	W, E	22·0	52·1	30·1				
	" "	" 5	S	E, W	21·5	52·0	30·5				
	" "	" 7	"	E, W	21·2	51·9	30·7	...	30·4	0·0	0·00
38	958 Gr. 72	Mar. 3	N	E, W	5 12 1·4	77 29 31·7	30·3				
	" "	" 4	"	E, W	0·9	31·7	30·8				
	" "	" 6	S	W, E	1·3	31·6	30·3				
	" "	" 8	"	W, E	2·5	31·6	29·1	...	30·1	0·3	0·09
39	967 Gr. 72	Mar. 1	N	E, W	0 34 58·3	71 42 33·1	31·4				
	" "	" 5	S	W, E	57·8	32·9	30·7	31·1	...	0·2	0·04
40	970 Gr. 72	Mar. 2	N	E, W	3 25 41·5	75 43 12·0	30·5				
	" "	" 4	"	W, E	41·9	12·0	30·1				
	" "	" 7	S	W, E	41·8	11·9	30·1				
	" "	" 8	"	E, W	42·0	11·9	29·9	...	30·2	0·2	0·04
41	975 Gr. 72	Mar. 3	N	W, E	2 41 35·9	69 35 55·7	31·6				
	" "	" 6	S	E, W	35·4	55·5	30·9	31·3	...	0·0	0·00
42	980 Gr. 72	Mar. 1	N	W, E	2 10 29·9	74 27 59·4	29·5				
	" "	" 4	"	E, W	29·1	59·3	30·2				
	" "	" 5	S	E, W	29·0	59·3	30·3				
	" "	" 8	"	W, E	29·7	59·2	29·5	...	29·9	0·5	0·25

136. Bolikonda—*Co-latitude* 72° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
43	989 Gr. 72	Mar. 1	N	E, W	2 47 57·1	75 5 28·9	31·8				
	" "	" 3	"	E, W	57·6	28·8	31·2				
	" "	" 5	S	W, E	57·6	28·8	31·2				
	" "	" 6	"	W, E	57·6	28·7	31·1	...	31·3	0·9	0·81
44	996 Gr. 72	Mar. 2	N	W, E	3 0 11·1	75 17 41·6	30·5				
	" "	" 7	S	E, W	10·4	41·4	31·0	...	30·8	0·4	0·16
45	997 Gr. 72	Mar. 1	N	W, E	7 49 56·2	80 7 27·3	31·1				
	" "	" 5	S	E, W	55·7	27·3	31·6	..	31·4	1·0	1·00
46	1012 Gr. 72	Mar. 2	N	E, W	6 3 35·5	66 13 56·8	32·3				
	" "	" 3	"	W, E	35·5	56·7	32·2				
	" "	" 6	S	E, W	35·4	56·5	31·9				
	" "	" 7	"	W, E	35·6	56·4	32·0	32·1	..	0·8	0·64
47	1014 Gr. 72	Mar. 4	N	E, W	2 55 45·3	75 13 15·7	30·4				
	" "	" 8	S	W, E	46·3	15·6	29·3	...	29·9	0·5	0·25
48	1015 Gr. 72	Mar. 2	N	W, E	6 34 39·5	78 52 9·3	29·8				
	" "	" 3	"	E, W	39·0	9·3	30·3				
	" "	" 6	S	W, E	39·0	9·3	30·3				
	" "	" 7	"	E, W	38·8	9·3	30·5	...	30·2	0·2	0·04
49	1036 Gr. 72	Mar. 2	N	E, W	9 46 25·8	82 3 57·2	31·4				
	" "	" 3	"	W, E	26·1	57·2	31·1				
	" "	" 6	S	E, W	26·2	57·2	31·0				
	" "	" 7	"	W, E	26·7	57·3	30·6	...	31·0	0·6	0·36
50	1039 Gr. 72	Mar 4	N	W, E	7 32 58·8	64 44 33·0	31·8				
	" "	" 8	S	E, W	59·1	32·6	31·7	31·8	...	0·5	0·25
51	1046 Gr. 72	Mar. 3	N	E, W	3 25 19·8	68 52 11·9	31·7				
	" "	" 6	S	W, E	20·1	11·7	31·8	31·8	...	0·5	0·25
52	1048 Gr. 72	Mar. 4	N	E, W	1 40 24·9	73 57 55·3	30·4				
	" "	" 7	S	E, W	25·6	55·2	29·6				
	" "	" 8	S	W, E	25·8	55·1	29·3	...	29·8	0·6	0·36
53	1060 Gr 72	Mar. 4	N	W, E	6 34 9·1	78 51 39·9	30·8				
	" "	" 8	S	E, W	10·0	39·9	29·9	...	30·4	0·0	0·00
54	1061 Gr. 72	Mar. 3	N	W, E	0 38 35·3	72 56 7·2	31·9				
	" "	" 6	S	E, W	35·9	7·1	31·2	..	31·6	1·2	1·44
55	1066 Gr. 72	Mar. 3	N	E, W	1 18 40·6	70 58 50·8	31·4				
	" "	" 4	"	E, W	40·7	50·8	31·5				
	" "	" 6	S	W, E	39·9	50·7	30·6				
	" "	" 8	"	W, E	41·0	50·6	31·6	31·3	.	0·0	0·00
56	1074 Gr. 72	Mar. 3	N	W, E	10 41 6·0	61 36 26·1	32·1				
	" "	" 4	"	W, E	5·9	26·0	31·9				
	" "	" 6	S	E, W	5·8	25·8	31·6				
	" "	" 8	"	E, W	6·6	25·6	32·2	32·0	...	0·7	0·49

136. Bolikonda—*Co-latitude* 72° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
57	1086 Gr. 72	Mar. 3	N	E, W	10 33 30·5	82 51 1·4	30·9				
	" "	" 6	S	W, E	30·4	1·4	31·0	...	31·0	0·6	0·36
58	1090 Gr. 72	Mar. 4	N	E, W	2 31 2·4	74 48 33·0	30·6	...	30·6	0·2	0·04
59	1106 Gr. 72	Mar. 4	N	W, E	10 28 36·0	82 46 6·4	30·4				
	" "	" 8	S	E, W	36·6	6·5	29·9	...	30·2	0·2	0·04
60	1107 Gr. 72	Mar. 3	N	W, E	5 0 9·8	67 17 21·4	31·2				
	" "	" 6	S	E, W	9·4	21·2	30·6	30·9	...	0·4	0·16
61	1115 Gr. 72	Mar. 3	N	E, W	0 16 59·3	72 34 29·4	30·1				
	" "	" 4	"	E, W	59·4	29·3	29·9				
	" "	" 6	S	W, E	59·5	29·3	29·8				
	" "	" 8	"	W, E	59·2	29·2	30·0	...	30·0	0·4	0·16
62	1129 Gr. 72	Mar. 3	N	W, E	6 51 9·4	65 26 22·4	31·8				
	" "	" 6	S	E, W	9·3	22·2	31·5	31·7	...	0·4	0·16
63	1137 Gr. 72	Mar. 4	N	W, E	0 41 47·3	71 35 45·1	32·4				
	" "	" 8	S	E, W	46·9	44·9	31·8	32·1	...	0·8	0·64
64	1141 Gr. 72	Mar. 3	N	E, W	6 49 56·7	65 27 36·3	33·0				
	" "	" 6	S	W, E	56·7	36·1	32·8	32·9	...	1·6	2·56
65	1152 Gr. 72	Mar. 4	N	E, W	7 28 14·9	64 49 17·0	31·9				
	" "	" 8	S	W, E	14·5	16·7	31·2	31·6	...	0·3	0·09
66	1164 Gr. 72	Mar. 3	N	W, E	0 0 32·6	72 18 3·6	31·0				
	" "	" 6	S	E, W	32·2	3·5	31·3	...	31·2	0·8	0·64
67	1171 Gr. 72	Mar. 3	N	E, W	6 51 45·0	79 9 16·3	31·3				
	" "	" 4	"	W, E	44·9	16·3	31·4				
	" "	" 6	S	W, E	45·5	16·3	30·8				
	" "	" 8	"	E, W	45·8	16·4	30·6	...	31·0	0·6	0·36
68	1176 Gr. 72	Mar. 3	N	W, E	5 8 41·7	77 26 12·8	31·1				
	" "	" 6	S	E, W	42·1	12·8	30·7	...	30·9	0·5	0·25
69	1188 Gr. 72	Mar. 3	N	E, W	4 8 18·2	68 9 13·5	31·7				
	" "	" 4	"	E, W	18·6	13·4	32·0				
	" "	" 6	S	W, E	18·9	13·3	32·2				
	" "	" 8	"	W, E	18·2	13·2	31·4	31·8	...	0·5	0·25
70	1198 Gr. 72	Mar. 3	N	W, E	0 17 52·2	71 59 38·5	30·7				
	" "	" 4	"	W, E	52·1	38·4	30·5				
	" "	" 6	S	E, W	51·7	38·4	30·1				
	" "	" 8	"	E, W	52·0	38·3	30·3	30·4	...	0·9	0·81
71	1208 Gr. 72	Mar. 3	N	E, W	4 2 20·4	68 15 11·2	31·6				
	" "	" 4	"	E, W	20·1	11·2	31·3				
	" "	" 6	S	W, E	20·0	11·1	31·1				
	" "	" 8	"	W, E	20·3	11·0	31·3	31·3	...	0·0	0·00

136. Bolikonda—*Co-latitude* 72° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Mean by North Star	Mean by South Star	v	v v
		1899			° ′ ″	° ′ ″	″	″	″		
72	1223 Gr. 72	Mar. 3	N	W, E	3 20 18·8	75 37 48·2	29·4				
	,, ,,	,, 4	,,	W, E	18·2	48·2	30·0				
	,, ,,	,, 6	S	E, W	18·3	48·2	29·9				
	,, ,,	,, 8	,,	E, W	18·5	48·2	29·7	...	29·8	0·6	0·36
73	1252 Gr. 72	Mar. 4	N	E, W	2 48 24·8	69 29 5·8	30·6				
	,, ,,	,, 8	S	W, E	24·8	5·7	30·5	30·6	...	0·7	0·49
74	1261 Gr. 72	Mar. 4	N	W, E	0 17 59·7	71 59 30·5	30·2				
	,, ,,	,, 8	S	E, W	59·7	30·4	30·1	30·2	...	1·1	1·21
								Σ vv by N Stars = 11·91			
								Σ vv by S Stars = 9·24			

Summary.

No. of North Stars 39 No. of South Stars 35

No. of observations 204

	°	′	″	″
Co-latitude by North Stars	72	17	31·31	± 0·060
,, ,, South ,,	72	17	30·44	± 0·059
Mean Co-latitude	72	17	30·88	± 0·042

Correction for Height above Sea-level + 0·04

Final Co-latitude 72° 17′ 30″·92

		°	′	″	″
Astronomical Latitude (A)	=	17	42	29·08	± 0·042
Geodetic Latitude (G)	=	17	42	35·82	
Deflection of plumb-line (A−G)	=		−	6·74	

137. Bostan—*Co-latitude* 61° 29′ +

Latitude ... 28° 31′ | *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 77 33 | *Mean Height of Barometer* 29·29 in.

Height ... 758 feet | *Mean Temperature* 50°·1

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	234 & 244 Gr. 80	Jan. 10	12 15	E, W	61 19 29·62	+ 9 36·31	5·93				
	" " "	" 13		W, E	29·79	36·65	6·44				
	244 & 253 Gr. 80	" 10	12 31	W, E	35 39·90	− 6 34·10	5·80				
	" " "	" 13		E, W	40·00	34·34	5·66	5·96	1·5	0·25	0·0938
2	300 & 348 Gr. 80	Jan. 10	5 20	W, E	61 33 32·52	− 4 27·61	4·91				
	" " "	" 13		E, W	32·60	26·41	6·19				
	318 & 326 Gr. 80	" 10	5 23	E, W	37 6·12	8 1·01	5·11				
	" " "	" 13		W, E	6·22	0·22	6·00	5·56	1·5	0·15	0·0338
3	353 & 368 Gr. 80	Jan. 10	0 32	E, W	61 17 40·29	+ 11 24·84	5·13				
	" " "	" 13		W, E	40·18	24·46	4·64	4·89	1·0	0·82	0·6724
4	376 & 394 Gr. 80	Jan. 10	7 5	W, E	61 22 49·47	+ 6 15·88	5·35				
	" " "	" 13		E, W	49·53	16·36	5·89	5·62	1·0	0·09	0·0081
5	401 & 418 Gr. 80	Jan. 10	11 22	E, W	61 35 14·50	− 6 7·92	6·58				
	" " "	" 13		W, E	14·53	9·07	5·46	6·02	1·0	0·31	0·0961
6	431 & 438 Gr. 80	Jan. 10	10 40	W, E	61 24 9·27	+ 4 56·75	6·02				
	" " "	" 13		E, W	9·29	55·99	5·28				
	438 & 467 Gr. 80	" 10	10 53	E, W	37 8·06	− 8 1·79	6·27				
	" " "	" 13		W, E	8·08	2·72	5·36				
	467 & 472 Gr. 80	" 10	10 52	W, E	38 3·94	8 58·05	5·89				
	" " "	" 13		E, W	3·95	58·03	5·92				
	472 & 431 Gr. 80	" 10	10 39	E, W	25 5·15	+ 4 0·48	5·63				
	" " "	" 13		W, E	5·16	0·70	5·86	5·78	2·0	0·07	0·0098
7	523 & 551 Gr. 80	Jan. 11	19 36	E, W	61 43 45·20	− 14 38·32	6·88				
	" " "	" 13		W, E	45·18	39·00	6·18				
	551 & 546 Gr. 80	" 11	19 25	W, E	33 0·26	3 53·77	6·49				
	" " "	" 13		E, W	0·24	53·81	6·43	6·50	1·5	0·79	0·9362
8	562 & 571 Gr. 80	Jan. 11	3 29	W, E	61 30 32·21	− 1 26·12	6·09				
	" " "	" 13		E, W	32·18	25·85	6·33	6·21	1·0	0·50	0·2500
9	602 & 610 Gr. 80	Jan. 11	11 21	E, W	61 37 22·24	− 8 15·83	6·41				
	" " "	" 15		W, E	22·21	16·44	5·77				
	660 & 602 Gr. 80	" 11	11 36	W, E	22 5·76	+ 7 0·80	6·56				
	" " "	" 15		E, W	5·67	6 59·33	5·00	5·94	1·5	0·23	0·0794
10	693 & 704 Gr. 80	Jan. 11	5 40	W, E	61 45 19·99	− 16 13·78	6·21				
	" " "	" 12		E, W	19·96	14·26	5·70				
	707 & 693 Gr. 80	" 11	5 34	E, W	39 48·21	10 42·07	6·14				
	" " "	" 12		W, E	48·19	42·78	5·41	5·87	1·5	0·16	0·0384

137. Bostan—*Co-latitude* 61° 29′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
11	720 & 727 Gr. 80	Jan. 11	14 6	E, W	61 16 17·56	+ 12 48·00	5·56				
	,, ,, ,,	,, 12		W, E	17·53	48·84	6·37	5·97	1·0	0·26	0·0676
12	785 & 809 Gr. 80	Jan. 11	9 32	W, E	61 47 41·37	− 18 34·73	6·64				
	,, ,, ,,	,, 15		E, W	41·26	34·53	6·73	6·69	1·0	0·98	0·9604
13	816 & 846 Gr. 80	Jan. 11	12 44	E, W	61 47 57·59	− 18 51·87	5·72				
	,, ,, ,,	,, 12		W, E	57·56	51·50	6·06				
	846 & 828 Gr. 80	,, 11	12 49	W, E	42 52·82	13 46·98	5·84				
	,, ,, ,,	,, 12		E, W	52·79	46·89	5·90	5·88	1·5	0·17	0·0434
14	872 & 892 Gr. 80	Jan. 11	11 22	W, E	61 20 56·65	+ 8 9·03	5·68				
	,, ,, ,,	,, 12		E, W	56·62	8·99	5·61	5·65	1·0	0·06	0·0036
15	916 & 978 Gr. 80	Jan. 11	10 19	E, W	61 9 59·10	+ 19 6·23	5·33				
	,, ,, ,,	,, 12		W, E	59·07	5·39	4·46				
	984 & 916 Gr. 80	,, 11	10 18	W, E	10 49·67	18 15·53	5·20				
	,, ,, ,,	,, 12		E, W	49·64	15·38	5·02	5·00	1·5	0·71	0·7562
16	999 & 1014 Gr. 80	Jan. 9	8 44	W, E	61 31 56·58	− 2 50·85	5·73				
	,, ,, ,,	,, 10		E, W	56·54	50·72	5·82	5·78	1·0	0·07	0·0049
17	1023 & 1053 Gr. 80	Jan. 9	14 23	E, W	61 23 25·08	+ 5 41·43	6·51				
	,, ,, ,,	,, 10		W, E	25·05	39·98	5·03	5·77	1·0	0·06	0·0036
18	1127 & 1138 Gr 80	Jan. 9	0 29	W, E	61 24 56·78	+ 4 7·69	4·47				
	,, ,, ,,	,, 10		E, W	56·75	8·89	5·64				
	1138 & 1145 Gr 80	,, 9	0 24	E, W	19 17·31	9 47·79	5·10				
	,, ,, ,,	,, 10		W, E	17·28	48·12	5·40				
	1145 & 1161 Gr. 80	,, 9	0 24	W, E	13·67	50·88	4·55				
	,, ,, ,,	,, 10		E, W	13·63	51·36	4·99				
	1161 & 1127 Gr. 80	,, 9	0 29	E, W	24 53·14	4 10·78	3·92				
	,, ,, ,,	,, 10		W, E	53·10	12·12	5·22	4·91	2·0	0·80	1·2800
19	1193 & 1221 Gr. 80	Jan. 9	2 6	E, W	61 41 26·74	− 12 20·67	6·07				
	,, ,, ,,	,, 10		W, E	26·73	20·96	5·77	5·92	1·0	0·21	0·0441
20	1233 & 1245 Gr. 80	Jan. 9	12 22	W, E	61 18 25·61	+ 10 39·26	4·87				
	,, ,, ,,	,, 10		E, W	25·59	39·64	5·23	5·05	1·0	0·66	0·4356
21	1265 & 1284 Gr. 80	Jan. 9	3 23	E, W	61 23 20·03	+ 5 45·74	5·77				
	,, ,, ,,	,, 10		W, E	20·00	45·81	5·81				
	1284 & 1323 Gr. 80	,, 9	3 41	W, E	41 29·43	− 12 23·40	6·03				
	,, ,, ,,	,, 10		E, W	29·41	23·64	5·77				
	1323 & 1298 Gr. 80	,, 9	3 44	E, W	37 45·72	8 39·65	6·07				
	,, ,, ,,	,, 10		W, E	45·71	39·98	5·73				
	1298 & 1265 Gr. 80	,, 9	3 26	W, E	19 36·32	+ 9 29·51	5·83				
	,, ,, ,,	,, 10		E, W	36·30	29·47	6·77	5·85	2·0	0·14	0·0392
22	1343 & 1397 Gr. 80	Jan. 11	1 28	W, E	61 30 43·97	− 1 37·98	5·99				
	,, ,, ,,	,, 12		E, W	43·96	40·23	3·73				
	1397 & 1405 Gr. 80	,, 11	1 13	E, W	15 14·30	+ 13 50·50	4·80				
	,, ,, ,,	,, 12		W, E	14·30	50·31	4·61	4·78	1·5	0·93	1·2974
23	1425 & 1450 Gr. 80	Jan. 11	4 21	E, W	61 11 22·14	+ 17 44·67	6·81				
	,, ,, ,,	,, 12		W, E	22·14	42·89	5·03				
	1450 & 1432 Gr. 80	,, 11	4 22	W, E	13 7·31	15 59·25	6·56				
	,, ,, ,,	,, 12		E, W	7·31	57·87	5·18				
	1432 & 1452 Gr. 80	,, 11	4 20	E, W	15 14·20	13 51·74	5·94				
	,, ,, ,,	,, 12		W, E	14·20	51·00	5·20				
	1452 & 1425 Gr. 80	,, 11	4 19	W, E	13 29·03	15 37·16	6·19				
	,, ,, ,,	,, 12		E, W	29·03	36·03	5·06	5·75	2·0	0·04	0·0032

137. Bostan—*Co-latitude* 61° 29′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
24	1474 & 1508 Gr. 80	Jan. 11	0 25	W, E	61 17 32·94	+ 11 33·18	6·12				
	1508 & 1486 Gr. 80	„ 11	0 13	E, W	29 56·56	− 0 50·81	5·75	5·94	1·0	0·23	0·0529
25	1536 & 1539 Gr. 80	Jan. 11	6 41	E, W	61 37 59·99	− 8 53·55	6·44				
	„ „ „	„ 12		W, E	38 0·01	54·02	5·99				
	1550 & 1536 Gr. 80	„ 11	6 34	W, E	44 55·40	15 49·06	6·34				
	„ „ „	„ 12		E, W	55·42	49·54	5·88	6·17	1·5	0·46	0·3174
26	1570 & 1590 Gr. 80	Jan. 11	23 31	W, E	61 23 13·48	+ 5 50·68	4·16				
	„ „ „	„ 12		E, W	13·50	51·95	5·45	4·80	1·0	0·91	0·8281
27	1595 & 1599 Gr. 80	Jan. 11	2 2	E, W	61 36 11·83	− 7 5·87	5·96				
	„ „ „	„ 12		W, E	11·87	5·79	6·08	6·02	1·0	0·31	0·0961
28	1617 & 1646 Gr. 80	Jan. 13	7 3	W, E	61 18 56·76	+ 10 8·59	5·35				
	„ „ „	„ 14		E, W	56·81	9·63	6·44	5·89	1·0	0·18	0·0324
29	1665 & 1701 Gr. 80	Jan. 13	4 27	E, W	61 33 29·82	− 4 23·58	6·24				
	„ „ „	„ 14		W, E	29·95	23·59	6·36				
	1713 & 1665 Gr. 80	„ 14	4 15	E, W	45 24·79	16 18·59	6·20	6·25	1·5	0·54	0·4374
30	1728 & 1746 Gr. 80	Jan. 14	2 58	E, W	61 45 31·89	− 16 26·31	5·58				
	1780 & 1728 Gr. 80	„ 14	3 0	W, E	48 2·08	18 56·97	5·11	5·35	0·5	0·36	0·0648
31	1794 & 1802 Gr. 80	Jan. 14	5 0	W, E	61 21 53·91	+ 7 10·70	4·61	4·61	0·5	1·10	0·6050
32	264 & 291 Gr. 80	Jan. 13	8 31	W, E	61 42 41·61	− 13 35·78	5·83				
	264 & 294 Gr. 80	„ 10	8 31	E, W	43 28·55	14 21·98	6·57	6·20	0·5	0·49	0·1201
								Σ P = 39·5		ΣPvv = 9·7114	

Summary.

No. of pairs 32

No. of observations 106

Mean difference between observations taken E, W and those taken W, E = + 0″·33

Observed Co-latitude (weighted mean) 61° 29′ 5″·72 ± 0″·060

Correction for Height above Sea-level + 0″·03

Final Co-latitude 61° 29′ 5″·75

		°	′	″	″
Astronomical Latitude (A)	=	28	30	54·25	± 0·060
Geodetic Latitude (G)	=	28	30	59·64	
Deflection of plumb-line (A − G)	=		−	5·39	

138. Budhon—*Co-latitude* 65° 54′ +

Latitude ... 24° 5′ — *Instrument*—Zenith Telescope

Longitude ... 78 34 — *Mean Height of Barometer* in. 28·21

Height ... 1867 feet — *Mean Temperature* 62°·0

Observer—Lieut. H. M. Cowie, R.E.

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	1568 & 1569 Newcomb	Dec. 29	18 49	E, W	66 4 52·82	− 10 2·60	50·22				
	„ „ „	„ 30		W, E	52·94	1·87	51·07	50·65	1·0	0·29	0·0841
2	4055 Gr. 80 & 4 Newc.	Dec. 28	34 50	W, E	66 12 54·31	− 18 2·99	51·32				
	„ „ „ „	„ 29		E, W	54·36	3·08	51·28				
	„ „ „ „	„ 30		E, W	54·41	2·71	51·70	51·41	1·2	0·47	0·2651
3	14 Gr. 80 & 18 Newc.	Dec. 28	13 25	E, W	65 58 44·26	− 3 53·19	51·07				
	„ „ „ „	„ 30		W, E	44·39	52·15	52·24				
	„ „ „ „	„ 31		E, W	44·46	53·49	50·97	51·63	0·8	0·69	0·3809
4	23 & 31 Newcomb	Dec. 28	28 57	W, E	65 33 46·18	+ 21 4·94	51·12				
	„ „ „	„ 29		E, W	46·23	4·68	50·91				
	„ „ „	„ 30		W, E	46·27	5·02	51·29				
	„ „ „	„ 31		E, W	46·32	4·30	50·62	50·99	1·3	0·05	0·0033
5	49 & 50 Newcomb	Dec 28	16 45	E, W	66 11 38·04	− 16 47·32	50·72				
	„ „ „	„ 29		W, E	38·09	47·32	50·77				
	„ „ „	„ 30		E, W	38·14	47·42	50·72				
	„ „ „	„ 31		W, E	38·19	47·14	51·05	50·82	0·9	0·12	0·0130
6	50 & 61 Newcomb	Dec. 28	16 36	W, E	66 2 18·97	− 7 28·16	50·81				
	„ „ „	„ 29		E, W	19·02	28·25	50·77				
	„ „ „	„ 30		W, E	19·07	28·62	50·45				
	„ „ „	„ 31		E, W	19·12	28·31	50·81	50·71	0·9	0·23	0·0476
7	73 & 81 Newcomb	Dec. 28	3 52	E, W	65 37 22·64	+ 17 28·40	51·04				
	„ „ „	„ 29		W, E	22·68	28·31	50·99				
	„ „ „	„ 30		E, W	22·71	28·44	51·15				
	„ „ „	„ 31		W, E	22·75	27·84	50·59	50·95	1·3	0·01	0·0001
8	102 & 108 Newcomb	Dec. 28	15 43	W, E	65 37 14·57	+ 17 36·33	50·90				
	„ „ „	„ 29		E, W	14·59	36·30	50·89				
	„ „ „	„ 30		W, E	14·61	36·30	50·91				
	„ „ „	„ 31		E, W	14·64	36·58	51·22	50·99	1·3	0·05	0·0033
9	281 & 291 Gr. 80	Dec. 28	13 7	E, W	66 18 57·92	− 24 7·12	50·80				
	„ „ „	„ 29		W, E	57·94	6·75	51·19				
	„ „ „	„ 30		E, W	57·96	6·74	51·22				
	„ „ „	„ 31		W, E	57·98	7·21	50·77	51·00	0·9	0·06	0·0032
10	281 & 294 Gr. 80	Dec. 28	13 7	E, W	66 19 45·02	− 24 54·21	50·81				
	„ „ „	„ 29		W, E	45·04	54·25	50·79				
	„ „ „	„ 30		E, W	45·06	54·13	50·93				
	„ „ „	„ 31		W, E	45·08	53·62	51·46	51·00	0·9	0·06	0·0032
		1903									
11	135 Newc. & 334 Gr. 80	Jan. 2	5 24	E, W	65 33 11·44	+ 21 38·96	50·40				
	„ „ „ „	„ 4		W, E	11·49	39·40	50·89				
	„ „ „ „	„ 5		E, W	11·52	39·95	51·47	50·92	1·2	0·02	0·0005

138. Budhon—*Co-latitude* 65° 54′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
12	340 & 347 Gr. 80	Jan. 2	9 3	W, E	66 7 55·70	− 13 5·80	49·90				
	” ” ”	” 3		E, W	55·73	5·09	50·64				
	” ” ”	” 4		E, W	55·74	5·16	50·58	50·26	0·8	0·68	0·3699
13	143 Newc. & 368 Gr. 80	Jan. 2	4 54	E, W	65 39 16·19	+ 15 34·65	50·84				
	” ” ” ”	” 3		W, E	16·21	35·22	51·43				
	” ” ” ”	” 4		W, E	16·23	34·95	51·18				
	” ” ” ”	” 5		E, W	16·25	34·97	51·22	51·17	0·9	0·23	0·0476
14	368 & 373 Gr. 80	Jan. 2	4 54	W, E	65 40 6·54	+ 14 43·28	49·82				
	” ” ”	” 3		E, W	6·55	44·28	50·83				
	” ” ”	” 4		E, W	6·56	44·41	50·97				
	” ” ”	” 5		W, E	6·58	44·16	50·74	50·59	0·9	0·35	0·1103
15	161 & 171 Newcomb	Jan. 2	2 53	E, W	65 34 51·50	+ 19 59·73	51·23				
	” ” ”	” 3		W, E	51·52	59·29	50·81				
	” ” ”	” 4		E, W	51·53	58·82	50·35				
	” ” ”	” 5		W, E	51·54	58·95	50·49	50·72	1·3	0·22	0·0629
16	178 & 185 Newcomb	Jan. 2	2 58	W, E	66 5 34·18	− 10 43·53	50·65				
	” ” ”	” 3		E, W	34·19	42·89	51·30				
	” ” ”	” 4		W, E	34·20	42·98	51·22				
	” ” ”	” 5		E, W	34·21	43·31	50·90	51·02	1·3	0·08	0·0083
17	196 & 201 Newcomb	Jan. 2	25 25	E, W	66 9 28·50	− 14 36·81	51·69				
	” ” ”	” 3		W, E	28·50	37·16	51·34				
	” ” ”	” 4		E, W	28·50	36·92	51·58				
	” ” ”	” 5		W, E	28·50	37·24	51·26	51·47	0·9	0·53	0·2528
18	201 & 211 Newcomb	Jan. 2	25 33	W, E	66 1 16·79	− 6 26·04	50·75				
	” ” ”	” 3		E, W	16·78	25·96	50·82				
	” ” ”	” 4		W, E	16·78	26·11	50·67				
	” ” ”	” 5		E, W	16·77	25·92	50·85	50·78	0·9	0·16	0·0230
19	217 & 224 Newcomb	Jan. 2	23 48	E, W	66 7 22·76	− 12 32·18	50·58				
	” ” ”	” 3		W, E	22·75	31·89	50·86				
	” ” ”	” 4		E, W	22·75	31·49	51·26				
	” ” ”	” 5		W, E	22·74	31·34	51·40	51·03	0·9	0·09	0·0073
20	1069 Gr. 90 & 224 Newc.	Jan. 2	23 51	E, W	66 4 5·32	− 9 14·86	50·46				
	” ” ” ”	” 3		W, E	5·31	14·60	50·71				
	” ” ” ”	” 4		E, W	5·31	14·35	50·96				
	” ” ” ”	” 5		W, E	5·30	13·60	51·70	50·96	0·9	0·02	0·0004
21	1083 Gr. 90 & 224 Newc.	Jan. 2	23 49	E, W	66 6 24·63	− 11 33·95	50·68				
	” ” ” ”	” 3		W, E	24·62	33·41	51·21				
	” ” ” ”	” 4		E, W	24·62	33·31	51·31				
	” ” ” ”	” 5		W, E	24·61	33·00	51·61	51·21	0·9	0·27	0·0656
22	224 & 230 Newcomb	Jan. 2	23 42	W, E	66 12 52·57	− 18 1·66	50·91				
	” ” ”	” 3		E, W	52·56	1·80	50·76				
	” ” ”	” 4		W, E	52·55	1·31	51·24				
	” ” ”	” 5		E, W	52·54	1·39	51·15	51·02	0·9	0·08	0·0058
23	250 & 252 Newcomb	Jan. 2	11 39	W, E	66 8 10·47	− 13 19·17	51·30				
	” ” ”	” 3		E, W	10·46	19·49	50·97				
	” ” ”	” 4		W, E	10·45	19·08	51·37				
	” ” ”	” 5		E, W	10·44	19·02	51·42	51·27	1·3	0·33	0·1416

138. Budhon—*Co-latitude* 65° 54′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
24	256 & 263 Newcomb	Dec. 28	2 13	E, W	65 58 41 43	− 3 50 25	51 18				
	" " "	" 29		W, E	41 41	50 61	50 80				
	" " "	" 30		E, W	41 40	51 19	50 21				
	" " "	" 31		W, E	41 38	50 80	59 58	50·70	1·3	0·24	0·0749
		1903									
25	258 & 262 Newcomb	Jan. 2	4 42	E, W	65 57 16 88	− 2 25·79	51 09				
	" " "	" 3		W, E	16 87	26 17	50 70				
	" " "	" 4		E, W	16 86	26 08	50 78				
	" " "	" 5		W, E	16 85	25·76	51 09	50 92	1·3	0 02	0·0005
		1902									
26	273 & 287 Newcomb	Dec 28	9 51	W, E	65 30 51·51	+ 23 59 60	51·11				
	" " "	" 29		E, W	51 49	59 15	50 64				
	" " "	" 30		W, E	51 47	58 98	50 45				
	" " "	" 31		E, W	51·45	59·54	50·99	50 80	0 9	0 14	0·0176
27	695 Gr. 80 & 287 Newc	Dec 28	9 33	W, E	65 48 44 90	+ 6 6 55	51·45				
	" " " "	" 29		E, W	44 88	5 06	49 94				
	" " " "	" 30		W, E	44 86	6 16	51·02				
	" " " "	" 31		E, W	44 84	5 84	50 68	50·78	0 9	0 16	0 0230
28	732 & 764 Gr. 80	Dec 28	31 15	E, W	65 48 23 54	+ 6 28 52	52 06				
	" " "	" 30		W, E	23 49	28 20	51 69				
	" " "	" 31		W, E	23 47	27·51	50·98	51·70	1·2	0·76	0·6931
29	309 & 318 Newcomb	Dec. 28	8 53	W, E	65 51 38·00	+ 3 13·91	51 91				
	" " "	" 29		E, W	37 99	12·82	50 81				
	" " "	" 30		W, E	37 97	12 16	50 13				
	" " "	" 31		E, W	37 95	12 51	50 46	50·83	1·3	0 11	0·0157
30	846 & 861 Gr 80	Dec. 28	8 33	E, W	65 58 37·75	− 3 47·19	50·56				
	" " "	" 29		W, E	37 73	47·41	50 32				
	" " "	" 30		E, W	37 72	47 46	50 26				
	" " "	" 31		W, E	37 70	46 85	50 85	50·50	1·3	0 44	0 2517
31	895 & 933 Gr. 80	Dec. 30	32 6	E, W	65 47 53·66	+ 6 57·58	51·24				
	" " "	" 31		W, E	53·65	56·79	50 44	50·84	1·0	0·10	0·0100
32	366 & 369 Newcomb	Dec. 29	25 54	W, E	66 6 25·42	− 11 35·12	50 30				
	" " "	" 30		E, W	25·42	34 21	51 21				
	" " "	" 31		E, W	25·41	34·60	50·81	50·66	1·2	0·28	0 0941
33	374 & 391 Newcomb	Dec. 28	14 44	E, W	65 37 6·75	+ 17 44·13	50 88				
	" " "	" 29		W, E	6 74	44 41	51 15				
	" " "	" 30		E W	6·73	44·30	51·03				
	" " "	" 31		W, E	6·72	44·46	51·18	51·07	1·3	0·13	0·0220

138. Budhon—*Colatitude* 65° 54′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1902	° ′		° ′ ″	′ ″	″	″			
34	1040 & 1051 Gr. 80	Dec. 28	35 56	W, E	65 34 15·70	+ 20 35·29	50·99				
	" " "	" 29		E, W	15·69	35·39	51·08				
	" " "	" 30		W, E	15·68	34·54	50·22				
	" " "	" 31		E, W	15·67	35·37	51·04	50·84	1·3	0·10	0·0130
35	407 Newc. & 1065 Gr. 80	Dec. 31	11 28	W, E	66 13 47·70	− 18 57·15	50·55	50·55	0·7	0·39	0·1065
								Σ P = 37·3		Σ Pvv = 3·2219	

Summary.

No. of pairs 35

No. of observations 127

Mean difference between observations taken E, W and those taken W, E = − 0″·03

Observed Co-latitude (weighted mean) 65° 54′ 50″·94 ± 0″·034

Correction for Height above Sea-level + 0″·07

Final Co-latitude 65° 54′ 51″·01

		°	′	″	
Astronomical Latitude (A)	=	24	5	8·99	± 0·034
Geodetic Latitude (G)	=	24	5	8·41	
Deflection of plumb-line (A−G)	=	+		0·58	

139. Burgpaili—*Co-latitude* 71° 5′ +

Latitude	... 18° 54′	*Maximum recorded Height of Barometer*	= 29·156 in.
Longitude	... 79 44	*Minimum* „ „ „	= 28·916
Height	983 feet	*Maximum* „ *Reading of Thermometer*	= 80°·5
Instrument—Zenith Sector No. 2		*Minimum* „ „ „	= 64·5

Observer—J. Eccles, M A.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Position of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	$v\,v$
		1889			° ′ ″	° ′ ″	″	″	″		
1	399 Gr. 72	Jan. 30	N	E, W	3 32 37·1	74 38 33·0	55·9				
	„ „	Feb. 2	S	W, E	36·8	33·1	56·3	...	56·1	0·1	0·01
2	419 Gr. 72	Jan. 30	N	W, E	0 1 52·1	71 4 3·7	55·8				
	„ „	Feb. 2	S	E, W	52·4	3·7	56·1	56·0	...	1·0	1·00
3	429 Gr. 72	Jan. 30	N	E, W	2 37 1·3	73 42 57·3	56·0				
	„ „	Feb. 2	S	W, E	1·8	57·3	55·5	...	55·8	0·2	0·04
4	441 Gr. 72	Jan. 30	N	W, E	3 50 29·7	67 15 27·7	57·4				
	„ „	Feb. 2	S	E, W	29·9	27·7	57·6	57·5	...	0·5	0·25
5	449 Gr. 72	Jan. 30	N	E, W	0 15 6·6	71 21 4·3	57·7				
	„ „	„ 31	„	E, W	6·6	4·3	57·7				
	„ „	Feb. 2	S	W, E	5·7	4·3	58·6				
	„ „	„ 3	„	W, E	8·0	4·3	56·3	...	57·6	1·6	2·56
6	460 Gr. 72	Jan. 30	N	W, E	5 58 36·4	65 7 21·4	57·8				
	„ „	„ 31	„	W, E	36·1	21·4	57·5				
	„ „	Feb. 2	S	E, W	36·2	21·4	57·6				
	„ „	„ 3	„	E, W	36·8	21·4	58·2	57·8	...	0·8	0·64
7	472 Gr. 72	Jan. 30	N	E, W	0 24 24·4	71 30 21·0	56·6				
	„ „	„ 31	„	E, W	25·1	21·0	55·9				
	„ „	Feb. 2	S	W, E	24·1	21·0	56·9				
	„ „	„ 3	„	W, E	25·2	21·0	55·8	...	56·3	0·3	0·09
8	500 Gr. 72	Jan. 30	N	W, E	1 37 22·8	72 43 18·3	55·5				
	„ „	„ 31	„	W, E	22·4	18·3	55·9				
	„ „	Feb. 1	„	E, W	22·0	18·3	56·3				
	„ „	„ 2	S	E, W	22·8	18·3	55·5				
	„ „	„ 3	„	E, W	23·0	18·3	55·3				
	„ „	„ 4	„	W, E	23·0	18·3	55·3	...	55·6	0·4	0·16
9	523 Gr. 72	Jan. 30	N	E, W	0 26 31·0	71 32 26·9	55·9				
	„ „	„ 31	„	E, W	31·4	26·9	55·5				
	„ „	Feb. 2	S	W, E	31·7	26·9	55·2				
	„ „	„ 3	„	W, E	31·6	26·9	55·3	...	55·5	0·5	0·25
10	530 Gr. 72	Feb. 1	N	W, E	2 10 20·3	68 55 37·9	58·2				
	„ „	„ 4	S	E, W	19·9	37·9	57·8	58·0	...	1·0	1·00

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

139. Burgpaili—*Co-latitude* 71° 5′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
11	551 Gr. 72	Jan. 30	N	W, E	5 37 39·3	65 28 16·6	55·9				
	,, ,,	,, 31	,,	W, E	39·7	16·5	56·2				
	,, ,,	Feb. 1	,,	E, W	40·0	16·5	56·5				
	,, ,,	,, 2	S	E, W	39·4	16·5	55·9				
	,, ,,	,, 3	,,	E, W	40·6	16·4	57·0				
	,, ,,	,, 4	,,	W, E	39·8	16·4	56·2	56·3	...	0·7	0·49
12	566 Gr. 72	Jan. 30	N	E, W	11 31 1·1	82 36 58·7	57·6				
	,, ,,	,, 31	,,	E, W	2·3	58·8	56·5				
	,, ,,	Feb. 1	,,	W, E	3·5	58·8	55·3				
	,, ,,	,, 2	S	W, E	2·6	58·9	56·3				
	,, ,,	,, 3	,,	W, E	3·8	58·9	55·1	...	56·2	0·2	0·04
13	577 Gr. 72	Jan. 30	N	W, E	0 47 21·5	70 18 34·8	56·3				
	,, ,,	,, 31	,,	W, E	22·3	34·7	57·0				
	,, ,,	Feb. 2	S	E, W	22·4	34·7	57·1				
	,, ,,	,, 3	,,	E, W	22·1	34·7	56·8	56·8	...	0·2	0·04
14	579 Gr. 72	Feb. 1	N	E, W	4 21 59·9	66 43 57·1	57·0				
	,, ,,	,, 4	S	W, E	59·9	57·0	56·9	57·0	...	0·0	0·00
15	589 Gr. 72	Jan. 31	N	E, W	4 13 43·7	66 52 13·6	57·3				
	,, ,,	Feb. 3	S	W, E	43·7	13·5	57·2	57·3	...	0·3	0·09
16	590 Gr. 72	Jan. 30	N	E, W	5 32 31·5	65 33 26·3	57·8				
	,, ,,	Feb. 2	S	W, E	31·0	26·2	57·2	57·5	...	0·5	0·25
17	593 Gr. 72	Feb. 1	N	W, E	4 1 51·4	67 4 6·3	57·7				
	,, ,,	,, 4	S	E, W	51·5	6·2	57·7	57·7	...	0·7	0·49
18	600 Gr. 72	Jan. 31	N	W, E	3 38 10·7	67 27 46·2	56·9				
	,, ,,	Feb. 3	S	E, W	10·3	46·1	56·4	56·7	...	0·3	0·09
19	610 Gr. 72	Jan. 30	N	W, E	3 40 5·5	67 25 52·9	58·4				
	,, ,,	Feb. 1	,,	E, W	4·0	52·9	56·9				
	,, ,,	,, 2	S	E, W	3·5	52·8	56·3				
	,, ,,	,, 4	,,	W, E	4·5	52·8	57·3	57·2	...	0·2	0·04
20	618 Gr. 72	Jan. 31	N	E, W	1 57 17·0	69 8 39·0	56·0				
	,, ,,	Feb. 3	S	W, E	16·0	39·0	55·0	55·5	...	1·5	2·25
21	623 Gr. 72	Jan. 30	N	E, W	1 22 47·7	69 43 10·3	58·0				
	,, ,,	Feb. 1	,,	W, E	47·3	10·3	57·6				
	,, ,,	,, 2	S	E, W	46·4	10·3	56·7				
	,, ,,	,, 3	,,	W, E	47·1	10·3	57·4	57·4	...	0·4	0·16
22	645 Gr. 72	Jan. 31	N	W, E	2 24 33·5	73 30 29·1	55·6				
	,, ,,	Feb. 1	,,	E, W	34·2	29·1	54·9				
	,, ,,	,, 2	S	E, W	34·4	29·1	54·7				
	,, ,,	,, 3	,,	E, W	33·9	29·1	55·2				
	,, ,,	,, 4	,,	W, E	33·4	29·1	55·7	...	55·2	0·8	0·64

139. Burgpaili—*Co-latitude* 71° 5′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
23	682 Gr. 72	Jan 30	N	E, W	5 28 15·7	65 37 41·8	57·5				
	,, ,,	Feb. 1	,,	W, E	16·2	41·7	57·9				
	,, ,,	,, 2	S	W, E	15·6	41·7	57·3				
	,, ,,	,, 4	,,	E, W	15·5	41·6	57·1	57·5	.	0·5	0·25
24	684 Gr. 72	Feb. 3	S	W, E	1 49 49·3	69 16 7·6	56·9	56·9	.	0·1	0·01
25	690 Gr. 72	Jan. 30	N	W, E	2 47 43·5	73 53 38·7	55·2				
	,, ,,	Feb. 1	,,	E, W	42·9	38·7	55·8				
	,, ,,	,, 2	S	E, W	43·4	38·7	55·3				
	,, ,,	,, 4	,,	W, E	43·4	38·7	55·3	..	55·4	0·6	0·36
26	697 Gr. 72	Jan. 31	N	W, E	5 24 41·4	65 41 15·6	57·0				
	,, ,,	Feb. 3	S	E, W	40·9	15·4	56·3	56·7	...	0·3	0·09
27	706 Gr. 72	Jan. 30	N	E, W	2 9 45·9	73 15 41·7	55·8				
	,, ,,	Feb. 1	,,	W, E	45·4	41·7	56·3				
	,, ,,	,, 2	S	W, E	45·5	41·7	56·2				
	,, ,,	,, 4	,,	E, W	45·6	41·7	56·1	...	56·1	0·1	0·01
28	711 Gr. 72	Jan. 31	N	E, W	3 17 2·0	67 48 54·8	56·8				
	,, ,,	Feb 3	S	W, E	2·1	54·7	56·8	56·8	..	0·2	0·04
29	727 Gr. 72	Jan. 30	N	W, E	2 46 9·8	68 19 46·1	55·9				
	,, ,,	Feb. 2	S	E, W	10·0	46·0	56·0	56·0	...	1·0	1·00
30	728 Gr. 72	Jan. 31	N	W, E	10 23 25·4	81 29 21·7	56·3				
	,, ,,	Feb. 1	,,	E, W	25·8	21·7	55·9				
	,, ,,	,, 3	S	E, W	26·2	21·8	55·6				
	,, ,,	,, 4	,,	W, E	26·0	21·9	55·9	...	55·9	0·1	0·01
31	737 Gr. 72	Jan. 30	N	E, W	2 50 16·1	73 56 12·3	56·2				
	,, ,,	,, 31	,,	E, W	16·3	12·3	56·0				
	,, ,,	Feb. 1	,,	W, E	16·6	12·3	55·7				
	,, ,,	,, 2	S	W, E	16·4	12·3	55·9				
	,, ,,	,, 3	,,	W, E	16·4	12·3	55·9				
	,, ,,	,, 4	,,	E, W	16·7	12·3	55·6	...	55·9	0·1	0·01
32	758 Gr. 72	Jan. 31	N	W, E	7 8 44·6	63 57 12·3	56·9				
	,, ,,	Feb. 3	S	E, W	45·3	12·1	57·4	57·2	...	0·2	0·04
33	759 Gr. 72	Jan. 30	N	W, E	5 45 41·0	65 20 15·7	56·7				
	,, ,,	Feb. 2	S	E, W	41·4	15·5	56·9	56·8	...	0·2	0·04
34	760 Gr. 72	Feb. 1	N	E, W	9 23 30·3	61 42 26·8	57·1				
	,, ,,	,, 4	S	W, E	30·1	26·6	56·7	56·9	...	0·1	0·01
35	777 Gr. 72	Jan. 30	N	E, W	2 48 59·7	73 54 55·5	55·8				
	,, ,,	,, 31	,,	E, W	58·8	55·5	56·7				
	,, ,,	Feb. 1	,,	W, E	58·9	55·5	56·6				
	,, ,,	,, 2	S	W, E	59·5	55·5	56·0				
	,, ,,	,, 3	,,	W, E	59·4	55·5	56·1				
	,, ,,	,, 4	,,	E, W	59·4	55·5	56·1	...	56·2	0·2	0·04
36	792 Gr. 72	Jan. 30	N	W, E	3 0 4·5	68 5 52·1	56·6				
	,, ,,	Feb. 1	,,	E, W	3·9	52·0	55·9				
	,, ,,	,, 2	S	E, W	4·0	52·0	56·0				
	,, ,,	,, 4	,,	W, E	4·4	51·9	56·3	56·2	...	0·8	0·64

139. Burgpaili—*Co-latitude* 71° 5′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
37	795 Gr. 72	Jan. 31	N	W, E	6 56 29·8	64 9 27·5	57·3				
	" "	Feb. 3	S	E, W	29·4	27·3	56·7	57·0	...	0·0	0·00
38	807 Gr. 72	Jan. 30	N	E, W	9 22 31·9	80 28 28·4	56·5				
	" "	" 31	"	E, W	32·0	28·5	56·5				
	" "	Feb. 2	S	W, E	32·2	28·6	56·4				
	" "	" 3	"	W, E	32·1	28·6	56·5	...	56·5	0·5	0·25
39	811 Gr. 72	Feb. 1	N	W, E	5 28 8·9	65 37 49·0	57·9				
	" "	" 4	S	E, W	9·1	48·9	58·0	58·0	...	1·0	1·00
40	812 Gr. 72	Jan. 30	N	W, E	0 12 52·2	71 18 48·3	56·1				
	" "	" 31	"	W, E	52·2	48·3	56·1				
	" "	Feb. 2	S	E, W	52·2	48·3	56·1				
	" "	" 3	"	E, W	52·1	48·3	56·2	...	56·1	0·1	0·01
41	833 Gr. 72	Jan. 30	N	E, W	5 33 10·0	65 32 47·7	57·7				
	" "	Feb. 2	S	W, E	10·2	47·6	57·8	57·8	...	0·8	0·64
42	839 Gr. 72	Jan. 31	N	E, W	5 33 35·0	65 32 22·0	57·0				
	" "	Feb. 1	"	E, W	34·7	21·9	56·6				
	" "	" 3	S	W, E	35·7	21·9	57·6				
	" "	" 4	"	W, E	34·4	21·8	56·2	56·9	...	0·1	0·01
43	850 Gr. 72	Jan. 30	N	W, E	1 29 48·0	69 36 8·8	56·8				
	" "	Feb. 2	S	E, W	47·8	8·8	56·6	56·7	...	0·3	0·09
44	852 Gr. 72	Jan. 31	N	W, E	1 12 34·7	69 53 22·5	57·2				
	" "	Feb. 3	S	E, W	34·7	22·4	57·1	57·2	...	0·2	0·04
45	855 Gr. 72	Feb. 1	N	W, E	2 57 53·6	68 8 2·7	56·3				
	" "	" 4	S	E, W	53·8	2·6	56·4	56·4	...	0·6	0·36
46	873 Gr. 72	Jan. 30	N	E, W	6 51 10·2	77 57 6·9	56·7				
	" "	Feb. 1	"	E, W	10·7	7·0	56·3				
	" "	" 2	S	W, E	10·4	7·0	56·6				
	" "	" 4	"	W, E	10·4	7·1	56·7	...	56·6	0·6	0·36
47	878 Gr. 72	Jan. 31	N	E, W	6 36 55·7	77 42 52·4	56·7				
	" "	Feb. 3	S	W, E	56·1	52·5	56·4	...	56·6	0·6	0·36
48	881 Gr. 72	Jan. 30	N	W, E	5 59 12·0	65 6 44·2	56·2				
	" "	Feb. 1	"	W, E	12·4	44·1	56·5				
	" "	" 2	S	E, W	12·6	44·0	56·6				
	" "	" 4	"	E, W	13·0	44·0	57·0	56·6	...	0·4	0·16
49	888 Gr. 72	Jan. 31	N	W, E	7 47 17·8	78 53 12·9	55·1				
	" "	Feb. 3	"	E, W	17·0	13·0	56·0	...	55·6	0·4	0·16
50	894 Gr. 72	Jan. 31	N	E, W	0 24 14·7	71 30 10·7	56·0				
	" "	Feb. 1	"	E, W	14·6	10·7	56·1				
	" "	" 2	S	W, E	15·8	10·7	54·9				
	" "	" 4	"	W, E	15·4	10·7	55·3	...	55·6	0·4	0·16
51	895 Gr. 72	Jan. 31	N	E, W	2 50 16·2	68 15 41·8	58·0				
	" "	Feb. 3	S	W, E	16·3	41·8	58·1	58·1	...	1·1	1·21

139. Burgpaili—*Co-latitude* 71° 5′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	π v
		1889			° ′ ″	° ′ ″	″	″	″		
52	901 Gr. 72	Jan. 30	N	W, E	0 43 37·5	71 49 34·0	56·5				
	,, ,,	,, 31	,,	W, E	37·0	34·0	57·0				
	,, ,,	Feb. 1	,,	W, E	37·2	34·0	56·8				
	,, ,,	,, 2	S	E, W	37·9	34·0	56·1				
	,, ,,	,, 3	,,	E, W	37·9	34·0	56·1				
	,, ,,	,, 4	,,	E, W	37·3	34·0	56·7	...	56·5	0·5	0·25
53	918 Gr. 72	Jan. 30	N	E, W	4 32 17·2	66 32 40·4	57·6				
	,, ,,	,, 31	,,	E, W	16·8	40·4	57·2				
	,, ,,	Feb. 2	S	W, E	15·9	40·3	56·2				
	,, ,,	,, 3	,,	W, E	15·2	40·3	55·5	56·6	...	0·4	0·16
54	919 Gr. 72	Feb. 1	N	E, W	7 6 41·2	78 12 37·8	56·6				
	,, ,,	,, 4	S	W, E	42·3	37·9	55·6	...	56·1	0·1	0·01
55	923 Gr. 72	Jan. 31	N	W, E	1 58 4·1	73 3 58·8	54·7				
	,, ,,	Feb. 3	S	E, W	4·5	58·8	54·3	...	54·5	1·5	2·25
56	927 Gr. 72	Jan. 30	N	W, E	1 53 43·0	69 12 12·9	55·9				
	,, ,,	Feb. 1	,,	W, E	43·4	12·9	56·3				
	,, ,,	,, 2	S	E, W	43·3	12·9	56·2				
	,, ,,	,, 4	,,	E, W	43·2	13·0	56·2	56·2	...	0·8	0·64
57	930 Gr. 72	Jan. 31	N	E, W	8 30 19·0	79 36 15·8	56·8	...	56·8	0·8	0·64
58	939 Gr. 72	Jan. 30	N	E, W	5 22 57·3	65 42 60·0	57·3				
	,, ,,	Feb. 1	,,	E, W	57·5	60·0	57·5				
	,, ,,	,, 2	S	W, E	56·2	59·9	56·1				
	,, ,,	,, 4	,,	W, E	56·5	59·9	56·4	56·8	...	0·2	0·04
59	944 Gr. 72	Jan. 31	N	W, E	7 37 37·0	63 28 20·4	57·4				
	,, ,,	Feb. 1	,,	W, E	36·6	20·4	57·0				
	,, ,,	,, 3	S	E, W	36·2	20·3	56·5				
	,, ,,	,, 4	,,	E, W	37·0	20·3	57·3	57·1	...	0·1	0·01
60	948 Gr. 72	Jan. 30	N	W, E	5 55 43·9	77 1 38·6	54·7				
	,, ,,	Feb. 2	S	E, W	42·9	38·7	55·8				
	,, ,,	,, 4	,,	W, E	44·4	38·8	54·4	...	55·0	1·0	1·00
61	952 Gr. 72	Jan 31	N	E, W	3 34 55·2	67 31 2·8	58·0				
	,, ,,	Feb. 3	S	W, E	53·9	2·8	56·7	57·4	..	0·4	0·16
62	955 Gr. 72	Jan. 31	N	W, E	1 35 57·3	72 41 52·3	55·0				
	,, ,,	Feb. 3	S	E, W	56·3	52·3	56·0	...	55·5	0·5	0·25
63	958 Gr. 72	Feb. 1	N	W, E	6 23 34·5	77 29 30·9	56·4				
	,, ,,	,, 4	S	E, W	35·8	31·1	55·3	.	55·9	0·1	0·01
64	967 Gr. 72	Feb. 1	N	E, W	0 36 37·7	71 42 33·4	55·7				
	,, ,,	,, 4	S	W, E	38·2	33·4	55·2	...	55·5	0·5	0·25
65	975 Gr. 72	Jan. 31	N	E, W	1 30 1·0	69 35 56·4	57·4				
	,, ,,	Feb. 3	S	W, E	0·7	56·4	57·1	57·3	...	0·3	0·09
66	980 Gr. 72	Feb. 1	N	W, E	3 22 3·4	74 27 59·1	55·7				
	,, ,,	,, 4	S	E, W	4·2	59·2	55·0	..	55·4	0·6	0·36

139. Burgpaili—*Co-latitude* 71° 5′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	$v v$
		1889			° ′ ″	° ′ ″	″	″	″		
67	989 Gr. 72	Jan. 31	N	W, E	3 59 30·9	75 5 28·4	57·5				
	" "	Feb. 3	S	E, W	32·4	28·5	56·1	...	56·8	0·8	0·64
68	996 Gr. 72	Feb. 1	N	E, W	4 11 45·2	75 17 41·1	55·9				
	" "	" 4	S	W, E	44·5	41·3	56·8	...	56·4	0·4	0·16
69	1012 Gr. 72	Feb. 1	N	W, E	4 51 60·0	66 13 57·9	57·9				
	" "	" 4	S	E, W	59·8	57·9	57·7	57·8	...	0·8	0·64
70	1015 Gr. 72	Feb. 1	N	E, W	7 46 12·1	78 52 8·1	56·0				
	" "	" 4	S	W, E	12·9	8·3	55·4	...	55·7	0·3	0·09
71	1023 Gr. 72	Feb. 1	N	W, E	6 26 20·1	64 39 36·7	56·8				
	" "	" 4	S	E, W	20·0	36·6	56·6	56·7	...	0·3	0·09

Σ vv by N. Stars = 14·25
Σ vv by S. Stars = 11·43

Summary.

No. of North Stars 40 No. of South Stars 31

No. of observations 211

	°	′	″	″
Co-latitude by North Stars	71	5	57·01	± 0·064
" " South "	71	5	55·96	± 0·078
Mean Co-latitude	71	5	56·49	± 0·050
Correction for Height above Sea-level			+ 0·03	

Final Co-latitude 71° 5′ 56″·52

		°	′	″	″
Astronomical Latitude (A)	=	18	54	3·48	± 0·050
Geodetic Latitude (G)	=	18	54	7·20	
Deflection of plumb-line (A−G)	=		−	8·72	

140. Chamu—*Co-latitude* 63° 20′ +

Latitude	... 26° 40′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 72 38	*Mean Height of Barometer*	in 28·60
Height	... 1065 feet	*Mean Temperature*	71°·0

Observer—Captain S. G Burrard, R E.

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
1	15 & 30 Gr. 80	Nov. 15	18 38	E, W	63 8 49 81	+ 11 17 33	7 14				
	„ „ „	„ 16		W, E	49 76	18 11	7 87				
	„ „ „	„ 17		E, W	49 70	16 28	5 98	7 00	0 8	0 48	0·1843
2	15 & 31 Gr. 80	Nov 15	18 38	E, W	63 8 54·95	+ 11 12 10	7·05				
	„ „ „	„ 16		W, E	54 00	12 05	6 95				
	„ „ „	„ 17		E, W	54 84	10 85	5 69	6·56	0 8	0 04	0 0013
3	52 & 46 Gr. 80	Nov. 15	10 52	E, W	63 28 56·29	− 8 50 83	5 46				
	„ „ „	„ 16		W, E	56 23	48 44	7 79				
	„ „ „	„ 17		E, W	56 17	49·87	6 30	6·52	1·2	0·00	0·0000
4	56 & 57 Gr. 80	Nov. 16	25 33	W, E	63 5 54 73	+ 14 10 91	5·64				
	„ „ „	„ 17		E, W	54 67	12 34	7 01	6·32	1 0	0 20	0·0400
5	71 & 61 Gr. 80	Nov. 15	27 18	E, W	63 21 15·77	− 1 9·01	6·76				
	„ „ „	„ 16		W, E	15 75	10·39	5·36	6·06	1·0	0·46	0·2116
6	85 & 75 Gr 80	Nov. 15	6 43	W, E	63 34 52·04	− 14 45 32	6 72				
	„ „ „	„ 16		E, W	51 98	44 87	7 11				
	„ „ „	„ 17		W, E	51·91	44 38	7·53	7·12	1·2	0·60	0·4320
7	93 & 114 Gr. 80	Nov. 15	3 18	W, E	63 1 6·36	+ 19 1·76	8 12				
	„ „ „	„ 16		E, W	6 29	0 54	6 83	7·47	1·0	0 95	0·9025
8	185 & 162 Gr 80	Nov. 15	19 41	E, W	63 0 22·47	+ 19 46·02	8 49				
	„ „ „	„ 17		E, W	22·31	43·05	5 36	6·92	0·7	0 40	0·1120
9	185 & 199 Gr 80	Nov 15	19 41	E, W	63 9 30 47	+ 10 35·21	5·68				
	„ „ „	„ 16		W, E	30 39	35·30	5 69				
	„ „ „	„ 17		E, W	30 31	34·91	5 22	5·53	0·8	0·99	0 7841
10	185 & 200 Gr. 80	Nov. 15	19 41	E, W	63 9 25·14	+ 10 40 40	5 54				
	„ „ „	„ 16		W, E	25·07	40 47	5 54				
	„ „ „	„ 17		E, W	24·99	40 86	5 85	5·64	0·8	0 88	0·6195
11	241 & 260 Gr. 80	Nov. 15	21 37	W, E	63 26 15·21	− 6 8·05	6·26				
	„ „ „	„ 16		E, W	15·13	7·83	7·30				
	„ „ „	„ 17		W, E	15·05	9 82	5 23	6 26	1·2	0·26	0 0811
12	291 & 275 Gr. 80	Nov. 15	10 9	W, E	63 24 38·94	− 4 33·12	5·82				
	„ „ „	„ 16		E, W	38 86	33·16	5·70				
	„ „ „	„ 17		W, E	38·78	32 09	6 69	6·07	0·8	0·45	0·1620
13	294 & 275 Gr. 80	Nov 15	10 9	W, E	63 25 26·06	− 5 20 68	5·38				
	„ „ „	„ 16		E, W	25·98	19 80	6 18				
	„ „ „	„ 17		W, E	25·89	20·33	5·56	5·71	0·8	0 81	0·5249

140. Chamu—*Co-latitude* 63° 20′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
14	319 & 303 Gr. 80	Nov. 15	15 2	E, W	63 12 10·00	+ 7 56·90	6·90				
	" " "	" 16		W, E	9·91	56·26	6·17				
	" " "	" 17		E, W	9·83	57·18	7·01	6·69	0·8	0·17	0·0231
15	320 & 303 Gr. 80	Nov. 15	15 2	E, W	63 12 7·78	+ 7 59·19	6·97				
	" " "	" 16		W, E	7·69	58·61	6·30				
	" " "	" 17		E, W	7·61	58·69	6·30	6·52	0·8	0·00	0·0000
16	334 & 326 Gr. 80	Nov. 15	3 26	W, E	63 37 10·71	− 17 3·79	6·92				
	" " "	" 16		E, W	10·62	5·18	5·44				
	" " "	" 17		W, E	10·54	3·32	7·22	6·53	0·8	0·01	0·0001
17	335 & 326 Gr. 80	Nov. 15	3 26	W, E	63 37 10·62	− 17 2·66	7·96				
	" " "	" 16		E, W	10·54	4·09	6·45				
	" " "	" 17		W, E	10·45	2·61	7·84	7·42	0·8	0·90	0·6480
18	348 & 350 Gr. 80	Nov. 15	7 10	W, E	63 25 41·66	− 5 35·41	6·25				
	" " "	" 16		E, W	41·58	35·26	6·32				
	" " "	" 17		W, E	41·49	36·41	5·08	5·88	1·2	0·64	0·5915
19	355 & 379 Gr. 80	Nov. 15	28 26	E, W	63 4 28·64	+ 15 38·79	7·43				
	" " "	" 16		W, E	28·56	38·26	6·82				
	" " "	" 17		E, W	28·48	38·68	7·16	7·14	1·2	0·62	0·4613
20	438 & 425 Gr. 80	Nov. 15	12 18	E, W	63 3 39·14	+ 16 26·94	6·08				
	" " "	" 16		W, E	39·06	27·14	6·20	6·14	1·0	0·38	0·1444
21	477 & 454 Gr. 80	Nov. 15	0 25	W, E	63 33 9·18	− 13 2·11	7·07				
	" " "	" 16		E, W	9·10	3·02	6·08	6·57	1·0	0·05	0·0025
22	139 Gr. 80	Nov. 16	0 2	W, E	63 22 10·37	− 2 3·40	6·97	6·97	0·7	0·45	0·1418
23	396 Gr. 80	Nov. 15	0 4	W, E	63 23 50·67	− 3 43·63	7·04				
	" "	" 16		E, W	50·59	43·63	6·96				
	" "	" 17		W, E	50·50	43·43	7·07	7·02	1·2	0·50	0·3000
24	419 Gr. 80	Nov. 16	0 9	W, E	63 10 44·97	+ 9 21·15	6·12	6·12	0·7	0·40	0·1120
								ΣP = 22·3		ΣPvv = 6·4800	

Summary.

No. of pairs 24
No. of observations 62

Mean difference between observations taken E, W and those taken W, E = − 0″·22

Observed Co-latitude (weighted mean) 63° 20′ 6″·52 ± 0″·076

Correction for Height above Sea-level + 0″·04

Final Co-latitude 63° 20′ 6″·56

		°	′	″	
Astronomical Latitude (A)	=	26	39	53·44	± 0·076
Geodetic Latitude (G)	=	26	39	52·74	
Deflection of plumb-line (A − G)	=		+	0·70	

141. Chandaos—*Co-latitude* 61° 54′ +

Latitude	... 28° 5′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 77 54	*Mean Height of Barometer*	in 29·33
Height	... 699 feet	*Mean Temperature*	53°·42

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	427 & 455 Gr. 80	Jan. 30	24 20	E, W	61 58 19·34	− 3 20·27	59·07				
	" " "	" 31		W, E	19·39	19·43	59·96	59·52	1·0	0·26	0·0676
2	431 & 460 Gr. 80	Jan. 25	10 16	E, W	61 48 27·21	+ 6 31·94	59·15				
	" " "	" 26		W, E	27·25	31·83	59·08	59·12	1·0	0·14	0·0196
3	467 & 472 Gr 80	Jan. 30	10 52	W, E	61 38 4·32	+ 16 54·90	59·22				
	" " "	" 31		E, W	4·35	54·85	59·20	59·21	1·0	0·05	0·0025
4	495 & 539 Gr. 80	Jan. 25	15 32	W, E	61 52 18·50	+ 2 40·08	58·58				
	" " "	" 26		E, W	18·53	40·68	59·21	58·89	1·0	0·37	0·1369
5	549 & 571 Gr. 80	Jan. 25	3 55	E, W	61 56 51·34	− 1 51·50	59·84				
	" " "	" 26		W, E	51·36	51·51	59·85	59·85	1·0	0·59	0·3481
6	602 & 610 Gr. 80	Jan. 25	11 21	E, W	61 37 22·21	+ 17 36·65	58·86				
	" " "	" 26		W, E	22·22	36·21	58·43	58·65	1·0	0·61	0·3721
7	660 & 680 Gr. 80	Jan. 25	12 26	E, W	62 11 23·94	− 16 24·59	59·35				
	" " "	" 26		W, E	23·94	24·82	59·12	59·24	1·0	0·02	0·0004
8	693 & 704 Gr. 80	Jan. 25	5 40	W, E	61 45 19·79	+ 9 39·11	58·90				
	" " "	" 26		E, W	19·79	39·07	58·86	58·88	1·0	0·38	0·1444
9	719 & 731 Gr. 80	Jan. 25	12 48	E, W	61 43 54·46	+ 11 5·39	59·85				
	" " "	" 26		W, E	54·45	4·66	59·11				
	731 & 742 Gr. 80	" 25	12 41	W, E	36 32·79	+ 18 26·90	59·69				
	" " "	" 26		E, W	32·78	26·76	59·54	59·55	1·5	0·29	0·1262
10	776 & 785 Gr. 80	Jan. 29	9 20	W, E	62 0 29·38	− 5 30·21	59·17				
	" " "	" 30		E, W	29·37	30·87	58·50				
	785 & 809 Gr. 80	" 29	9 32	E, W	61 47 41·01	+ 7 18·07	59·08				
	" " "	" 30		W, E	40·99	18·44	59·43	59·05	1·5	0·21	0·0662
11	816 & 846 Gr. 80	Jan. 29	12 44	W, E	61 47 57·19	+ 7 1·23	58·42				
	" " "	" 30		E, W	57·18	1·34	58·52				
	846 & 828 Gr. 80	" 29	12 49	E, W	42 52·41	12 6·65	59·06				
	" " "	" 30		W, E	52·39	6·64	59·03	58·76	1·5	0·50	0·3750
12	851 & 892 Gr. 80	Jan. 29	10 33	E, W	62 10 15·87	− 15 16·90	58·97				
	" " "	" 30		W, E	15·85	15·61	60·24	59·60	1·0	0·34	0·1156
13	915 & 927 Gr. 80	Jan. 29	4 5	W, E	61 57 14·94	− 2 15·07	59·87				
	" " "	" 30		E, W	14·91	15·38	59·53	59·70	1·0	0·44	0·1936

141. Chandaos—*Co-latitude* 61° 54′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
14	962 & 978 Gr. 80	Jan. 29	11 20	E, W	62 11 6·96	− 16 7·72	59·24				
	" " "	" 30		W, E	6·93	7·52	59·41				
	984 & 962 Gr. 80	" 29	11 19	W, E	57·54	58·31	59·23				
	" " "	" 30		E, W	57·51	57·60	59·91	59·45	1·5	0·19	0·0542
15	1014 & 1059 Gr. 80	Jan. 29	9 1	E, W	61 48 7·95	+ 6 51·61	59·56				
	" " "	" 30		W, E	7·91	50·95	58·86	59·21	1·0	0·05	0·0025
16	1101 & 1150 Gr. 80	Jan. 29	18 23	W, E	61 37 55·34	+ 17 2·47	57·81				
	" " "	" 30		E, W	55·30	3·01	58·31	58·06	1·0	1·20	1·4400
17	1159 & 1221 Gr. 80	Jan. 29	2 35	E, W	62 10 53·63	− 15 54·39	59·24				
	" " "	" 30		W, E	53·59	54·75	58·84				
	1221 & 1186 Gr. 80	" 29	2 27	W, E	2 47·04	7 47·48	59·56				
	" " "	" 30		E, W	47·00	47·61	59·39	59·26	1·5	0·00	0·0000
18	1240 & 1287 Gr. 80	Jan. 31	0 8	W, E	61 48 14·02	+ 6 46·63	60·65				
	" " "	Feb. 1		E, W	13·97	45·56	59·53				
	1287 & 1271 Gr. 80	Jan. 31	0 10	E, W	50 28·33	4 30·74	59·07				
	" " "	Feb. 1		W, E	28·28	31·85	60·13	59·85	1·5	0·59	0·5222
19	1300 & 1323 Gr. 80	Jan. 31	3 17	E, W	62 5 38·85	− 10 39·77	59·08				
	" " "	Feb. 1		W, E	38·69	39·82	58·87	58·97	1·0	0·29	0·0841
20	1328 & 1342 Gr. 80	Jan. 31	5 33	W, E	61 52 33·08	+ 2 26·36	59·44				
	" " "	Feb. 1		E, W	33·03	26·71	59·74				
	1373 & 1328 Gr. 80	Jan. 31	5 40	E, W	59 46·29	− 4 46·39	59·90				
	" " "	Feb. 1		W, E	46·25	47·23	59·02	59·53	1·5	0·27	0·1094
21	1390 & 1397 Gr. 80	Jan. 31	2 5	E, W	62 7 9·02	− 12 9·50	59·52				
	" " "	Feb. 1		W, E	8·98	9·56	59·42	59·47	1·0	0·21	0·0441
22	1405 & 1414 Gr. 80	Jan. 31	0 21	W, E	62 7 14·52	− 12 15·21	59·31				
	" " "	Feb. 1		E, W	14·48	15·33	59·15	59·23	1·0	0·03	0·0009
23	1449 & 1454 Gr. 80	Jan. 31	18 6	E, W	61 54 34·14	+ 0 25·46	59·60				
	" " "	Feb. 1		W, E	34·11	26·16	60·27	59·94	1·0	0·68	0·4624
24	1490 & 1511 Gr. 80	Jan. 31	3 3	W, E	62 6 4·83	− 11 5·75	59·08				
	" " "	Feb. 1		E, W	4·80	6·08	58·72	58·90	1·0	0·36	0·1296
25	1536 & 1550 Gr. 80	Jan. 31	6 34	E, W	61 44 55·30	+ 10 4·02	59·32				
	" " "	Feb. 1		W, E	55·26	4·08	59·34				
	1567 & 1536 Gr. 80	Jan. 31	6 12	W, E	62 6 31·61	− 11 32·47	59·14				
	" " "	Feb. 1		E, W	31·59	31·93	59·66	59·37	1·5	0·11	0·0182
26	1585 & 1599 Gr. 80	Jan. 31	2 40	W, E	62 13 38·60	− 18 38·47	60·13				
	" " "	Feb. 1		E, W	38·58	38·59	59·99	60·06	1·0	0·80	0·6400
27	1613 & 1628 Gr. 80	Jan. 31	18 33	E, W	62 3 26·87	− 8 27·74	59·13				
	" " "	Feb. 1		W, E	26·86	27·23	59·63	59·38	1·0	0·12	0·0144
28	1637 & 1668 Gr. 80	Jan. 29	4 25	W, E	61 59 34·89	− 4 35·69	59·20				
	" " "	" 30		E, W	34·91	35·39	59·52				
	1668 & 1662 Gr. 80	" 29	4 11	E, W	62 13 7·06	18 8·11	58·95				
	" " "	" 30		W, E	7·06	7·23	59·83	59·38	1·5	0·12	0·0216

141. Chandaos—*Co-latitude* 61° 54′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
29	1673 & 1686 Gr. 80	Jan. 29	7 48	E, W	61 51 50 22	+ 3 8 51	58 73				
	” ” ”	” 30		W, E	50 21	8 43	58 64	58 69	1·0	0 57	0·3249
30	1701 & 1724 Gr 80	Jan 29	4 36	W, E	61 42 9·76	+ 12 48 98	58 74				
	” ” ”	” 30		E, W	9 76	48 73	58 40				
	1724 & 1713 Gr 80	” 29	4 24	E, W	54 4·64	0 54 24	58 88				
	” ” ”	” 30		W, E	4 65	54 36	59 01	58 78	1 5	0 48	0 3456
31	1728 & 1746 Gr 80	Jan. 29	2 58	E, W	61 45 32·41	+ 9 26 88	59 29				
	” ” ”	” 30		W, E	32 42	26 52	58 94				
	1780 & 1728 Gr 80	” 29	3 0	W, E	48 2 66	6 56·66	59 32				
	” ” ”	” 30		E, W	2 68	57·64	60 32	59 47	1 5	0 21	0·0662
32	1794 & 1799 Gr 80	Jan. 29	4 14	W, E	62 8 21 20	− 13 21 88	59·32				
	” ” ”	” 31		E, W	21 25	20 97	60 28	59 80	1 0	0 54	0 2916
33	1810 & 1846 Gr 80	Jan 29	17 18	E, W	61 38 4 57	+ 16 54 27	58 84				
	” ” ”	” 31		W, E	4·63	53·91	58 54	58·69	1·0	0 57	0 3249
34	1867 & 1872 Gr 80	Jan. 29	25 58	W, E	61 42 57 44	+ 12 1 56	59 00				
	” ” ”	” 31		E, W	57·46	2 07	59 53				
	1872 & 1892 Gr. 80	” 29	25 54	E, W	39 1 76	15 56 91	58 67				
	” ” ”	” 31		W, E	1 78	57 64	59 42	59 16	1 5	0 10	0·0150
								Σ P = 40 0		Σ Pvv = 6 8800	

Summary.

No of pairs 34

No. of observations 92

Mean difference between observations taken E, W and those taken W, E = − 0″ 04

Observed Co-latitude (weighted mean) 61° 54′ 59″·26 ± 0″·049

Correction for Height above Sea-level + 0″·03

Final Co-latitude 61° 54′ 59″·29

		°	′	″	″
Astronomical Latitude (A)	=	28	5	0·71	± 0·049
Geodetic Latitude (G)	=	28	5	1·59	
Deflection of plumb-line (A − G)	=		−	0·88	

142. Chandipur—*Co-latitude* 68° 33′ +

Latitude ... 21° 27′ — *Instrument*—Zenith Telescope

Longitude ... 87 5 — *Mean Height of Barometer* 29·83 in.

Height ... 53 feet — *Mean Temperature* 75°·3

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	1022 & 1026 Gr. 80 „ „ „	Mar. 16 „ 17	1 48	W, E E, W	68 31 9·89 9·90	+ 2 15·34 15·97	25·23 25·87	25·55	1·0	0·42	0·1764
2	1043 & 1059 Gr. 80 „ „ „	Mar. 16 „ 17	1 58	E, W W, E	68 50 23·09 23·08	− 16 58·29 57·35	24·80 25·73	25·27	1·0	0·70	0·4900
3	1062 & 1099 Gr. 80 „ „ „	Mar. 16 „ 17	9 8	W, E E, W	68 34 19·99 19·97	− 0 54·37 54·79	25·62 25·18	25·40	1·0	0·57	0·3249
4	1155 & 1159 Gr. 80 „ „ „	Mar. 16 „ 17	3 45	E, W W, E	68 30 46·03 46·01	+ 2 39·83 41·36	25·86 27·37	26·62	1·0	0·65	0·4225
5	1181 & 1206 Gr. 80 „ „ „	Mar. 16 „ 17	0 35	W, E E, W	68 42 4·45 4·43	− 8 37·95 38·93	26·50 25·50	26·00	1·0	0·03	0·0009
6	1223 & 1233 Gr. 80 „ „ „	Mar. 16 „ 17	5 21	E, W W, E	68 19 28·30 28·27	+ 13 58·15 59·46	26·45 27·73	27·09	1·0	1·12	1·2544
7	1343 & 1350 Gr. 80 „ „ „	Mar. 16 „ 17	5 29	W, E E, W	68 27 29·07 29·03	+ 5 55·75 56·83	24·82 25·86	25·34	1·0	0·63	0·3969
8	1363 & 1368 Gr. 80 „ „ „	Mar. 16 „ 17	4 28	E, W W, E	68 48 1·06 1·01	− 14 34·27 35·42	26·79 25·59	26·19	1·0	0·22	0·0484
9	1396 & 1407 Gr. 80 „ „ „	Mar. 16 „ 17	3 12	E, W W, E	68 51 21·78 21·72	− 17 54·59 53·88	27·19 27·84	27·52	0·7	1·55	1·6818
10	1407 & 1411 Gr. 80 „ „ „	Mar. 16 „ 17	2 51	W, E E, W	68 30 13·30 13·24	+ 3 13·36 12·74	26·66 25·98	26·32	0·7	0·35	0·0858
11	1449 & 1452 Gr. 80 „ „ „	Mar. 16 „ 17	11 32	E, W W, E	68 27 26·06 25·99	+ 5 59·46 6 1·61	25·52 27·60	26·56	1·0	0·59	0·3481
12	1466 & 1478 Gr. 80 „ „ „	Mar. 16 „ 17	8 3	W, E E, W	68 54 58·03 57·97	− 21 31·56 32·84	26·47 25·13	25·80	1·0	0·17	0·0289

142. Chandipur—*Co-latitude* 68° 33′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
13	1490 & 1494 Gr. 80	Mar. 16	9 29	E, W	68 30 56·84	+ 2 30·14	26 98				
	" " "	" 17		W, E	56 78	30·49	27 27	27 13	1 0	1·16	1·3456
14	1499 & 1504 Gr 80	Mar. 16	9 12	W, E	68 34 2·72	− 0 35·46	27 26				
	" " "	" 17		E, W	2 67	37·41	25 26	26·26	0 7	0·29	0·0589
15	1504 & 1520 Gr. 80	Mar. 16	8 55	E, W	68 50 53 53	− 17 28·45	25 08				
	" " "	" 17		W, E	53 46	27 74	25 72	25·40	0·7	0 57	0·2274
16	1583 & 1595 Gr 80	Mar. 16	4 45	W, E	68 22 19 05	+ 11 7·54	26 59				
	" " "	" 17		E, W	18 98	6 58	25 56	26 08	1 0	0·11	0·0121
17	1599 & 1632 Gr. 80	Mar. 16	8 46	E, W	68 19 14·91	+ 14 11·53	26 44	26·44	0·7	0·47	0·1546
18	1637 & 1650 Gr. 80	Mar. 16	10 58	W, E	68 32 50·01	+ 0 36 37	26 38				
	" " "	" 17		E, W	49·93	36 84	26 77	26·58	1·0	0·61	0·3721
19	1650 & 1662 Gr. 80	Mar 16	10 44	E, W	68 46 22·15	− 12 56·58	25·57				
	" " "	" 17		W, E	22 07	55·08	26·99	26·28	1·0	0·31	0 0961
20	1668 & 1672 Gr. 80	Mar. 16	1 49	W, E	68 12 21·19	+ 21 5·34	26·53				
	" " "	" 17		E, W	21 10	4 32	25·42	25·98	1·0	0·01	0·0001
21	1685 & 1686 Gr. 80	Mar. 16	14 27	E, W	68 30 23·90	+ 3 2 19	26 09				
	" " "	" 17		W, E	23·82	4 24	28 06	27 08	1·0	1·11	1·2321
22	1691 & 1701 Gr 80	Mar. 16	11 19	W, E	68 24 59·26	+ 8 26·49	25·75				
	" " "	" 17		E, W	59·18	26·59	25 77	25·76	0·6	0·21	0·0265
23	1701 & 1705 Gr. 80	Mar. 16	11 32	E, W	68 38 31 08	− 5 5 36	25·72				
	" " "	" 17		W, E	31 01	4·47	26 54	26·13	0 6	0·16	0·0154
24	1705 & 1713 Gr. 80	Mar. 16	11 20	W, E	68 50 26·00	− 17 0·15	25 85				
	" " "	" 17		E, W	25·92	0·63	25·29	25·57	0·6	0·40	0·0960
25	1691 & 1713 Gr. 80	Mar. 16	11 7	W, E	68 36 54·18	− 3 28·20	25·89				
	" " "	" 17		E, W	54·09	29·58	24·51	25·20	0·6	0·77	0·3557
26	1717 & 1731 Gr. 80	Mar. 16	6 40	E, W	68 36 52·33	− 3 26·27	26·06				
	" " "	" 17		W, E	52·24	26 45	25·79	25·93	1·0	0·04	0·0016
27	1758 & 1767 Gr. 80	Mar. 16	17 19	E, W	68 31 55·16	+ 1 30·36	25·52				
	" " "	" 17		W, E	55·08	32·20	27·28	26·40	1·0	0 43	0·1849

142. Chandipur—*Co-latitude* 68° 33′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
28	1912 & 1929 Gr. 80 " " "	Mar. 14 " 15	3 5	E, W W, E	68 34 35·73 35·64	− 1 9·63 9·92	26·10 25·72	25·91	0·7	0·06	0·0025
29	1929 & 1954 Gr. 80 " " "	Mar. 14 " 15	3 24	W, E E, W	68 16 2·37 2·27	+ 17 24·60 23·51	26·97 25·78	26·38	0·7	0·41	0·1177
30	2017 & 2020 Gr. 80 " " "	Mar. 14 " 15	17 28	E, W W, E	68 36 2·09 2·02	− 2 36·66 36·77	25·43 25·25	25·34	1·0	0·63	0·3969
31	2029 & 2032 Gr. 80 " " "	Mar. 14 " 15	9 55	W, E E, W	68 35 23·70 23·62	− 1 57·99 57·99	25·71 25·63	25·67	1·0	0·30	0·0900
32	2048 & 2104 Gr. 80 " " "	Mar. 14 " 15	17 26	W, E E, W	68 23 56·43 56·36	+ 9 29·29 28·39	25·72 24·75	25·24	1·0	0·73	0·5329
33	2124 & 2127 Gr. 80 " " "	Mar. 13 " 14	1 16	W, E E, W	68 16 8·60 8·55	+ 17 17·25 17·14	25·85 25·69	25·77	1·0	0·20	0·0400
34	2143 & 2150 Gr. 80 " " "	Mar. 13 " 14	4 58	E, W W, E	68 45 7·94 7·88	− 11 42·79 41·07	25·15 26·81	25·98	1·0	0·01	0·0001
35	2205 & 2256 Gr. 80 " " "	Mar. 13 " 14	8 23	E, W W, E	68 11 51·57 51·52	+ 21 33·26 34·70	24·83 26·22	25·53	0·7	0·44	0·1355
36	2256 & 2225 Gr. 80 " " "	Mar. 13 " 14	8 22	W, E E, W	68 10 44·66 44·59	+ 22 39·48 41·73	24·14 26·32	25·23	0·7	0·74	0·3833
37	2283 & 2311 Gr. 80 " " "	Mar. 13 " 14	6 20	W, E E, W	68 49 43·64 43·60	− 16 17·27 17·67	26·37 25·93	26·15	1·0	0·18	0·0324
38	2327 & 2357 Gr. 80 " " "	Mar. 13 " 14	19 19	E, W W, E	68 32 15·70 15·65	+ 1 10·09 10·75	25·79 26·40	26·10	1·0	0·13	0·0169
39	2364 & 2370 Gr. 80 " " "	Mar. 13 " 14	8 32	W, E E, W	68 33 0·87 0·82	+ 0 24·18 25·36	25·05 26·18	25·62	0·7	0·35	0·0858
40	2370 & 2377 Gr. 80 " " "	Mar. 13 " 14	8 52	E, W W, E	68 12 55·18 55·14	+ 20 30·67 31·74	25·85 26·88	26·37	0·7	0·40	0·1120
41	2404 & 2408 Gr. 80 " " "	Mar. 13 " 14	10 25	W, E E, W	68 43 3·91 3·88	− 9 36·85 37·87	27·06 26·01	26·54	1·0	0·57	0·3249
42	2414 & 2437 Gr. 80	Mar. 13	5 5	E, W	68 28 15·75	+ 5 8·39	24·14	24·14	0·5	1·83	1·6745
43	2437 & 2443 Gr. 80 " " "	Mar. 13 " 14	5 27	W, E E, W	68 49 43·39 43·34	− 16 18·22 19·26	25·17 24·08	24·63	0·7	1·34	1·2569
44	2451 & 2475 Gr. 80 " " "	Mar. 13 " 14	5 12	E, W W, E	68 49 17·20 17·16	− 15 51·54 51·28	25·66 25·88	25·77	0·7	0·20	0·0280
45	2475 & 2482 Gr. 80 " " "	Mar. 13 " 14	5 35	W, E E, W	68 25 30·25 30·22	+ 7 55·07 55·55	25·32 25·77	25·54	0·7	0·43	0·1294
46	2550 & 2576 Gr. 80 " " "	Mar. 13 " 14	9 43	E, W W, E	68 35 24·18 24·17	− 1 56·87 57·65	27·31 26·52	26·92	0·7	0·95	0·6318

142. Chandipur—*Co-latitude* 68° 33′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
47	2576 & 2582 Gr. 80	Mar. 13	9 31	W, E	68 47 51·50	− 14 25 26	26·24	26·24	0 5	0 27	0·0365
48	2641 & 2656 Gr. 80	Mar. 13	12 6	W, E	68 22 54·46	+ 10 30·70	25·16				
	„ „ „	„ 14		E, W	54·44	31 42	25 86	25·51	1 0	0·46	0·2116
49	2710 & 2765 Gr. 80	Mar. 13	11 47	E, W	68 34 22·40	− 0 57·83	24 57				
	„ „ „	„ 14		W, E	22 40	57·11	25 29	24·03	1 0	1·04	1 0816
								Σ P	41 9	ΣPvv= 16·7593	

Summary.

No. of pairs 49

No. of observations 95

Mean difference between observations taken E, W and those taken W, E = − 0″·54

Observed Co-latitude (weighted mean) 68° 33′ 25″·97 ± 0″·061

Correction for Height above Sea-level 0″·00

Final Co-latitude 68° 33′ 25″·97

		° ′ ″	″
Astronomical Latitude (A)	=	21 26 34·03	± 0·061
Geodetic Latitude (G)	=	21 26 36·99	
Deflection of plumb-line (A−G)	=	− 2·96	

143. Chanduria—*Co-latitude* 64° 15′ +

Latitude	... 25° 44′	*Instrument*—Zenith Telescope	
Longitude	... 88 25	*Mean Height of Barometer*	in. 29·87
Height	... 160 feet	*Mean Temperature*	50°·1

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
1	1592 & 6 Newcomb " " "	Dec. 29 " 31	19 36	W, E E, W	64 4 22·03 22·18	+ 11 5·58 6·44	27·61 28·62	28·12	1·0	0·06	0·0036
2	10 & 14 Newcomb " " "	Dec. 29 " 31	10 48	E, W W, E	64 33 22·92 23·08	− 17 55·12 54·64	27·80 28·44	28·12	1·0	0·06	0·0036
3	23 & 37 Newcomb	Dec. 31	30 15	E, W	64 14 47·58	+ 0 41·11	28·69	28·69	0·7	0·63	0·2778
4	55 & 64 Newcomb " " "	Dec. 29 " 31	11 47	E, W W, E	63 48 13·03 13·15	+ 27 15·57 15·28	28·60 28·43	28·52	1·0	0·46	0·2116
5	76 & 82 Newcomb " " "	Dec. 29 " 31	18 59	W, E E, W	63 57 40·29 40·39	+ 17 48·67 48·44	28·96 28·83	28·90	0·7	0·84	0·4939
6	76 & 88 Newcomb " " "	Dec. 29 " 31	18 56	W, E E, W	64 1 6·10 6·19	+ 14 22·15 21·92	28·25 28·11	28·18	0·7	0·12	0·0101
7	98 & 102 Newcomb	Dec. 31	14 14	W, E	64 8 13·42	+ 7 15·07	28·49	28·49	0·7	0·43	0·1294
8	105 & 130 Newcomb " " "	Dec. 29 " 31	23 58	W, E E, W	63 45 18·07 18·13	+ 30 10·81 10·08	28·88 28·21	28·55	0·7	0·49	0·1681
9	115 & 130 Newcomb " " "	Dec. 29 " 31	24 1	W, E E, W	63 41 54·50 54·55	+ 33 34·25 34·08	28·75 28·63	28·69	0·7	0·63	0·2778
10	368 Gr. 80 & 161 Newc. " " " "	Dec. 29 " 31	3 51	W, E E, W	64 36 48·62 48·64	− 21 20·59 20·65	28·03 27·99	28·01	1·0	0·05	0·0025
11	196 & 208 Newcomb " " "	Dec. 29 " 31	23 7	E, W W, E	63 52 26·87 26·85	+ 23 0·49 1·86	27·36 28·71	28·04	0·7	0·02	0·0003
12	208 & 211 Newcomb " " "	Dec. 29 " 31	23 15	W, E E, W	63 44 14·74 14·72	+ 31 12·80 13·39	27·54 28·11	27·83	0·7	0·23	0·0370
13	213 & 234 Newcomb " " "	Dec. 29 " 31	16 48	E, W W, E	64 31 22·05 22·04	− 15 53·76 54·64	28·29 27·40	27·85	0·7	0·21	0·0309
14	215 & 234 Newcomb " " "	Dec. 29 " 31	16 27	E, W W, E	64 10 9·58 9·56	+ 5 19·08 18·72	28·66 28·28	28·47	0·7	0·41	0·1177
15	461 Newc. & 1272 Gr. 80 " " " "	Dec. 29 " 31	13 49	W, E E, W	64 19 54·97 54·98	− 4 26·55 27·05	28·42 27·93	28·18	0·7	0·12	0·0101

143. Chanduria—*Co-latitude* 64° 15′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
16	461 & 482 Newcomb	Dec. 29	13 38	W, E	64 9 28·00	+ 5 59·18	28 17				
	" " "	" 31		E, W	29 00	59 07	28 07	28·12	0·7	0 06	0 0025
17	485 & 495 Newcomb	Dec 29	1 15	E, W	64 7 47 72	+ 7 39 93	27 65				
	" " "	" 31		W, E	47 74	40 39	28 13	27 89	0·7	0·17	0·0202
18	495 & 505 Newcomb	Dec. 29	1 12	W, E	64 10 37 38	+ 4 49 67	27 05				
	" " "	" 31		E, W	37 41	50 89	28 30	27 68	0·7	0 38	0·1011
19	1378 Gr 80 & 531 Newc.	Dec 29	2 19	W, E	64 46 42 27	− 31 14 75	27 52				
	" " " "	" 31		E, W	42 34	14 54	27·80	27·66	1 0	0 40	0·1600
20	554 & 558 Newcomb	Dec. 29	3 39	E, W	64 32 2 96	− 16 35·02	27·94				
	" " "	" 31		W, E	3 04	35 25	27 79	27·87	1 0	0·19	0 0361
21	568 & 578 Newcomb	Dec. 29	13 26	W, E	64 34 54 49	− 19 24·94	29 55				
	" " "	" 31		E, W	54 59	25 76	28 83	29·19	1 0	1·13	1·2769
22	607 & 621 Newcomb	Dec 29	11 11	E, W	64 21 10 00	− 5 42·36	27 64				
	" " "	" 31		W, E	10 15	42·21	27 94	27 79	1 0	0·27	0·0729
23	623 & 630 Newcomb	Dec 29	1 7	W, E	64 39 25 85	− 23 57 98	27 87				
	" " "	" 31		E, W	26 01	60 12	25 89	26·88	1·0	1·18	1·3924
24	273 & 278 Newcomb	1902 Jan. 1	8 19	E, W	63 58 59 36	+ 16 28·87	28 23	28 23	0·4	0·17	0 0116
25	282 Newc. & 741 Gr. 80	1901 Dec 30	28 12	E, W	64 29 10·16	− 13 42·00	28·16				
	" " " "	1902 Jan. 1		W, E	10 11	42·52	27 59	27·88	1 0	0 18	0 0324
26	304 & 309 Newcomb	1901 Dec 30	7 10	W, E	64 9 31 04	+ 5 57·34	28 38				
	" " "	1902 Jan 1		E, W	30 99	57 28	28 27	28 33	1 0	0 27	0·0729
27	329 & 342 Newcomb	1901 Dec 30	19 40	E, W	63 55 17 10	+ 20 10·67	27·77				
	" " "	1902 Jan 1		W, E	17 07	11 49	28·56	28 17	1 0	0 11	0 0121
28	359 & 970 Newcomb	1901 Dec. 30	31 26	W, E	64 32 49 38	− 17 22 63	26 75	26 75	0 7	1·31	1·2013
29	382 & 387 Newcomb	Dec 30	18 47	E, W	63 50 18 76	+ 25 9 86	28·62				
	" " "	1902 Jan. 1		W, E	18 72	10 78	29 50	29 06	1·0	1·00	1 0000
30	394 Newc. & 1060 Gr. 80	1901 Dec. 30	21 9	W, E	64 41 30 69	− 26 2 05	28·64	28 64	0·7	0 58	0 2355
31	410 & 417 Newcomb	Dec. 30	33 1	E, W	64 46 32·18	− 31 4 81	27·37				
	" " "	1902 Jan. 1		W, E	32 15	5·51	26·64	27·01	1·0	1·05	1·1025
32	426 & 433 Newcomb	1901 Dec. 30	13 15	W, E	63 45 47·17	+ 29 41·38	28 55				
	" " "	1902 Jan. 1		E, W	47 18	41·13	28·31	28·43	1·0	0 37	0·1369

143. Chanduria—*Co-latitude* 64° 15′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
33	1179 Gr. 80 & 440 Newc.	Dec. 30	8 53	W, E	64 48 20·69	− 32 53·12	27·57				
	" " " "	1902 Jan. 1		E, W	20·70	54·07	26·63	27·10	1·0	0·96	0·9216
34	638 & 647 Newcomb	1901 Dec. 30	17 27	E, W	64 2 42·32	+ 12 45·97	28·29				
	" " "	1902 Jan. 1		W, E	42·52	45·98	28·50	28·40	1·0	0·34	0·1156
35	657 & 669 Newcomb	1901 Dec. 30	16 6	W, E	64 6 9·09	+ 9 18·66	27·75				
	" " "	1902 Jan. 1		E, W	9·31	18·43	27·74	27·75	1·0	0·31	0·0961
36	689 & 697 Newcomb	1901 Dec. 30	14 57	E, W	63 59 43·88	+ 15 44·10	27·98				
	" " "	1902 Jan. 1		W, E	44·12	43·93	28·05	28·02	1·0	0·04	0·0016
37	726 & 740 Newcomb	1901 Dec. 30	22 24	E, W	64 4 8·23	+ 11 19·21	27·44	27·44	0·4	0·62	0·1538
38	727 & 740 Newcomb	Dec. 30	22 28	E, W	64 8 40·57	+ 6 46·75	27·32				
	" " "	1902 Jan. 1		W, E	40·92	47·32	28·24	27·78	0·7	0·28	0·0549
39	758 & 768 Newcomb	1901 Dec. 30	15 58	W, E	64 45 44·59	− 30 16·10	28·49				
	" " "	1902 Jan. 1		E, W	44·95	16·96	27·99	28·24	1·0	0·18	0·0324
40	781 & 794 Newcomb	Jan. 1	2 20	E, W	64 30 49·72	− 15 22·02	27·70	27·70	0·7	0·36	0·0907
41	816 & 827 Newcomb	1901 Dec. 30	30 45	W, E	64 15 54·61	− 0 26·70	27·91	27·91	0·7	0·15	0·0158
								Σ P = 34·1		ΣPvv = 10·1242	

Summary.

No. of pairs 41

No. of observations 74

Mean difference between observations taken E, W and those taken W, E = − 0″·15

Observed Co-latitude (weighted mean) 64° 15′ 28″·06 ± 0″·058

Correction for Height above Sea-level + 0″·01

Final Co-latitude 64° 15′ 28″·07

		°	′	″	″
Astronomical Latitude (A)	=	25	44	31·93	± 0·058
Geodetic Latitude (G)	=	25	44	27·47	
Deflection of plumb-line (A − G)	=	+		4·46	

144. Changa—*Co-latitude* 65° 1′ +

Latitude	... 24° 59′	*Instrument*—Zenith Telescope	
Longitude	.. 69 54	*Mean Height of Barometer*	in 29·67
Height	... 349 feet	*Mean Temperature*	54°·1

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	10 & 14 Newcomb „ „ „	Dec. 27 „ 28	10 49	E, W W, E	64 33 41 24 41·31	+ 27 31 31 31 83	12·55 13·14	12·85	1 0	0 11	0 0121
2	75 Gr. 80 & 36 Newc. „ „ „ „	Dec. 27 „ 28	5 18	W, E E, W	64 57 44·28 44 ·04	+ 3 28·42 28·89	12·70 13 23	12·97	0 7	0 23	0·0370
3	36 Newc. & 113 Gr 80 „ „ „ „	Dec 27 „ 28	5 39	E, W W, E	65 19 5 09 5 14	− 17 52 49 51 68	12·60 13 46	13 03	0 7	0 29	0·0589
4	136 & 160 Gr. 80 „ „ „	Dec 27 „ 28	6 19	W, E E, W	65 2 4·48 4 51	− 0 52 14 51 46	12·34 13 05	12·70	0 7	0·04	0 0011
5	136 & 181 Gr. 80 „ „ „	Dec. 27 „ 28	6 26	W, E E, W	64 55 44 09 44 12	+ 5 27 83 28 0,	11 92 12·15	12·04	0·7	0·70	0·3430
6	185 Gr. 80 & 79 Newc „ „ „ „	Dec. 27 „ 28	21 49	E, W W, E	65 5 35 90 35·92	− 4 22 49 22 89	13·41 13·03	13·22	1·0	0·48	0 2304
7	82 & 93 Newcomb „ „ „	Dec. 27 „ 28	19 42	W, E E, W	64 40 30·22 30·25	+ 20 42 51 42·43	12 73 12·68	12·71	0·7	0 03	0 0006
8	88 & 93 Newcomb „ „ „	Dec. 27 „ 28	19 38	W, E E, W	64 43 55·90 55 92	+ 17 16·56 15 97	12·46 11·89	12·18	0·7	0·56	0 2195
9	97 & 108 Newcomb „ „ „	Dec. 27 „ 28	16 8	E, W W, E	65 12 43·70 43·71	− 11 31 29 30·84	12 41 12·87	12·64	1·0	0·10	0·0100
10	118 & 121 Newcomb „ „ „	Dec. 27 „ 28	4 23	W, E E, W	65 17 12·37 12 38	− 15 59·77 59·76	12 60 12 62	12 61	1·0	0·13	0 0169
11	296 & 317 Gr. 80 „ „ „	Dec. 27 „ 28	7 45	E, W W, E	64 55 35·91 35·93	+ 5 37·19 37·30	13·10 13 23	13·17	1·0	0·43	0·1849
12	334 & 339 Gr. 80 „ „ „	Dec. 27 „ 28	4 33	W, E E, W	64 42 17·73 17·74	+ 18 56·17 55 05	13·90 12 79	13 35	1 0	0 61	0·3721
13	141 & 155 Newcomb	Dec. 27	8 4	E, W	64 40 11·28	+ 21 1·45	12·73	12·73	0·7	0·01	0·0001
14	161 Newc. & 414 Gr. 80 „ „ „ „	Dec. 27 „ 28	3 40	E, W W, E	64 48 47·19 47 18	+ 12 27 21 26 17	14·40 13·35	13·88	0·7	1·14	0 9097
15	414 Gr. 80 & 185 Newc. „ „ „ „	Dec. 27 „ 28	3 57	W, E E, W	65 6 27·86 27·85	− 5 13·60 14·58	14·26 13·27	13·77	0·7	1·03	0·7426

144. Changa—*Co-latitude* 65° 1′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900-01	° ′		° ′ ″	′ ″	″	″			
16	471 Gr. 80 & 203 Newc. " " " "	Dec. 27 " 28	4 1	E, W W, E	65 18 36·13 36·12	− 17 23·13 21·41	13·00 14·71	13·86	0·7	1·12	0·8781
17	471 Gr. 80 & 209 Newc. " " " "	Dec. 27 " 28	3 57	E, W W, E	65 15 13·56 13·55	− 14 0·24 0·86	13·32 12·69	13·01	0·7	0·27	0·0510
18	229 Newc. & 577 Gr. 80	Dec. 28	0 26	W, E	65 24 56·41	− 23 43·42	12·99	12·99	0·7	0·25	0·0438
19	589 Gr. 80 & 218 Newc.	Dec. 27	14 27	W, E	64 43 4·04	+ 18 9·42	13·46	13·46	0·7	0·72	0·3629
20	256 & 258 Newcomb " " "	Dec. 27 " 28	3 28	E, W W, E	64 43 35·64 35·61	+ 17 36·81 37·00	12·45 12·61	12·53	1·0	0·21	0·0441
21	273 & 283 Newcomb " " "	Dec. 27 " 28	9 27	W, E E, W	65 7 29·01 29·00	− 6 16·51 16·25	12·50 12·75	12·63	1·0	0·11	0·0121
22	740 & 776 Gr. 80 " " "	Dec. 31 Jan. 1	12 30	W, E E, W	65 11 13·41 13·36	− 9 59·05 10 0·39	14·36 12·97	13·67	0·7	0·93	0·6054
23	749 & 776 Gr. 80 " " "	Dec. 31 Jan. 1	12 40	W, E E, W	65 20 29·81 29·78	− 19 16·64 16·58	13·17 13·20	13·19	0·7	0·45	0·1418
24	305 & 313 Newcomb " " "	Dec. 31 Jan. 1	19 8	W, E E, W	65 26 37·48 37·48	− 25 24·66 24·69	12·82 12·79	12·81	1·0	0·07	0·0049
25	327 Newc. & 869 Gr. 80 " " " "	Dec. 31 Jan. 1	13 34	E, W W, E	65 12 6·56 6·52	− 10 53·33 53·59	13·23 12·93	13·08	1·0	0·34	0·1156
26	343 Newc. & 902 Gr. 80 " " " "	Dec. 31 Jan. 1	3 21	W, E E, W	64 48 44·88 44·85	+ 12 27·64 27·70	12·52 12·55	12·54	1·0	0·20	0·0400
27	348 Newc. & 943 Gr. 80 " " " "	Dec. 31 Jan. 1	7 34	E, W W, E	65 27 6·63 6·60	− 25 53·45 53·58	13·18 13·02	13·10	0·7	0·36	0·0907
28	348 & 371 Newcomb " " "	Dec. 31 Jan. 1	7 13	E, W W, E	65 5 43·41 43·37	− 4 30·56 31·21	12·85 12·16	12·51	0·7	0·23	0·0370
29	387 & 394 Newcomb " " "	Dec. 31 Jan. 1	20 23	E, W W, E	65 27 1·28 1·25	− 25 48·47 48·22	12·81 13·03	12·92	0·7	0·18	0·0227
30	387 & 415 Newcomb " " "	Dec. 31 Jan. 1	20 9	E, W W, E	65 12 39·42 39·41	− 11 26·36 27·43	13·06 11·98	12·52	0·7	0·22	0·0339
31	426 & 430 Newcomb " " "	Dec. 31 Jan. 1	14 45	E, W W, E	65 16 8·81 8·81	− 14 56·16 56·07	12·65 12·74	12·70	1·0	0·04	0·0016
32	440 & 458 Newcomb " " "	Dec. 31 Jan. 1	9 0	E, W W, E	64 55 2·85 2·82	+ 6 10·02 9·87	12·87 12·69	12·78	0·7	0·04	0·0011
33	440 & 464 Newcomb " " "	Dec. 31 Jan. 1	8 53	E, W W, E	64 47 54·16 54·13	+ 13 18·01 18·38	12·17 12·51	12·34	0·7	0·40	0·1120
34	468 & 479 Newcomb " " "	Dec. 31 Jan. 1	16 18	E, W W, E	65 13 42·62 42·62	− 12 29·72 29·77	12·90 12·85	12·88	0·7	0·14	0·0137

144. Changa—*Co-latitude* 65° 1′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1900-01	° ′		° ′ ″	′ ″	″	″			
35	475 & 479 Newcomb „ „ „	Dec 31 Jan. 1	16 12	E, W W, E	65 19 35·28 35·28	− 18 23·16 23·04	12·12 12·24	12·18	0·7	0·56	0·2195
36	484 Newc. & 1311 Gr. 80 „ „ „ „	Dec 31 Jan. 1	7 6	W, E E, W	64 59 59·08 59·09	+ 1 13·04 13·03	12·12 12·12	12·12	1·0	0·62	0·3844
37	498 & 511 Newcomb „ „ „	Jan. 3 „ 4	8 49	E, W W, E	65 8 46·73 46·75	− 7 33·58 34·07	13·15 12·68	12·92	1·0	0·18	0·0324
38	517 & 521 Newcomb „ „ „	Jan 3 „ 4	3 6	W, E E, W	65 1 57·80 57·82	− 0 44·91 45·32	12·89 12·50	12·70	0·7	0·04	0·0011
39	521 & 531 Newcomb „ „ „	Jan. 3 „ 4	2 50	E, W W, E	65 17 58·66 58·69	− 16 45·76 45·77	12·90 12·92	12·91	0·7	0·17	0·0202
40	533 & 547 Newcomb „ „ „	Jan. 3 „ 4	18 44	W, E E, W	65 13 33·44 33·48	− 12 20·15 21·54	13·29 11·94	12·62	0·7	0·12	0·0101
41	533 & 559 Newcomb „ „ „	Jan. 3 „ 4	18 22	W, E E, W	64 51 34·05 34·08	+ 9 38·93 37·66	12·98 11·74	12·36	0·7	0·38	0·1011
42	1495 & 1500 Gr. 80 „ „ „	Jan. 3 „ 4	8 40	E, W W, E	65 22 38·35 38·39	− 21 25·37 25·87	12·98 12·52	12·75	1·0	0·01	0·0001
43	578 & 583 Newcomb „ „ „	Jan. 3 „ 4	13 54	E, W W, E	65 2 47·85 47·89	− 1 35·17 35·08	12·68 12·81	12·75	1·0	0·01	0·0001
44	1541 Gr. 80 & 595 Newc „ „ „ „	Jan. 3 „ 4	9 44	W, E E, W	64 55 20·38 20·43	+ 5 52·22 51·94	12·60 12·37	12·49	1·0	0·25	0·0625
45	1555 & 1571 Gr. 80 „ „ „	Jan. 3 „ 4	1 36	E, W W, E	64 59 51·39 51·45	+ 1 21·23 21·01	12·62 12·46	12·54	1·0	0·20	0·0400
46	1585 Gr. 80 & 623 New. „ „ „ „	Jan. 3 „ 4	0 27	W, E E, W	65 19 53·99 54·04	− 18 41·81 41·43	12·18 12·61	12·40	1·0	0·34	0·1156
47	634 & 638 Newcomb „ „ „	Jan. 3 „ 4	16 31	E, W W, E	64 58 51·80 51·87	+ 2 20·50 20·17	12·30 12·04	12·17	1·0	0·57	0·3249
48	641 Newc. & 1662 Gr 80 „ „ „	Jan. 3 „ 4	7 22	W, E E, W	65 24 6·72 6·80	− 22 54·33 54·89	12·39 11·91	12·15	1·0	0·59	0·3481
49	657 & 673 Newcomb „ „ „	Jan. 3 „ 4	17 16	E, W W, E	65 16 26·21 26·30	− 15 13·82 13·77	12·39 12·53	12·46	1·0	0·28	0·0784
50	683 & 694 Newcomb „ „ „	Jan. 5 „ 7	0 48	E, W W, E	65 30 44·44 44·67	− 29 31·97 32·07	12·47 12·60	12·54	1·0	0·20	0·0400
51	699 & 708 Newcomb „ „ „	Jan. 5 „ 7	20 27	W, E E, W	65 24 43·70 43·95	− 23 30·80 31·21	12·90 12·74	12·82	1·0	0·08	0·0064
52	713 & 718 Newcomb „ „ „	Jan. 5 „ 7	8 50	E, W W, E	65 12 7·37 7·64	− 10 55·16 55·39	12·21 12·25	12·23	1·0	0·51	0·2601
53	720 & 728 Newcomb „ „ „	Jan. 5 „ 7	18 35	W, E E, W	64 51 37·15 37·42	+ 9 35·56 35·18	12·71 12·60	12·66	0·7	0·08	0·0045

144. Changa—*Co-latitude* 65° 1′ + .

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
54	728 & 739 Newcomb	Jan. 5	18 19	E, W	64 36 15·11	+ 24 57·29	12·40				
	" " "	" 7		W, E	15·37	57·02	12·39	12·40	0·7	0·34	0·0709
55	758 & 768 Newcomb	Jan. 5	15 58	W, E	64 45 27·14	+ 15 45·84	12·98				
	" " "	" 7		E, W	27·45	45·54	12·99	12·99	1·0	0·25	0·0625
56	783 & 787 Newcomb	Jan. 5	3 41	E, W	64 52 22·87	+ 8 49·32	12·19				
	" " "	" 7		W, E	23·21	49·18	12·39	12·29	1·0	0·45	0·2025
57	791 & 807 Newcomb	Jan. 5	16 51	W, E	64 56 57·99	+ 4 14·70	12·69				
	" " "	" 7		E, W	58·34	14·78	13·12	12·91	0·7	0·17	0·0202
58	798 & 807 Newcomb	Jan. 5	16 36	W, E	65 11 14·57	− 10 2·26	12·31				
	" " "	" 7		E, W	14·93	1·93	13·00	12·66	0·7	0·08	0·0045
59	818 & 821 Newcomb	Jan. 7	13 41	E, W	64 49 56·20	+ 11 16·37	12·57	12·57	0·5	0·[illegible]	0·0145
60	821 & 828 Newcomb	Jan. 7	13 46	W, E	64 44 46·49	+ 16 25·99	12·48	12·48	0·5	0·26	0·0338
								Σ P = 49·7		Σ Pvv = 8·2897	

Summary.

No. of pairs 60

No. of observations 115

Mean difference between observations taken E, W and those taken W, E = − 0″·08

Observed Co-latitude (weighted mean) 65° 1′ 12″·74 ± 0″·036

Correction for Height above Sea-level + 0″·01

Final Co-latitude 65° 1′ 12″·75

		°	′	″	″
Astronomical Latitude (A)	=	24	58	47·25	± 0·036
Geodetic Latitude (G)	=	24	58	47·00	
Deflection of plumb-line (A − G)	=			+ 0·25	

145. Chaniana—*Co-latitude* 65° 53′ +

Latitude	... 24° 7′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 72 35	*Mean Height of Barometer*	in 29·12
Height	... 953 feet	*Mean Temperature*	68°·7

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	1193 & 1181 Gr. 80 ” ” ”	Feb. 25 Mar. 2	2 10	W, E E, W	65 56 38·11 37·93	− 3 3·83 4·70	34·28 33·23	33·75	1·0	0·82	0·6724
2	1223 & 1206 Gr. 80	Mar. 2	3 9	E, W	66 7 7·58	− 13 33·71	33·87	33·87	0·7	0·70	0·3430
3	1240 Gr 80 & 716 Gr. 72	Feb. 25	3 43	E, W	65 38 1·94	+ 15 32·53	34·47	34·47	0·7	0·10	0·0070
4	1265 & 1266 Gr 80 ” ” ”	Feb. 25 Mar. 2	1 3	W, E E, W	65 47 42·14 41·92	+ 5 52·27 51·85	34·41 33·77	34·09	1·0	0·48	0·2304
5	1284 & 1297 Gr. 80 ” ” ”	Feb. 25 Mar. 2	7 58	E, W W, E	65 58 18·35 18·12	− 4 43·78 43·81	34·57 34·31	34·44	1·0	0·13	0·0169
6	757 Gr 72 & 1327 Gr 80 ” ” ” ”	Feb. 25 Mar. 2	5 12	W, E E, W	66 2 31·54 31·30	− 8 57·30 56·85	34·24 34·45	34·34	1·0	0·23	0·0529
7	779 Gr. 72 & 1344 Gr. 80 ” ” ” ”	Feb 25 Mar. 2	37 27	W, E E, W	66 9 47·50 47·30	− 16 11·99 12·17	35·51 35·13	35·32	1·0	0·75	0·5625
8	1363 & 1373 Gr. 80 ” ” ”	Feb. 25 Mar. 2	1 40	W, E E, W	65 58 15·42 15·16	− 4 40·88 39·93	34·54 35·23	34·88	0·7	0·31	0·0673
9	1390 & 1383 Gr. 80 ” ” ”	Feb. 25 Mar. 2	1 58	W, E E, W	66 8 13·25 12·98	− 14 38·54 37·69	34·71 35·29	35·00	0·7	0·43	0·1294
10	1363 & 1383 Gr. 80 ” ” ”	Feb. 25 Mar. 2	1 54	W, E E, W	66 12 36·58 36·32	− 19 1·50 0·69	35·08 35·63	35·35	0·7	0·78	0·4259
11	1390 & 1373 Gr. 80 ” ” ”	Feb. 25 Mar. 2	1 44	W, E E, W	65 53 52·09 51·82	− 0 17·92 16·90	34·17 34·92	34·54	0·7	0·03	0·0006
12	1397 & 1395 Gr. 80 ” ” ”	Feb. 25 Mar. 2	6 0	E, W W, E	66 1 30·94 30·66	− 7 56·11 56·32	34·83 34·34	34·58	0·7	0·01	0·0001
13	1397 & 1396 Gr. 80 ” ” ”	Feb. 25 Mar. 2	6 0	E, W W, E	66 1 32·44 32·17	− 7 57·88 58·13	34·56 34·04	34·30	0·7	0·27	0·0510
14	1405 & 1436 Gr. 80 ” ” ”	Feb. 25 Mar. 2	3 23	E, W W, E	65 48 53·71 53·42	+ 4 41·17 40·95	34·88 34·37	34·62	0·7	0·05	0·0018
15	1416 & 1436 Gr. 80 ” ” ”	Feb. 25 Mar. 2	3 15	E, W W, E	65 57 18·10 17·80	− 3 42·49 44·34	35·61 33·46	34·53	0·7	0·04	0·0011

145. Chaniana—*Co-latitude* 65° 53′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
16	1417 & 1459 Gr. 80	Feb. 25	3 27	E, W	66 9 51·05	− 16 16·16	34·89				
	" " "	Mar. 2		W, E	50·76	16·84	33·92	34·40	1·0	0·17	0·0289
17	1473 & 1470 Gr. 80	Feb. 25	5 19	E, W	66 8 51·31	− 15 17·77	33·54				
	" " "	Mar. 2		W, E	51·01	15·89	35·12	34·33	0·7	0·24	0·0403
18	1474 & 1470 Gr 80	Feb. 25	5 18	E, W	66 9 0·79	− 15 26·27	34·52				
	" " "	Mar. 2		W, E	0·49	25·68	34·81	34·66	0·7	0·09	0·0057
19	1483 & 1482 Gr 80	Feb. 25	8 34	W, E	65 41 18·13	+ 12 16·55	34·68				
	" " "	Mar. 2		E, W	17·82	16·80	34·62	34·65	0·7	0·08	0·0045
20	1483 & 1498 Gr. 80	Feb. 25	8 35	W, E	65 41 44·23	+ 11 50·34	34·57				
	" " "	Mar. 2		E, W	43·92	51·19	35·11	34·84	0·7	0·27	0·0510
21	1505 & 1498 Gr. 80	Feb. 25	8 33	W, E	65 42 58·30	+ 10 35·86	34·16				
	" " "	Mar. 2		E, W	57·98	37·28	35·26	34·71	0·7	0·14	0·0137
22	1507 & 1498 Gr. 80	Feb. 25	8 28	W, E	65 47 52·96	+ 5 41·04	34·00				
	" " "	Mar. 2		E, W	52·64	42·43	35·07	34·53	0·7	0·04	0·0011
23	1507 & 1482 Gr. 80	Feb. 25	8 27	W, E	65 47 26·86	+ 6 7·25	34·11				
	" " "	Mar. 2		E, W	26·55	8·04	34·59	34·35	0·7	0·22	0·0339
24	1197 Gr. 80	Feb. 25	0 15	W, E	65 37 49·95	+ 15 44·25	34·20	34·20	0·7	0·37	0·0958
25	1227 Gr. 80	Feb. 25	0 12	W, E	65 41 27·84	+ 12 6·68	34·52	34·52	0·7	0·05	0·0018
								ΣP = 19·3		Σ Pvv = 2·8390	

Summary.

No. of pairs 25
No. of observations 46

Mean difference between observations taken E, W and those taken W, E = − 0″·26

Observed Co-latitude (weighted mean) 65° 53′ 34″·57 ± 0″·053

Correction for Height above Sea-level + 0″·04

Corrected Co-latitude 65° 53′ 34″·61 ± 0″·053

For final Co-latitude and deduction of $(A-G)$ ***see*** **page (193).**

145. Chaniana—*Co-latitude* 65° 53′ +

Latitude ...	24° 7′	*Maximum recorded Height of Barometer*	= 29·15 in
Longitude ...	72 35	*Minimum* ,, ,, ,,	= 29·09
Height	953 feet	*Maximum* ,, *Reading of Thermometer*	= 74°·8
Instrument—Zenith Sector No. 1		*Minimum* ,, ,, ,,	= 61 8

Observer—Captain S. G. Burrard, R E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N P D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	Seconds of Co-latitude corrected for error of Limb*	v	v^2
		1893			° ′ ″	° ′ ″	″	″	″	″		
1	1181 Gr 80 ,, ,,	Feb 26 Mar. 1	N S	E, W W, E	2 13 5 47 5 63	68 6 40 23 40 15	34 76 34 52		34 64	35 04	0 66	0 4356
2	1193 Gr 80	Feb 27	N	W, E	2 6 58·30	63 46 35·88	34·18	34·18	...	33 80	0 94	0 8836
3	1206 Gr. 80 ,, ,,	Feb 27 ,, 28	N S	E, W W, E	3 22 42·88 45 54	69 16 17 37 17 34	34 40 31 89		33·15	33 76	0 62	0 3844
4	1223 Gr. 80 ,, ,,	Feb. 26 Mar. 1	N S	E, W W, E	2 55 38 74 36·20	62 57 58 08 57 93	36 82 34 13	35 48		34 96	0 22	0 0484
5	1227 Gr. 80	Feb. 27	N	W, E	0 12 7·56	65 41 27·76	35 32	35 32	...	35 28	0 54	0 2916
6	716 Gr. 72	Feb. 27	N	E, W	3 27 37·62	69 21 10 65	33 03	...	33 03	33 65	0 73	0·5329
7	1265 Gr 80 ,, ,,	Feb. 26 Mar. 1	N S	E, W W, E	1 9 1·54 1·87	64 44 32 83 32·68	34 37 34 55	34·46	...	34 25	0·49	0·2401
8	1266 Gr. 80	Feb 28	S	E, W	0 57 16·83	66 50 51·30	34·47	...	34·47	34 64	0·26	0 0676
9	1284 Gr. 80 ,, ,,	Feb. 26 Mar. 1	N S	W, E E, W	7 53 32·02 33·38	58 0 2·79 2·56	34·81 35 94	35·38	...	* 33·96	0·78	0·6084
10	1297 Gr. 80 ,, ,,	Feb. 27 ,, 28	N S	E, W W, E	8 2 59·45 60·82	73 56 33·81 33·80	34·36 32 98	...	33·67	35·12	0·74	0·5476
11	757 Gr. 72 ,, ,,	Feb. 26 Mar. 1	N S	E, W W, E	5 2 12·82 13·40	60 51 21·38 21·17	34·20 34·57	34·39	...	33·48	1·26	1·5876
12	1327 Gr. 80 ,, ,,	Feb. 27 ,, 28	N S	W, E E, W	5 20 8·40 8·24	71 13 41·59 41·56	33·19 33·32	...	33·26	34·22	0 16	0·0256
13	1342 Gr. 80 ,, ,,	Feb. 26 Mar. 1	N S	W, E E, W	1 29 47·66 49·24	67 23 22·14 22·01	34·48 32·77	...	33·63	33 90	0·48	0·2304

* *See* Appendix 3.

145. Chaniana—*Co-latitude* 65° 53′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean by North Star	Seconds of Co-latitude: Mean by South Star	Seconds of Co-lat. corrected for error of Limb	v	vv
		1893			° ′ ″	° ′ ″	″	″	″	″		
14	1343 Gr. 80	Feb. 27	N	E, W	2 56 14·52	62 57 21·78	36·30					
	,, ,,	,, 28	S	W, E	13·73	21·71	35·44	35·87	...	35·34	0·60	0·3600
15	1363 Gr. 80	Feb. 26	N	E, W	1 34 46·79	64 18 48·25	35·04					
	,, ,,	Mar. 1	S	W, E	47·22	48·07	35·29	35·17	...	34·89	0·15	0·0225
16	1373 Gr. 80	Feb. 27	N	W, E	1 44 8·28	67 37 42·45	34·17					
	,, ,,	,, 28	S	E, W	6·69	42·41	35·72	...	34·95	35·26	0·88	0·7744
17	1383 Gr. 80	Feb. 26	N	W, E	2 12 52·41	68 6 24·81	32·40					
	,, ,,	Mar. 1	S	E, W	49·84	24·68	34·84	...	33·62	34·02	0·36	0·1296
18	1390 Gr. 80	Feb. 27	N	E, W	1 43 34·36	64 10 1·52	35·88	35·88	...	35·57	0·83	0·6889
19	1395 Gr. 80	Feb. 26	N	E, W	6 8 12·61	72 1 44·73	32·12					
	,, ,,	Mar. 1	S	W, E	12·11	44·65	32·54	...	32·33	33·43	0·95	0·9025
20	1397 Gr. 80	Feb. 28	S	E, W	5 52 20·10	60 1 16·87	36·97	36·97	...	35·91	1·17	1·3689
21	1405 Gr. 80	Feb. 26	N	W, E	3 27 28·35	62 26 5·51	33·86					
	,, ,,	Mar. 1	S	E, W	29·37	5·29	34·66	34·26	...	33·64	1·10	1·2100
22	1416 Gr. 80	Feb. 27	N	E, W	3 10 40·67	62 42 54·22	34·89					
	,, ,,	,, 28	S	W, E	42·73	54·14	36·87	35·88	...	35·31	0·57	0·3249
23	1417 Gr. 80	Feb. 27	N	E, W	3 10 44·18	62 42 50·17	34·35					
	,, ,,	,, 28	S	W, E	46·01	50·09	36·10	35·23	...	34·66	0·08	0·0064
24	1436 Gr. 80	Feb. 26	N	E, W	3 18 8·79	69 11 41·80	33·01					
	,, ,,	Mar. 1	S	W, E	8·08	41·67	33·59	...	33·30	33·89	0·49	0·2401
25	1459 Gr. 80	Feb. 27	N	W, E	3 43 18·27	69 36 51·72	33·45					
	,, ,,	,, 28	S	E, W	16·05	51·68	35·63	...	34·54	35·21	0·83	0·6889
26	1470 Gr. 80	Feb. 26	N	W, E	5 33 36·10	71 27 8·70	32·60					
	,, ,,	Mar. 1	S	E, W	34·42	8·61	34·19	...	33·40	34·40	0·02	0·0004
27	1474 Gr. 80	Feb. 28	S	W, E	5 2 42·25	60 50 52·60	34·85	34·85	...	33·94	0·80	0·6400
28	1482 Gr. 80	Feb. 26	N	E, W	8 21 36·53	74 15 9·54	33·01					
	,, ,,	Mar. 1	S	W, E	35·28	9·49	34·21	...	33·61	35·11	0·73	0·5329
29	1483 Gr. 80	Feb. 27	N	W, E	8 46 9·68	57 7 26·50	36·18					
	,, ,,	,, 28	S	E, W	9·97	26·39	36·36	36·27	...	34·69	0·05	0·0025

145. Chaniana—*Co-latitude* 65° 53′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	Seconds of Co-lat. corrected for error of Limb	v	$v v$
		1893			° ′ ″	° ′ ″	″	″	″	″		
30	1498 Gr. 80	Feb. 26	N	W, E	8 22 29·94	74 16 1·73	31·79					
	„ „	Mar. 1	S	E, W	28·32	1·68	33·36	...	32·58	34·09	0·29	0·0841
31	1505 Gr. 80	Feb. 27	N	E, W	8 43 43·09	57 9 54·63	37·72					
	„ „	„ 28	S	W, E	42·11	54·53	36·64	37·18	...	35·61	0·87	0·7569
32	1507 Gr. 80	Feb. 26	N	E, W	8 33 52·28	57 19 44·06	36·34					
	„ „	Mar. 1	S	W, E	53·50	43·74	37·24	36·79	..	35·25	0·51	0·2601
										$\Sigma\, vv$ by N Stars	=	9·3008
										$\Sigma\, vv$ by S Stars	=	5·5770

Summary.

No. of North Stars 17 No. of South Stars 15

No. of observations 57

	° ′ ″	″
Co-latitude by North Stars	65 53 34·74	± 0·12
„ „ South „	65 53 34·38	± 0·11
Mean Co-latitude	65 53 34·56	
Correction for Height above Sea-level	+ 0·04	
Corrected Co-latitude by Sector Method	65 53 34·60	± 0·080
Corrected Co-latitude by Talcott Method, p. (190)	65 53 34·61	± 0·053

Final Co-latitude 65° 53′ 34″·61

		° ′ ″	
Astronomical Latitude (A)	=	24 6 25·39	± 0·048
Geodetic Latitude (G)	=	24 6 36·64	
Deflection of plumb-line (A−G)	=	− 11·25	

146. Charaldanga—*Co-latitude* 65° 7′ +

Latitude	... 24° 53′	*Instrument*—Zenith Telescope	
Longitude	... 88 26	*Mean Height of Barometer*	in. 29·88
Height	... 149 feet	*Mean Temperature*	56°·0

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
1	1520 & 1534 Newcomb	Dec. 15	16 49	E, W	65 0 8·83	+ 7 6·16	14·99				
	" " "	" 18		W, E	9·11	5·92	15·03	15·01	1·0	0·38	0·1444
2	3902 Gr. 80 & 1549 Newc.	Dec. 15	2 26	E, W	64 42 25·18	+ 24 50·37	15·55	15·55	0·7	0·92	0·5925
3	1569 & 1572 Newcomb	Dec. 15	19 21	W, E	65 33 11·34	− 25 57·95	13·39				
	" " "	" 18		E, W	11·55	57·77	13·78	13·59	1·0	1·04	1·0816
4	1586 & 1595 Newcomb	Dec. 15	31 46	E, W	64 47 56·13	+ 19 18·87	15·00				
	" " "	" 18		W, E	56·29	18·35	14·64	14·82	0·7	0·19	0·0253
5	1586 & 1 Newcomb	Dec. 15	31 37	E, W	64 38 50·88	+ 28 23·94	14·82				
	" " "	" 18		W, E	51·03	23·83	14·86	14·84	0·7	0·21	0·0309
6	23 & 31 Newcomb	Dec. 15	28 56	W, E	65 34 3·44	− 26 49·54	13·90				
	" " "	" 17		E, W	3·51	50·29	13·22				
	" " "	" 18		E, W	3·54	50·60	12·94	13·49	0·8	1·14	1·0397
7	30 & 31 Newcomb	Dec. 15	28 45	W, E	65 23 3·78	− 15 49·43	14·35				
	" " "	" 17		E, W	3·85	50·53	13·32				
	" " "	" 18		E, W	3·88	50·38	13·50	13·88	0·8	0·75	0·4500
8	112 Gr. 80 & 55 Newc.	Dec. 15	13 16	E, W	65 17 36·28	− 10 21·42	14·86				
	" " " "	" 17		W, E	36·35	21·00	15·35				
	" " " "	" 18		W, E	36·38	21·73	14·65	14·93	1·2	0·30	0·1080
9	64 & 71 Newcomb	Dec. 15	10 21	W, E	65 14 13·58	− 6 58·62	14·96				
	" " "	" 17		E, W	13·64	58·80	14·84				
	" " "	" 18		E, W	13·67	58·61	15·06	14·96	1·2	0·33	0·1307
10	73 & 81 Newcomb	Dec. 15	3 52	E, W	65 37 38·91	− 30 24·87	14·04				
	" " "	" 17		W, E	38·96	24·57	14·39				
	" " "	" 18		W, E	38·99	24·33	14·66	14·29	1·2	0·34	0·1387
11	88 & 93 Newcomb	Dec. 15	19 38	W, E	64 43 39·27	+ 23 35·08	14·35				
	" " "	" 17		E, W	39·30	35·16	14·46				
	" " "	" 18		E, W	39·31	34·74	14·05	14·31	0·8	0·32	0·0819

146. Charaldanga—*Co-latitude* 65° 7′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
12	88 & 104 Newcomb " " " " " "	Dec 15 " 17 " 18	19 58	W, E E, W E, W	65 3 4 49 4 52 4·54	+ 4 9 80 10 06 10 30	14·29 14 58 14 84	14·50	0 8	0·13	0·0135
13	118 & 121 Newcomb " " " " " "	Dec. 15 " 17 " 18	4 24	E, W W, E W, E	65 16 56·98 57 00 57·01	− 9 42·65 42 80 42 06	14 33 14 [illegible] 14 35	14·31	1 2	0 32	0 1229
14	131 & 138 Newcomb " " " " " "	Dec. 15 " 17 " 18	16 44	W, E E, W E, W	64 52 29·06 29 06 29 06	+ 14 45 69 40 44 45 92	14 75 15 50 14 98	15 00	1 2	0 37	0 1643
15	347 Gr. 80 & 155 Newc. " " " " " "	Dec. 15 " 17 " 18	7 49	E, W W, E W, E	64 54 40·29 40·29 40 29	+ 12 34 91 34 50 34 39	15·20 14 79 14 68	14 97	1 2	0 34	0 1387
16	161 & 171 Newcomb " " "	Dec. 15 " 17	2 53	E, W W, E	65 35 4·53 4·53	− 27 51·01 49·72	13·52 14 81	14 17	1 0	0·46	0·2116
17	414 Gr. 80 & 185 Newc " " " "	Dec. 16 " 19	3 57	W, E E, W	65 6 15·74 15 76	+ 0 58·65 59 56	14 39 15 32	14 86	1 0	0·23	0 0529
18	186 & 195 Newcomb	Dec. 16	16 2	E, W	65 27 4·78	− 19 51·35	13·43	13·43	0 7	1 20	1·0080
19	208 & 217 Newcomb " " "	Dec. 16 " 19	22 20	W, E E, W	64 39 55·29 55·20	+ 27 19 57 19·76	14·86 14 96	14·91	0 7	0 28	0·0549
20	208 & 230 Newcomb " " "	Dec. 16 " 19	22 14	W, E E, W	64 45 24·72 24·63	+ 21 49·94 50·30	14 66 14 93	14 80	0·7	0 17	0·0202
21	589 Gr. 80 & 248 Newc.	Dec. 16	14 27	W, E	64 42 56·19	+ 24 19·86	16·05	16·05	0 7	1·42	1 4115
22	256 & 258 Newcomb " " "	Dec. 16 " 19	3 28	E, W W, E	64 43 28 74 28·65	+ 23 46·51 46 76	15·25 15 41	15·33	1·0	0·70	0 4900
23	273 & 283 Newcomb " " "	Dec. 16 " 19	9 37	E, W W, E	65 7 23·51 23 44	− 0 8 63 10·89	14 88 12·55	13 72	0 7	0·91	0·5797
24	273 & 288 Newcomb " " "	Dec. 16 " 19	9 1	E, W W, E	64 40 44 62 44 55	+ 26 31·16 31 05	15 78 15 60	15 69	0 7	1·06	0·7865
25	318 Newc. & 874 Gr. 80	Dec. 16	9 12	E, W	65 32 42·53	− 25 27·98	14·55	14·55	0·7	0·08	0·0045
26	343 & 362 Newcomb " " "	Dec. 16 " 19	3 44	W, E E, W	65 11 51 48 51·45	− 4 36·55 37·19	14·93 14·26	14·60	1·0	0 03	0·0009

146. Charaldanga—*Co-latitude* 65° 7′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
27	387 & 394 Newcomb „ „ „	Dec. 16 „ 19	20 23	W, E E, W	65 27 3·41 3·43	− 19 48·87 48·27	14·54 15·16	14·85	1·0	0·22	0·0484
28	410 & 417 Newcomb „ „ „	Dec. 15 „ 17	33 1	E, W W, E	64 46 32·16 32·17	+ 20 42·29 42·69	14·45 14·86	14·66	1·0	0·03	0·0009
29	426 & 430 Newcomb „ „ „	Dec. 15 „ 17	14 45	W, E E, W	65 16 13·88 13·90	− 8 59·55 59·10	14·33 14·80	14·57	1·0	0·06	0·0036
30	1173 Gr. 80 & 437 Newc.	Dec. 17	16 53	E, W	64 58 57·65	+ 8 16·20	13·85	13·85	0·7	0·78	0·4259
31	440 & 458 Newcomb „ „ „	Dec. 15 „ 17	9 0	E, W W, E	64 55 9·42 9·46	+ 12 5·48 5·28	14·90 14·74	14·82	0·7	0·19	0·0253
32	440 Newc. & 1233 Gr. 80 „ „ „ „	Dec. 15 „ 17	8 53	E, W W, E	64 48 1·00 1·04	+ 19 13·82 13·97	14·82 15·01	14·92	0·7	0·29	0·0589
33	471 & 476 Newcomb „ „ „	Dec. 15 „ 17	2 55	W, E E, W	64 55 30·13 30·18	+ 11 44·29 44·61	14·42 14·79	14·61	1·0	0·02	0·0004
34	493 & 494 Newcomb	Dec. 15	34 8	E, W	65 11 39·54	− 4 25·13	14·41	14·41	0·7	0·22	0·0339
35	498 & 511 Newcomb „ „ „	Dec. 15 „ 17	8 48	W, E E, W	65 8 56·56 56·65	− 1 42·26 40·67	14·30 15·98	15·14	1·0	0·51	0·2601
36	517 & 521 Newcomb „ „ „	Dec. 15 „ 17	3 6	E, W W, E	65 2 8·41 8·51	+ 5 7·18 6·53	15·59 15·04	15·32	0·7	0·69	0·3333
37	521 & 531 Newcomb „ „ „	Dec. 15 „ 17	2 50	W, E E, W	65 18 9·85 9·96	− 10 54·95 55·52	14·90 14·44	14·67	0·7	0·04	0·0011
38	533 & 547 Newcomb „ „ „	Dec. 15 „ 17	18 44	E, W W, E	65 13 45·35 45·47	− 6 30·69 31·44	14·66 14·03	14·35	1·0	0·28	0·0784
39	556 & 566 Newcomb „ „ „	Dec. 15 „ 17	6 13	W, E E, W	65 16 15·59 15·74	− 9 1·42 0·59	14·17 15·15	14·66	1·0	0·03	0·0009
40	568 & 578 Newcomb	Dec. 15	13 26	E, W	64 34 53·41	+ 32 22·19	15·60	15·60	0·4	0·97	0·3764
41	578 & 583 Newcomb „ „ „	Dec. 15 „ 17	13 54	W, E E, W	65 3 1·34 1·51	+ 4 13·66 12·98	15·00 14·49	14·75	0·7	0·12	0·0101
42	592 & 605 Newcomb „ „ „	Dec. 15 „ 17	12 45	E, W W, E	65 31 40·97 41·16	− 24 26·08 26·88	14·89 14·28	14·59	1·0	0·04	0·0016

146. Charaldanga—*Co-latitude* 65° 7′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
43	634 & 638 Newcomb " " "	Dec. 16 " 19	16 30	W, E E, W	64 59 6·97 7·37	+ 8 7 10 7·18	14·16 14·55	14 36	1·0	0·27	0·0729
44	1654 Gr. 80 & 617 Newc.	Dec. 16	18 23	E, W	64 58 34·31	+ 8 40 13	14·44	14 44	0·7	0·19	0·0253
45	650 & 666 Newcomb	Dec. 19	32 2	W, E	65 33 6 39	− 25 51·43	14·96	14·96	0 4	0 33	0 0436
46	650 & 671 Newcomb	Dec. 19	32 35	W, E	64 59 58·68	+ 7 16·73	15·41	15·41	0·4	0 78	0 2434
47	683 & 694 Newcomb " " "	Dec. 16 " 19	0 47	W, E E, W	65 30 59·98 60 50	− 23 45 86 46·72	14·12 13·78	13·95	1·0	0·68	0·4624
48	697 & 703 Newcomb " " "	Dec. 16 " 19	16 33	E, W W, E	65 35 37·16 37 68	− 28 23·40 23·97	13·76 13 71	13·74	1 0	0 89	0 7921
49	720 & 728 Newcomb " " "	Dec. 16 " 19	18 35	E, W W, E	64 51 52 65 53·23	+ 15 21·50 22·03	14·15 15·26	14·71	0·[illegible]	0·08	0·0045
50	728 & 739 Newcomb " " "	Dec. 16 " 19	18 19	W, E E, W	64 36 30 65 31·23	+ 30 44 60 43·15	15 25 14·38	14·82	0·7	0·19	0 0253
								Σ P	42 6	ΣPvv = 12·2125	

Summary.

No. of pairs 50

No. of observations 100

Mean difference between observations taken E, W and those taken W, E = − 0″·02

Observed Co-latitude (weighted mean) 65° 7′ 14″·63 ± 0″·051

Correction for Height above Sea-level + 0″·01

Final Co-latitude 65° 7′ 14″·64

		°	′	″	″
Astronomical Latitude (A)	=	24	52	45·36	± 0·051
Geodetic Latitude (G)	=	24	52	43·95	
Deflection of plumb-line (A − G)	=			+ 1·41	

147. Colaba—*Co-latitude* 71° 6′ +

Latitude ... 18° 54′ *Instrument*—Zenith Telescope

Longitude ... 72 51 *Mean Height of Barometer* 30·01 in.

Height ... 75 feet *Mean Temperature* 72°·9

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
1	86 & 114 Gr. 80 " " "	Nov. 28 " 29	4 32	E, W W, E	70 50 6·77 6·77	+ 16 14·28 13·91	21·0 20·7	20·8	1·0	0·1	0·01
2	137 & 170 Gr. 80 " " "	Nov. 28 " 29	4 21	W, E E, W	71 17 21·63 21·63	− 10 59·69 60·10	21·9 21·5	21·7	1·0	0·8	0·64
3	26 Dudley 75 & 199 Gr. 80	Nov. 28	11 56	E, W	71 3 58·77	+ 2 22·04	20·8	20·8	0·7	0·1	0·01
4	27 Dudley 75 & 248 Gr. 80	Nov. 29	7 34	E, W	70 51 3·59	+ 15 16·83	20·4	20·4	0·7	0·5	0·18
5	353 & 363 Gr. 80 " " "	Nov. 28 " 29	9 1	W, E E, W	70 51 41·11 41·09	+ 14 40·04 40·07	21·1 21·2	21·1	1·0	0·2	0·04
6	396 & 411 Gr. 80 " " "	Nov. 28 " 29	7 19	W, E E, W	70 42 1·18 1·15	+ 24 20·15 20·08	21·3 21·2	21·2	1·0	0·3	0·09
7	418 & 444 Gr. 80 " " "	Nov. 28 " 29	1 57	E, W W, E	71 1 57·96 57·94	+ 4 22·79 22·94	20·7 20·9	20·8	0·7	0·1	0·01
8	444 & 467 Gr. 80 " " "	Nov. 28 " 29	1 43	W, E E, W	70 48 31·85 31·83	+ 17 49·23 48·58	21·1 20·4	20·7	0·7	0·2	0·03
9	467 & 488 Gr. 80 " " "	Nov. 28 " 29	1 36	E, W W, E	70 56 28·10 28·08	+ 9 52·88 52·24	21·0 20·3	20·6	0·7	0·3	0·06
10	69 Dudley 75 & 539 Gr. 80 " " " "	Nov. 25 " 30	6 21	W, E E, W	71 4 30·78 30·68	+ 1 51·35 51·39	22·1 22·1	22·1	0·7	1·2	1·01
11	539 & 562 Gr. 80 " " "	Nov. 25 " 30	6 13	E, W W, E	71 13 18·65 18·57	− 6 56·63 57·11	22·0 21·5	21·7	0·7	0·8	0·45
12	597 & 610 Gr. 80 " " "	Nov. 25 " 30	20 45	E, W W, E	71 2 16·31 16·22	+ 4 4·33 4·78	20·6 21·0	20·8	0·7	0·1	0·01
13	610 & 626 Gr. 80 " " "	Nov. 25 " 30	20 47	W, E E, W	71 4 22·12 22·04	+ 1 57·71 59·40	19·8 21·4	20·6	0·7	0·3	0·06
14	509 Gr. 64 & 682 Gr. 80 " " " "	Nov. 25 " 30	5 2	E, W W, E	71 12 14·77 14·73	− 5 53·21 53·83	21·6 20·9	21·2	0·7	0·3	0·06
15	682 Gr. 80 & 407 Gr. 72 " " " "	Nov. 25 " 30	5 9	W, E E, W	71 5 2·36 2·31	+ 1 19·64 18·28	22·0 20·6	21·3	0·7	0·4	0·11

147. Colaba—*Co-latitude* 71° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
16	704 Gr. 80 & 421 Gr. 72	Nov. 25	3 28	E, W	70 53 46·52	+ 12 35·73	22·2				
	" " " "	" 30		W, E	46·49	34·30	20·8	21·5	1·0	0·6	0·36
17	739 & 754 Gr. 80	Nov. 25	3 28	W, E	70 42 47·49	+ 23 32·89	20·4	20·4	0·7	0·5	0·18
18	792 Gr. 80 & 622 Gr. 64	Nov. 25	4 52	E, W	71 4 17·59	+ 2 4·47	22·1				
	" " " "	" 30		W, E	17·61	3·55	21·2	21·6	1·0	0·7	0·49
19	877 Gr. 80 & 513 Gr. 72	Nov. 25	3 6	W, E	71 6 49·41	− 0 28·69	20·7				
	" " " "	" 30		E, W	49·49	29·77	19·7	20·2	1·0	0·7	0·49
20	946 & 962 Gr. 80	Nov. 25	2 18	E, W	71 13 14·03	− 6 53·75	20·3				
	" " "	" 30		W, E	13·93	53·42	20·5	20·4	1·0	0·5	0·25
21	977 & 995 Gr. 80	Nov. 25	1 18	W, E	71 1 0·67	+ 5 19·69	20·4				
	" " "	" 30		E, W	0·80	19·51	20·3	20·3	1·0	0·6	0·36
22	1026 & 1037 Gr. 80	Nov. 25	4 15	E, W	70 58 23·02	+ 7 55·96	19·0				
	" " "	" 30		W, E	23·19	56·80	20·0	19·5	0·7	1·4	1·37
23	1037 & 1043 Gr. 80	Nov. 25	4 11	W, E	71 2 32·06	+ 3 47·72	19·8				
	" " "	" 30		E, W	32·24	47·79	20·0	19·9	0·7	1·0	0·70
24	1043 & 1053 Gr. 80	Nov. 25	4 27	E, W	71 18 59·71	− 12 38·52	21·2				
	" " "	" 30		W, E	59·90	39·49	20·4	20·8	0·7	0·1	0·01
25	1161 & 1173 Gr. 80	Nov. 26	10 28	W, E	71 22 56·59	− 16 35·83	20·8				
	" " "	" 27		E, W	56·65	35·48	21·2	21·0	1·0	0·1	0·01
26	1179 & 1181 Gr. 80	Nov. 26	2 47	E, W	70 53 32·99	+ 12 46·67	19·7				
	" " "	" 27		W, E	33·05	47·81	20·9	20·3	1·0	0·6	0·36
27	1184 & 1197 Gr. 80	Nov. 26	5 32	W, E	71 9 27·09	− 3 5·93	21·2				
	" " "	" 27		E, W	27·15	6·07	21·1	21·1	1·0	0·2	0·04
28	1233 & 1256 Gr. 80	Nov. 26	2 55	E, W	70 44 18·10	+ 22 2·38	20·6				
	" " "	" 27		W, E	18·27	1·92	20·2	20·4	1·0	0·5	0·25
29	1265 & 1272 Gr. 80	Nov. 26	6 41	W, E	71 25 50·76	− 19 30·14	20·6				
	" " "	" 27		E, W	50·84	30·82	20·0	20·3	1·0	0·6	0·36
30	1281 & 1297 Gr. 80	Nov. 26	2 49	E, W	71 8 16·84	− 1 56·26	20·6				
	" " "	" 27		W, E	16·92	55·76	21·2	20·9	1·0	0·0	0·00
31	758 & 764 Gr. 72	Nov. 26	7 30	W, E	71 27 50·66	− 21 30·60	20·1				
	" " "	" 27		E, W	50·75	31·26	19·5	19·8	1·0	1·1	1·21
32	1349 & 1365 Gr. 80	Nov. 26	1 17	E, W	71 6 51·83	− 0 30·66	21·2				
	" " "	" 27		W, E	51·93	30·81	21·1	21·1	1·0	0·2	0·04
33	1378 Gr. 80 & 801 Gr. 72	Nov. 26	4 19	W, E	71 21 58·03	− 15 37·15	20·9	20·9	0·7	0·0	0·00
34	1402 & 1414 Gr. 80	Nov. 26	9 22	E, W	71 7 4·00	− 0 42·66	21·3				
	" " "	" 27		W, E	4·11	43·38	20·7	21·0	1·0	0·1	0·01

147. Colaba—*Co-latitude* 71° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
35	1434 & 1442 Gr. 80	Nov. 26	0 45	W, E	70 47 29·81	+ 18 52·04	21·8				
	" " "	" 27		E, W	29·93	52·15	22·1	21·9	1·0	1·0	1·00
36	1461 & 1470 Gr. 80	Nov. 26	0 42	E, W	70 45 47·48	+ 20 33·37	20·8				
	" " "	" 27		W, E	47·61	33·51	21·1	20·9	1·0	0·0	0·00
37	1480 & 1490 Gr. 80	Nov. 26	12 23	W, E	71 23 23·06	− 17 1·53	21·5				
	" " "	" 27		E, W	23·19	2·19	21·0	21·2	0·7	0·3	0·06
38	1490 & 1493 Gr. 80	Nov. 26	12 19	E, W	71 19 47·12	− 13 26·43	20·7				
	" " "	" 27		W, E	47·26	26·65	20·6	20·6	0·7	0·3	0·06
39	1504 & 1511 Gr. 80	Nov. 26	6 18	W, E	71 25 31·54	− 19 9·95	21·6				
	" " "	" 27		E, W	31·68	11·10	20·6	21·1	1·0	0·2	0·04
								Σ P = 33·6		Σ Pvv = 10·42	

Summary.

No. of pairs 39

No. of observations 74

Mean difference between observations taken E, W and those taken W, E = + 0″·03

Observed Co-latitude (weighted mean) 71° 6′ 20″·85 ± 0″·061

Correction for Height above Sea-level 0″·00

Final Co-latitude 71° 6′ 20″·85

		°	′	″	
Astronomical Latitude (A)	=	18	53	39·15	± 0·061
Geodetic Latitude (G)	=	18	53	49·48	
Deflection of plumb-line (A−G)	=		−	10·33	

148. Cuttack—*Co-latitude* 69° 31′ +

Latitude ... 20° 29′ *Instrument*—Zenith Telescope

Longitude ... 85 51 *Mean Height of Barometer* 29·57 in.

Height .. 133 feet *Mean Temperature* 73°·1

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	508 & 520 Gr. 80	Feb. 4	0 10	E, W	69 23 1·60	+ 8 5·65	7·25				
	” ” ”	” 5		W, E	1·63	6·96	8·59	7·92	1·0	0·03	0·0009
2	546 & 571 Gr. 80	Feb. 4	11 28	W, E	69 29 52·04	+ 1 16·10	8·14				
	” ” ”	” 5		E, W	52·06	16·43	8·49	8·32	1·0	0·37	0·1367
3	630 & 646 Gr. 80	Feb. 4	1 14	W, E	69 25 26·75	+ 5 41·48	8·23				
	” ” ”	” 5		E, W	26·76	40·78	7·54	7·89	0·7	0·06	0·0025
4	646 & 677 Gr. 80	Feb. 4	1 6	E, W	69 33 44·93	− 2 36·31	8·62				
	” ” ”	” 5		W, E	44·95	37·44	7·51	8·07	0·7	0·12	0·0101
5	698 & 707 Gr. 80	Feb. 4	1 59	W, E	69 12 32·67	+ 18 34·12	6·79				
	” ” ”	” 5		E, W	32·68	35·02	7·70	7·25	0·7	0·70	0·3430
6	707 & 712 Gr. 80	Feb. 4	1 55	E, W	69 8 8·83	+ 22 58·20	7·03				
	” ” ”	” 5		W, E	8·85	58·46	7·31	7·17	0·7	0·78	0·4259
7	723 & 731 Gr. 80	Feb. 4	20 40	W, E	69 36 1·49	− 4 53·24	8·25	8·25	0·7	0·30	0·0630
8	749 & 750 Gr. 80	Feb. 4	8 13	E, W	69 47 20·95	− 16 14·39	6·56				
	” ” ”	” 5		W, E	20·96	12·65	8·31	7·44	1·0	0·51	0·2601
9	783 & 800 Gr. 80	Feb 14	12 9	E, W	69 7 56·30	+ 23 10·12	6·42				
	” ” ”	” 16		W, E	56·35	12·13	8·48	7·45	1·0	0·50	0·2500
10	837 & 863 Gr. 80	Feb. 14	25 21	W, E	69 26 48·17	+ 4 20·52	8·69	8·69	0·7	0·74	0·3833
11	902 & 916 Gr. 80	Feb. 14	1 40	E, W	69 48 52·41	− 17 44·42	7·99				
	” ” ”	” 16		W, E	52·43	44·18	8·25	8·12	1·0	0·17	0·0289
12	927 & 943 Gr. 80	Feb. 14	3 30	W, E	69 31 28·15	− 0 21·15	7·00				
	” ” ”	” 16		E, W	28·17	18·04	10·13	8·57	1·0	0·62	0·3844
13	984 & 1016 Gr. 80	Feb. 4	18 39	W, E	69 31 36·83	− 0 28·95	7·88	7·88	0·7	0·07	0·0034
14	1061 & 1105 Gr. 80	Feb. 4	25 33	E, W	69 9 0·70	+ 22 6·51	7·21	7·21	0·7	0·74	0·3833
15	1139 & 1159 Gr. 80	Feb. 4	4 23	W, E	69 8 31·76	+ 22 34·30	6·06				
	” ” ”	” 5		E, W	31·75	35·62	7·37	6·72	1·0	1·23	1·5129

148. Cuttack—*Co-latitude* 69° 31′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1899	° ′		° ′ ″	′ ″	″	″			
16	1175 & 1192 Gr. 80	Feb. 4	17 50	E, W	69 38 38·48	− 7 31·61	6·87				
	„ „ „	„ 5		W, E	38·48	30·88	7·60				
	„ „ „	„ 18		W, E	38·39	30·71	7·68				
	„ „ „	„ 19		E, W	38·38	30·40	7·98	7·53	1·3	0·43	0·2293
17	1218 & 1227 Gr. 80	Feb. 4	4 7	E, W	69 48 23·16	− 17 14·36	8·80				
	„ „ „	„ 18		W, E	23·03	13·40	9·63	9·22	0·6	1·27	0·9677
18	1227 & 1233 Gr. 80	Feb. 4	3 59	W, E	69 41 14·06	− 10 4·70	9·36				
	„ „ „	„ 18		E, W	13·93	4·55	9·38	9·37	0·6	1·42	1·2098
19	1233 & 1265 Gr. 80	Feb. 18	4 28	W, E	69 12 49·36	+ 18 18·37	7·73				
	„ „ „	„ 19		E, W	49·33	17·78	7·11	7·42	0·6	0·53	0·1685
20	1218 & 1265 Gr. 80	Feb. 18	4 35	W, E	69 19 58·46	+ 11 9·52	7·98				
	„ „ „	„ 19		E, W	58·43	9·24	7·67	7·83	0·6	0·12	0·0086
21	1282 & 1284 Gr. 80	Feb. 4	11 45	E, W	69 45 43·83	− 14 36·11	7·72				
	„ „ „	„ 5		W, E	43·82	37·47	6·35				
	„ „ „	„ 19		W, E	43·70	35·49	8·21	7·50	0·8	0·45	0·1620
22	1282 & 1298 Gr. 80	Feb. 19	11 49	W, E	69 41 59·58	− 10 51·56	8·02	8·02	0·5	0·07	0·0025
23	1309 & 1313 Gr. 80	Feb. 4	14 40	W, E	69 51 6·32	− 19 57·89	8·43				
	„ „ „	„ 18		W, E	6·24	58·32	7·92	8·18	1·0	0·23	0·0529
24	1365 & 1378 Gr. 80	Feb. 4	2 40	W, E	69 44 51·00	− 13 43·05	7·95				
	„ „ „	„ 18		W, E	50·82	41·50	9·32				
	„ „ „	„ 19		E, W	50·80	42·73	8·07	8·36	0·8	0·41	0·1345
25	1378 & 1395 Gr. 80	Feb. 4	2 29	E, W	69 33 50·75	− 2 43·40	7·35				
	„ „ „	„ 17		W, E	50·58	42·41	8·17				
	„ „ „	„ 18		E, W	50·57	42·09	8·48				
	„ „ „	„ 19		W, E	50·55	42·48	8·07	8·02	0·9	0·07	0·0044
26	1407 & 1413 Gr. 80	Feb. 4	3 29	E, W	69 8 34·46	+ 22 33·19	7·65				
	„ „ „	„ 6		W, E	34·45	32·90	7·35				
	„ „ „	„ 17		W, E	34·26	34·28	8·54				
	„ „ „	„ 19		E, W	34·22	32·06	6·28	7·46	1·3	0·49	0·3121
27	1436 & 1459 Gr. 80	Feb. 4	0 13	W, E	69 25 42·50	+ 5 25·23	7·73				
	„ „ „	„ 6		E, W	42·49	25·22	7·71				
	„ „ „	„ 17		E, W	42·34	26·58	8·92				
	„ „ „	„ 18		E, W	42·32	25·47	7·79				
	„ „ „	„ 19		W, E	42·30	26·00	8·30	8·08	1·4	0·13	0·0237
28	1465 & 1470 Gr. 80	Feb. 4	1 40	E, W	69 49 26·90	− 18 19·83	7·07				
	„ „ „	„ 6		W, E	26·89	18·12	8·77				
	„ „ „	„ 17		W, E	26·79	19·30	7·49				
	„ „ „	„ 18		W, E	26·77	17·67	9·10	7·76	1·3	0·19	0·0469
29	1473 & 1476 Gr. 80	Feb. 4	8 20	W, E	69 11 52·25	+ 19 15·85	8·10				
	„ „ „	„ 17		E, W	52·13	16·47	8·60				
	„ „ „	„ 18		E, W	52·11	15·34	7·45				
	„ „ „	„ 19		W, E	52·09	15·58	7·67	7·96	1·3	0·01	0·0001
30	1494 & 1508 Gr. 80	Feb. 4	8 9	E, W	69 50 49·13	− 19 40·64	8·49				
	„ „ „	„ 6		W, E	49·12	41·03	8·09				
	„ „ „	„ 17		W, E	49·03	41·24	7·79	8·22	1·2	0·27	0·0875

148. Cuttack—*Co-latitude* 69° 31′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
31	1541 & 1554 Gr. 80 ,, ,, ,,	Feb. 6 ,, 17	5 8	W, E E, W	69 30 57·42 57·32	+ 0 10·09 10·41	7·51 7·73	7·62	1·0	0·33	0·1089
32	1580 & 1590 Gr. 80 ,, ,, ,,	Feb. 6 ,, 17	15 35	E, W W, E	69 19 2·64 2·56	+ 12 4·75 6·07	7·39 8·63	8·01	1·0	0·06	0·0036
33	1595 & 1603 Gr. 80 ,, ,, ,,	Feb. 6 ,, 17	5 57	W, E E, W	69 34 33·04 32·98	− 3 26·07 24·86	6·97 8·12	7·55	0·7	0·40	0·1120
34	1603 & 1621 Gr. 80	Feb. 17	6 0	W, E	69 31 14·77	− 0 5·24	9·53	9·53	0·5	1·58	1·2482
35	1648 & 1666 Gr. 80 ,, ,, ,,	Feb. 6 ,, 17	3 20	W, E E, W	69 24 58·69 58·84	+ 6 9·06 8·80	7·75 7·64	7·70	1·0	0·25	0·0625
36	1701 & 1708 Gr. 80 ,, ,, ,,	Feb. 6 ,, 17	12 43	W, E E, W	69 49 7·13 7·18	− 18 0·09 17 59·17	7·04 8·01	7·53	1·0	0·42	0·1764
37	1714 & 1724 Gr. 80 ,, ,, ,,	Feb. 6 ,, 17	3 32	E, W W, E	69 49 10·21 10·28	− 18 1·66 1·94	8·55 8·34	8·45	1·0	0·50	0·2500
38	1729 & 1743 Gr. 80 ,, ,, ,,	Feb. 16 ,, 17	13 56	E, W W, E	69 10 20·13 20·13	+ 20 46·84 47·46	6·97 7·59	7·28	1·0	0·67	0·4489
39	1751 & 1766 Gr. 80 ,, ,, ,,	Feb. 16 ,, 17	20 13	W, E E, W	69 14 54·44 54·44	+ 16 14·32 12·93	8·76 7·37	8·07	1·0	0·12	0·0144
40	1780 & 1793 Gr. 80 ,, ,, ,,	Feb. 16 ,, 17	4 37	E, W W, E	69 24 41·52 41·51	+ 6 26·05 26·60	7·57 8·11	7·84	1·0	0·11	0·0121
41	1802 & 1807 Gr. 80 ,, ,, ,,	Feb. 16 ,, 17	13 32	W, E E, W	69 53 27·08 27·09	− 22 18·66 19·23	8·42 7·86	8·14	1·0	0·19	0·0361
42	1826 & 1843 Gr. 80 ,, ,, ,,	Feb. 16 ,, 17	23 19	E, W W, E	69 8 7·62 7·62	+ 22 59·70 23 0·43	7·32 8·05	7·69	1·0	0·26	0·0676
43	1865 & 1898 Gr. 80	Feb. 16	5 39	W, E	69 13 14·91	+ 17 53·74	8·65	8·65	0·7	0·70	0·3430
44	1911 & 1919 Gr. 80 ,, ,, ,,	Feb. 15 ,, 16	20 44	E, W W, E	69 30 26·36 26·38	+ 0 42·01 42·12	8·37 8·50	8·44	1·0	0·49	0·2401
45	1965 & 1977 Gr. 80 ,, ,, ,,	Feb. 15 ,, 16	1 21	W, E E, W	69 43 49·26 49·29	− 12 41·49 41·51	7·77 7·78	7·78	1·0	0·17	0·0289
46	1994 & 2008 Gr. 80	Feb. 16	7 48	W, E	69 41 58·29	− 10 49·97	8·32	8·32	0·5	0·37	0·0685
47	2003 & 2009 Gr. 80 ,, ,, ,,	Feb. 15 ,, 16	7 34	W, E E, W	69 28 15·18 15·20	+ 2 53·44 53·01	8·62 8·21	8·42	0·7	0·47	0·1546
48	2029 & 2060 Gr. 80 ,, ,, ,,	Feb. 15 ,, 16	10 41	E, W W, E	69 21 54·30 54·34	+ 9 14·16 13·22	8·46 7·56	8·01	1·0	0·06	0·0036
49	2127 & 2144 Gr. 80 ,, ,, ,,	Feb. 15 ,, 16	2 32	E, W W, E	69 31 19·88 19·94	− 0 11·92 11·75	7·96 8·19	8·08	1·0	0·13	0·0169

148. Cuttack—*Co-latitude* 69° 31′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
50	2167 & 2176 Gr. 80	Feb. 16	1 39	E, W	69 27 34·58	+ 3 33·47	8·05	8·05	0·7	0·10	0·0070
51	2183 & 2205 Gr. 80 " " "	Feb. 15 " 16	7 13	E, W W, E	69 21 8·39 8·46	+ 9 59·50 58·51	7·89 6·97	7·43	1·0	0·52	0·2704
52	2268 & 2273 Gr. 80 " " "	Feb. 15 " 16	6 24	E, W W, E	69 26 47·72 47·78	+ 4 19·95 21·24	7·67 9·02	8·35	1·0	0·40	0·1600
53	2284 & 2293 Gr. 80 " " "	Feb. 15 " 16	17 57	W, E E, W	69 43 58·09 58·17	− 12 49·97 50·99	8·12 7·18	7·65	1·0	0·30	0·0900
54	2311 & 2325 Gr. 80 " " "	Feb. 15 " 16	5 17	E, W W, E	69 52 29·73 29·81	− 21 21·53 21·27	8·20 8·54	8·37	1·0	0·42	0·1764
55	2332 & 2370 Gr. 80 " " "	Feb. 15 " 16	7 13	W, E E, W	69 52 14·17 14·26	− 21 5·09 5·76	9·08 8·50	8·79	1·0	0·84	0·7056
56	2389 & 2408 Gr. 80 " " "	Feb. 15 " 16	9 18	E, W W, E	69 50 26·07 26·16	− 19 17·13 17·62	8·94 8·54	8·74	1·0	0·79	0·6241
57	2453 & 2459 Gr. 80 " " "	Feb. 15 " 16	15 36	E, W W, E	69 37 45·26 45·37	− 6 37·72 36·08	7·54 9·29	8·42	1·0	0·47	0·2209
58	2490 & 2494 Gr. 80 " " "	Feb. 15 " 16	2 30	W, E E, W	69 24 51·23 51·33	+ 6 16·96 15·73	8·19 7·06	7·63	1·0	0·32	0·1024
59	1327 & 1342 Gr. 80	Feb. 19	1 56	E, W	69 19 35·41	+ 11 30·81	6·22	6·22	0·7	1·73	2·0950
								Σ P = 53·3		ΣPvv = 15·4470	

Summary.

No. of pairs 59
No. of observations 124

Mean difference between observations taken E, W and those taken W, E = − 0″·81

Observed Co-latitude (weighted mean) 69° 31′ 7″·95 ± 0″·048

Correction for Height above Sea-level 0″·00

Final Co-latitude 69° 31′ 7″·95

		°	′	″	″
Astronomical Latitude (A)	=	20	28	52·05	± 0·048
Geodetic Latitude (G)	=	20	29	0·68	
Deflection of plumb-line (A−G)	=		−	8·63	

149. Daiadhari—*Co-latitude* 65° 21′ +

Latitude ... 24° 38′ *Instrument*—Zenith Sector No 1 used as Zenith Telescope

Longitude ... 77 42 *Mean Height of Barometer* 28·10 in.

Height ... 1867 feet *Mean Temperature* 68°·0

Observer—Captain G P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	3780 & 3787 Gr. 80	Nov. 22	25 12	E, W	65 26 1·31	− 4 19·54	41·77				
	„ „ „	„ 24		W, E	1·33	18 82	42·51	42 14	1 0	1·00	1·0000
2	3796 & 3813 Gr. 80	Nov. 22	5 21	W, E	65 38 58 67	− 17 15·25	43·42				
	„ „ „	„ 24		E, W	58·71	16·36	42 35	42·89	1 0	1·75	3·0625
3	3823 & 3877 Gr. 80	Nov 22	0 26	E, W	65 30 0·59	− 8 20·25	40 34				
	„ „ „	„ 24		W, E	0 62	18 82	41 80	41·07	1 0	0·07	0·0049
4	3891 & 3919 Gr. 80	Nov. 22	1 34	W, E	65 15 4·52	+ 6 38·73	43·25				
	„ „ „	„ 24		E, W	4·52	37·28	41·80	42·52	0·7	1·38	1·3331
5	3931 & 3891 Gr. 80	Nov. 22	1 44	E, W	65 25 15·14	− 3 32·13	43·01				
	„ „ „	„ 24		W, E	15 13	32 98	42·15	42·58	0·7	1·44	1·4515
6	3959 & 3972 Gr. 80	Nov. 22	6 28	E, W	65 41 29·45	− 19 47·21	42·24				
	„ „ „	„ 24		W, E	29·45	48·29	41·16	41·70	1·0	0·56	0·3136
7	3977 & 3980 Gr. 80	Nov. 22	19 21	W, E	65 34 9·66	− 12 25·82	43·84	43·84	0·7	2·70	5·1030
8	3991 & 3993 Gr. 80	Nov. 22	21 29	E. W	65 36 11·07	− 14 31·29	39·78				
	„ „ „	„ 24		W, E	11·06	28·05	43·01	41·40	1·0	0·26	0·0676
9	188 & 242 Gr. 80	Nov. 22	10 28	W, E	65 22 51·75	− 1 13·64	38·11				
	„ „ „	„ 24		E, W	51·67	9 80	41 87	39·99	1·0	1·15	1·3225
10	256 & 268 Gr. 80	Nov. 22	15 43	E, W	65 38 20·09	− 16 38·34	41 75				
	„ „ „	„ 24		W, E	20·00	35 62	44 38	43·06	1·0	1·92	3·6864
11	285 & 290 Gr. 80	Nov. 22	4 23	W, E	65 17 44·98	+ 3 57·02	42 00				
	„ „ „	„ 24		E, W	44·87	54·71	39 58	40·79	1·0	0·35	0·1225
12	331 & 334 Gr. 80	Nov. 22	5 25	E, W	65 34 11·43	− 12 29·28	42·15				
	„ „ „	„ 24		W, E	11·34	28·71	42 63	42·39	0·7	1·25	1·0938
13	334 & 350 Gr. 80	Nov. 22	5 12	W, E	65 21 53·16	− 0 12·53	40·63				
	„ „ „	„ 24		E, W	53·07	12·40	40·67	40·65	0·7	0·49	0·1681
14	368 & 373 Gr. 80	Nov. 22	4 55	E, W	65 41 2·67	− 19 23·83	38·84				
	„ „ „	„ 24		W, E	2·57	20·56	42·01	40·43	1·0	0·71	0·5041
15	395 & 404 Gr. 80	Nov. 24	24 28	W, E	65 39 0·51	− 17 17·55	42·96	42·96	0·7	1·82	2·3187

149. Daiadhari—*Co-latitude* 65° 21′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1898	° ′		° ′ ″	′ ″	″	″			
16	411 & 428 Gr. 80 " " "	Nov. 22 " 24	12 57	W, E E, W	65 1 25·39 25·28	+ 20 16·15 14·74	41·54 40·02	40·78	1·0	0·36	0·1296
17	431 & 434 Gr. 80 " " "	Nov. 22 " 24	6 49	E, W W, E	65 16 19·57 19·47	+ 5 20·17 21·76	39·74 41·23	40·48	0·7	0·66	0·3049
18	434 & 467 Gr. 80 " " "	Nov. 22 " 24	7 2	W, E E, W	65 29 17·95 17·85	− 7 36·73 37·24	41·22 40·61	40·92	0·7	0·22	0·0339
19	471 & 508 Gr. 80 " " "	Nov. 22 " 24	3 57	E, W W, E	65 15 36·48 36·38	+ 6 4·36 3·07	40·84 39·45	40·14	0·7	1·00	0·7000
20	520 & 471 Gr. 80 " " "	Nov. 22 " 24	4 7	W, E E, W	65 25 45·18 45·09	− 4 3·75 4·29	41·43 40·80	41·12	0·7	0·02	0·0003
21	549 & 562 Gr. 80 " " "	Nov. 22 " 24	0 27	W, E E, W	65 26 0·28 0·19	− 4 20·29 19·07	39·99 41·12	40·55	0·7	0·59	0·2437
22	562 & 577 Gr. 80 " " "	Nov. 22 " 24	0 26	E, W W, E	65 25 15·50 15·41	− 3 35·21 33·72	40·29 41·69	40·99	0·7	0·15	0·0158
23	14 & 38 Gr. 80 " " "	Nov. 23 " 25	13 46	E, W W, E	65 38 38·08 38·06	− 16 53·63 55·77	44·45 42·29	43·37	1·0	2·23	4·9729
24	42 & 55 Gr. 80 " " " " " " " " "	Nov. 23 " 25 " 30 Dec. 1	11 15	W, E E, W E, W W, E	65 0 19·64 19·60 19·50 19·47	+ 21 21·09 20·35 21·84 21·25	40·73 39·95 41·34 40·72	40·69	1·3	0·45	0·2632
25	68 & 75 Gr. 80 " " "	Nov. 23 " 25	4 44	W, E E, W	65 31 46·02 45·97	− 10 5·65 3·44	40·37 42·53	41·45	1·0	0·31	0·0961
26	93 & 113 Gr. 80	Nov. 23	5 38	W, E	65 19 42·41	+ 1 57·53	39·94	39·94	0·7	1·20	1·0080
27	137 & 139 Gr. 80 " " "	Nov. 23 " 25	1 48	E, W W, E	65 7 28·25 28·20	+ 14 12·41 13·11	40·66 41·31	40·99	0·7	0·15	0·0158
28	139 & 146 Gr. 80 " " "	Nov. 23 " 25	1 54	W, E E, W	65 13 44·40 44·35	+ 7 56·32 57·38	40·72 41·73	41·22	0·7	0·08	0·0045
29	155 & 179 Gr. 80 " " "	Nov. 23 " 25	18 44	E, W W, E	65 19 30·10 30·04	+ 2 10·44 9·54	40·54 39·58	40·06	1·0	1·08	1·1664
30	630 & 637 Gr. 80 " " "	Nov. 23 " 25	2 46	W, E E, W	65 25 52·72 52·65	− 4 10·82 14·92	41·90 37·73	39·82	0·7	1·32	1·2197
31	637 & 677 Gr. 80 " " "	Nov. 23 " 25	2 54	E, W W, E	65 34 10·78 10·73	− 12 28·80 28·54	41·98 42·19	42·08	0·7	0·94	0·6185
32	695 & 713 Gr. 80 " " "	Nov. 23 " 25	9 0	W, E E, W	65 15 56·74 56·68	+ 5 44·09 43·89	40·83 40·57	40·70	1·0	0·44	0·1936
33	749 & 776 Gr. 80 " " "	Nov. 23 " 25	12 39	E, W W, E	65 20 38·51 38·48	+ 0 57·97 62·26	36·48 40·74	38·61	1·0	2·53	6·4009

149. Daiadhari—*Co-latitude* 65° 21′ +

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
34	783 & 816 Gr. 80	Nov. 23	16 6	W, E	65 10 16·12	+ 11 25·01	41·13				
	" " "	" 25		E, W	16·09	21·11	37·20	39·16	0·7	1·98	2·7443
35	828 & 783 Gr. 80	Nov. 23	16 12	E, W	65 5 11·19	+ 16 29·62	40·81				
	" " "	" 25		W, E	11·16	25·78	36·94	38·88	0·7	2·26	3·5753
36	846 & 874 Gr. 80	Nov. 23	9 5	E, W	65 26 39·13	− 4 59·43	39·70				
	" " "	" 25		W, E	39·12	55·30	43·82	41·76	1·0	0·62	0·3844
37	892 & 915 Gr. 80	Nov 23	7 25	W, E	65 17 44·54	+ 3 57·55	42·09				
	" " "	" 25		E, W	44·54	53·80	38·40	40·25	1·0	0·89	0·7921
38	937 & 953 Gr. 80	Nov. 23	0 56	E, W	65 5 34·81	+ 16 7·09	41·90	41·90	0·7	0·76	0·4043
39	136 & 160 Gr 80	Nov. 30	6 19	W, E	65 2 41·18	+ 18 60·13	41·31				
	" " "	Dec. 1		E, W	41·13	58·95	40·08	40·69	1·0	0·45	0·2025
40	170 & 188 Gr. 80	Nov. 30	10 21	E, W	65 15 7·18	+ 6 34·15	41·33				
	" " "	Dec. 1		W, E	7·13	34·62	41·75	41·54	1·0	0·40	0·1600
41	222 & 260 Gr. 80	Nov. 30	19 58	E, W	65 3 55·36	+ 17 45·84	41·20				
	" " "	Dec. 1		W, E	55·33	44·48	39·81	40·50	1·0	0·64	0·4096
									Σ P = 35·3		Σ Pvv = 47·6126

Summary.

No. of pairs 41

No. of observations 80

Mean difference between observations taken E, W and those taken W, E = − 0″·71

Observed Co-latitude (weighted mean) 65° 21′ 41″·14 ± 0″·124

Correction for Height above Sea-level + 0″·07

Final Co-latitude 65° 21′ 41″·21

		°	′	″	″
Astronomical Latitude (A)	=	24	38	18·79	± 0·124
Geodetic Latitude (G)	=	24	38	17·59	
Deflection of plumb-line (A − G)	=			+ 1·20	

150. Dalea—*Co-latitude* 67° 40′ +

Latitude	... 22° 20′	*Instrument*—Zenith Telescope	
Longitude	... 82 4	*Mean Height of Barometer*	28·14 in.
Height	... 1622 feet	*Mean Temperature*	83°·9

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	1577 & 1584 Gr. 80	Mar. 15	14 47	W, E	67 56 26·76	− 15 56·89	29·87				
	„ „ „	„ 16		E, W	26·70	56·36	30·34	30·11	1·0	0·42	0·1764
2	1599 & 1603 Gr. 80	Mar. 15	7 58	E, W	67 32 49·64	+ 7 39·99	29·63				
	„ „ „	„ 16		W, E	49·54	40·81	30·35	29·99	0·5	0·30	0·0450
3	1621 & 1648 Gr. 80	Mar. 15	4 37	E, W	68 8 23·48	− 27 53·82	29·66				
	„ „ „	„ 16		W, E	23·39	54·12	29·27	29·47	1·0	0·22	0·0484
4	1652 & 1662 Gr. 80	Mar. 15	9 45	W, E	67 47 38·00	− 7 8·60	29·40	29·40	0·5	0·29	0·0421
5	1665 & 1673 Gr. 80	Mar. 15	1 50	E, W	67 49 49·81	− 9 19·90	29·91				
	„ „ „	„ 16		W, E	49·74	20·10	29·64				
	1668 & 1673 Gr. 80	„ 15	1 38	E, W	68 1 36·10	21 6·61	29·49				
	„ „ „	„ 16		W, E	36·03	6·36	29·67				
	1666 & 1673 Gr. 80	„ 15	1 47	E, W	67 52 21·69	11 51·88	29·81				
	„ „ „	„ 16		W, E	21·62	51·30	30·32	29·81	2·0	0·12	0·0288
6	1751 & 1758 Gr. 80	Mar. 15	18 25	W, E	67 26 42·73	+ 13 46·04	28·77	28·77	0·5	0·92	0·4232
7	1791 & 1794 Gr. 80	Mar. 15	1 18	E, W	67 38 55·77	+ 1 33·68	29·45				
	„ „ „	„ 16		W, E	55·67	35·13	30·80	30·13	1·0	0·44	0·1936
8	1802 & 1810 Gr. 80	Mar. 16	11 17	E, W	67 38 41·23	+ 1 48·60	29·83	29·83	0·5	0·14	0·0098
9	1825 & 1842 Gr. 80	Mar. 15	22 0	W, E	68 16 46·77	− 36 17·31	29·46				
	„ „ „	„ 16		E, W	46·67	17·39	29·28				
	1842 & 1843 Gr. 80	„ 15	22 14	E, W	3 2·76	22 32·72	30·04	29·59	1·5	0·10	0·0150
10	1879 & 1911 Gr. 80	Mar. 15	18 30	E, W	67 17 26·71	+ 23 3·35	30·06				
	„ „ „	„ 16		W, E	26·62	2·91	29·53	29·80	1·0	0·11	0·0121
11	1929 & 1933 Gr. 80	Mar. 15	4 2	W, E	67 37 55·30	+ 2 34·45	29·75				
	„ „ „	„ 16		E, W	55·18	33·83	29·01	29·38	1·0	0·31	0·0961
12	1935 & 1965 Gr. 80	Mar. 15	3 52	E, W	67 12 54·81	+ 27 35·65	30·46				
	„ „ „	„ 16		W, E	54·70	35·83	30·53	30·50	1·0	0·81	0·6561
13	1974 & 1996 Gr. 80	Mar. 15	18 40	W, E	67 14 0·48	+ 26 27·88	28·36				
	„ „ „	„ 16		E, W	0·33	30·56	30·89				
	1974 & 2017 Gr. 80	„ 15	18 45	W, E	19 20·67	21 7·91	28·58				
	„ „ „	„ 16		E, W	20·56	10·58	31·14	29·75	1·5	0·06	0·0054

750. Dalea—*Co-latitude* 67° 40′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1900	° ′		° ′ ″	′ ″	″	″			
14	2020 & 2063 Gr 80	Mar 15	16 26	E, W	67 34 40 20	+ 5 49 41	29·61				
	" " "	" 16		W, E	40 09	48 40	28 49				
	2048 & 2063 Gr 80	" 15	16 31	E, W	29 30·89	10 58 59	29·48				
	" " "	" 16		W, E	30·79	57 14	27 93	28·88	1·5	0 81	0·9842
15	2410 & 2411 Gr. 80	Mar. 17	4 32	E, W	67 29 7·28	+ 11 22·53	29·81	29·81	0·5	0·12	0·0072
16	2437 & 2445 Gr. 80	Mar. 17	4 5	E, W	67 28 25·92	+ 12 4·30	30·22				
	" " "	" 18		W, E	25·88	4 93	30·81	30·52	1·0	0·83	0·6889
17	2451 & 2490 Gr. 80	Mar. 17	4 9	E, W	67 46 13·86	− 5 44·66	29 20				
	" " "	" 18		W, E	13 83	44 81	29 02				
	2482 & 2490 Gr. 80	" 17	4 32	E, W	22 20 56	+ 18 2 78	29·34				
	" " "	" 18		W, E	26 53	2·96	29 49	29 27	1·5	0·42	0·2646
18	2550 & 2555 Gr. 80	Mar. 18	8 26	W, E	67 18 39·96	+ 21 50 58	30·54	30·54	0 5	0 85	0·3613
19	2568 & 2585 Gr. 80	Mar 17	20 14	W, E	67 34 53·59	+ 5 34 69	28·28				
	" " "	" 18		E, W	53 56	36 05	29·61				
	2585 & 2624 Gr 80	" 17	20 38	E, W	59 23 06	− 18 54·54	28 52				
	" " "	" 18		W, E	23·03	53·66	29·37	28·95	1·5	0·74	0·8214
20	2631 & 2656 Gr. 80	Mar. 17	11 42	W, E	67 58 58 61	− 18 28 63	29·98				
	" " "	" 18		E, W	58·61	29·27	29·34	29 66	1·0	0·03	0·0009
21	2683 & 2740 Gr. 80	Mar. 17	18 13	E, W	67 34 1·40	+ 6 28·06	29·46				
	" " "	" 18		W, E	1·38	27 99	29·37	29·42	1·0	0·27	0·0729
22	1685 & 1690 Gr. 80	Mar. 15	15 5	W, E	67 52 10·15	− 11 40·28	29·87				
	" " "	" 16		E, W	10·07	39·40	30 67				
	1690 & 1708 Gr. 80	" 15	14 53	E, W	39 36 91	+ 0 53 02	29 93				
	1708 & 1709 Gr. 80	" 16	14 42	E, W	50 50·68	− 10 20·41	30·27	30·19	1·5	0·50	0·3750
								ΣP = 23·0		ΣPvv = 5·3284	

Summary.

No. of pairs 22

No. of observations 54 .

Mean difference between observations taken E, W and those taken W, E = + 0″·32

Observed Co-latitude (weighted mean) 67° 40′ 29″·69 ± 0″·071

Correction for Height above Sea-level + 0″·06

Final Co-latitude 67° 40′ 29″·75

		°	′	″	″
Astronomical Latitude (A)	=	22	19	30·25	± 0·071
Geodetic Latitude (G)	=	22	19	33·62	
Deflection of plumb-line (A − G)	=			− 3·37	

151. Danapa—*Co-latitude* 74° 3′ +

Latitude	... 15° 56′	*Instrument*—Zenith Telescope	in.
Longitude	... 80 0	*Mean Height of Barometer*	29·82
Height	... 150 feet	*Mean Temperature*	76°·6

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
1	716 Gr. 72 & 1272 Gr. 80	Mar. 23	4 23	E, W	73 44 1·87	+ 19 57·66	59·5				
	" " " "	" 24		W, E	1·84	58·62	60·5				
	" " " "	" 27		E, W	1·76	57·87	59·6				
	" " " "	" 28		W, E	1·73	58·06	59·8	59·9	0·9	0·4	0·14
2	1272 & 1279 Gr. 80	Mar. 23	4 18	W, E	73 49 15·83	+ 14 44·13	60·0				
	" " "	" 24		E, W	15·80	44·95	60·8				
	" " "	" 27		W, E	15·72	44·40	60·1				
	" " "	" 28		E, W	15·69	45·34	61·0	60·5	0·9	0·2	0·04
3	1313 Gr. 80 & 758 Gr. 72	Mar. 23	10 17	W, E	74 13 34·07	− 9 33·92	60·2				
	" " " "	" 24		E, W	34·04	33·59	60·5				
	" " " "	" 27		W, E	33·95	33·84	60·1				
	" " " "	" 28		E, W	33·92	33·43	60·5	60·3	1·3	0·0	0·00
4	764 Gr. 72 & 1349 Gr. 80	Mar. 23	4 34	E, W	74 23 50·52	− 19 50·78	59·7				
	" " " "	" 24		W, E	50·49	49·86	60·6				
	" " " "	" 27		E, W	50·39	50·51	59·9				
	" " " "	" 28		W, E	50·36	50·10	60·3	60·1	1·3	0·2	0·05
5	1359 & 1362 Gr. 80	Mar. 23	13 31	W, E	73 58 11·66	+ 5 48·51	60·2				
	" " "	" 24		E, W	11·62	48·66	60·3				
	" " "	" 27		W, E	11·52	49·63	61·2				
	" " "	" 28		E, W	11·49	48·36	59·8	60·3	0·9	0·0	0·00
6	1362 & 1370 Gr. 80	Mar. 23	13 28	E, W	73 54 38·31	+ 9 21·61	59·9				
	" " "	" 24		W, E	38·28	21·89	60·2				
	" " "	" 27		E, W	38·18	22·07	60·3				
	" " "	" 28		W, E	38·14	22·37	60·5	60·2	0·9	0·1	0·01
7	1383 & 1402 Gr. 80	Mar. 23	6 12	W, E	74 17 25·63	− 13 24·75	60·9				
	" " "	" 24		E, W	25·59	25·29	60·3				
	" " "	" 27		W, E	25·49	24·66	60·8				
	" " "	" 28		E, W	25·46	25·01	60·5	60·6	1·3	0·3	0·12
8	1413 & 1428 Gr. 80	Mar. 23	1 25	E, W	74 0 42·99	+ 3 18·35	61·3				
	" " "	" 24		W, E	42·95	18·44	61·4				
	" " "	" 27		E, W	42·83	18·75	61·6				
	" " "	" 28		W, E	42·79	19·30	62·1	61·6	1·3	1·3	2·20
9	1434 & 1466 Gr. 80	Mar. 23	2 42	W, E	74 13 59·24	− 9 58·34	60·9				
	" " "	" 24		E, W	59·20	58·39	60·8				
	" " "	" 27		W, E	59·07	58·34	60·7				
	" " "	" 28		E, W	59·03	58·28	60·8	60·8	0·9	0·5	0·23
10	1466 & 1470 Gr. 80	Mar. 23	2 45	E, W	74 11 13·24	− 7 12·90	60·3				
	" " "	" 24		W, E	13·19	11·96	61·2				
	" " "	" 27		E, W	13·06	13·03	60·0				
	" " "	" 28		W, E	13·02	12·32	60·7	60·6	0·9	0·3	0·08

151. Danapa—*Co-latitude* 74° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
11	1470 & 1476 Gr. 80	Mar 23	3 1	W, E	74 28 5·07	− 24 3·99	61·1				
	" " "	" 24		E, W	5·03	4·11	60·9				
	" " "	" 27		W, E	4·90	3·55	61·4				
	" " "	" 28		E, W	4·85	4·38	60·5	61·0	0·9	0·7	0·44
12	1482 & 1500 Gr. 80	Mar. 23	0 8	E, W	74 7 22·86	− 3 22·47	60·4				
	" " "	" 24		W, E	22·81	22·20	60·6				
	" " "	" 27		E, W	22·67	22·19	60·5				
	" " "	" 28		W, E	22·62	21·67	61·0	60·6	1·3	0·3	0·12
13	1508 & 1540 Gr 80	Mar. 23	12 47	W, E	74 26 50·58	− 22 49·74	60·8				
	" " "	" 24		E, W	50·53	49·49	61·0				
	" " "	" 27		W, E	50·40	49·80	60·6				
	" " "	" 28		E, W	50·35	50·14	60·2	60·7	1·3	0·4	0·21
14	1550 & 1565 Gr 80	Mar 23	18 35	E, W	73 43 11·30	+ 20 47·35	58·6				
	" " "	" 24		W, E	11·25	48·[illegible]6	60·0				
	" " "	" 27		E, W	11·10	48·32	59·4				
	" " "	" 28		W, E	11·05	49·54	60·6	59·7	0·9	0·6	0·32
15	1565 & 1567 Gr. 80	Mar. 23	18 13	W, E	74 4 44·79	− 0 45·48	59·3				
	" " "	" 24		E, W	44·74	46·15	58·6				
	" " "	" 27		W, E	44·59	45·59	59·0				
	" " "	" 28		E, W	44·55	45·31	59·2	59·0	0·9	1·3	1·52
16	1577 & 1581 Gr. 80	Mar. 23	21 10	E, W	74 16 25·92	− 12 25·85	60·1				
	" " "	" 24		W, E	25·87	24·91	61·0				
	" " "	" 27		E, W	25·73	26·01	59·7				
	" " "	" 28		W, E	25·68	25·70	60·0	60·2	1·3	0·1	0·01
17	1582 & 1583 Gr. 80	Mar. 23	1 2	W, E	74 6 15·83	− 2 15·56	60·3				
	" " "	" 24		E, W	15·77	15·22	60·6				
	" " "	" 27		W, E	15·61	14·46	61·2				
	" " "	" 28		E, W	15·55	14·86	60·7	60·7	1·3	0·4	0·21
18	1590 & 1595 Gr. 80	Mar. 23	10 38	E, W	74 13 31·31	− 9 30·93	60·4				
	" " "	" 24		W, E	31·26	30·26	61·0				
	" " "	" 27		E, W	31·10	30·45	60·6				
	" " "	" 28		W, E	31·05	29·98	61·1	60·7	1·3	0·4	0·21
19	1617 & 1628 Gr. 80	Mar. 23	6 7	W, E	74 25 55·74	− 21 56·15	59·6				
	" " "	" 24		E, W	55·68	55·71	60·0				
	" " "	" 27		W, E	55·52	54·98	60·5				
	" " "	" 28		E, W	55·46	55·18	60·2	60·0	1·3	0·3	0·12
20	1637 Gr. 80 & 957 Gr. 72	Mar. 23	16 9	E, W	73 41 23·59	+ 22 36·11	59·7				
	" " " "	" 24		W, E	23·54	35·87	59·4				
	" " " "	" 27		E, W	23·37	35·37	58·7				
	" " " "	" 28		W, E	23·31	36·68	60·0	59·5	1·3	0·8	0·83
21	963 & 967 Gr. 72	Mar. 23	2 12	E, W	73 54 46·04	+ 9 13·12	59·2				
	" " "	" 24		W, E	45·98	14·41	60·4				
	" " "	" 27		E, W	45·80	14·36	60·2				
	" " "	" 28		W, E	45·74	14·51	60·3	60·0	1·3	0·3	0·12
22	991 Gr. 72 & 1706 Gr 80	Mar. 23	19 22	W, E	73 49 4·36	+ 14 56·37	60·7				
	" " " "	" 24		E, W	4·30	55·82	60·1				
	" " " "	" 27		W, E	4·12	55·69	59·8				
	" " " "	" 28		E, W	4·06	56·05	60·1	60·2	1·3	0·1	0·01

151. Danapa—*Co-latitude* 74° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
23	1717 Gr. 80 & 1011 Gr. 72	Mar. 23	11 59	E, W	73 52 40·00	+ 11 20·06	60·0				
	” ” ” ”	” 24		W, E	39·93	20·11	60·0				
	” ” ” ”	” 27		E, W	39·75	19·83	59·5				
	” ” ” ”	” 28		W, E	39·68	21·01	60·7	60·0	1·3	0·3	0·12
24	1727 & 1733 Gr. 80	Mar. 23	12 45	W, E	74 11 44·23	− 7 44·28	60·0				
	” ” ”	” 24		E, W	44·17	44·01	60·2				
	” ” ”	” 27		W, E	43·99	43·61	60·4				
	” ” ”	” 28		E, W	43·93	43·36	60·6	60·3	1·3	0·0	0·00
25	1746 & 1759 Gr. 80	Mar. 23	9 20	E, W	73 59 30·67	+ 4 28·47	59·1				
	” ” ”	” 24		W, E	30·60	29·72	60·3				
	” ” ”	” 27		E, W	30·41	29·15	59·6				
	” ” ”	” 28		W, E	30·35	30·32	60·7	59·9	1·3	0·4	0·21
26	1769 & 1794 Gr. 80	Mar. 23	7 53	W, E	74 11 37·11	− 7 38·16	58·9				
	” ” ”	” 24		E, W	37·04	40·07	57·0				
	” ” ”	” 27		W, E	36·84	36·45	60·4				
	” ” ”	” 28		E, W	36·78	36·66	60·1	59·1	1·3	1·2	1·87
27	1926 & 1941 Gr. 80	Mar. 25	11 45	W, E	74 19 37·11	− 15 37·83	59·3				
	” ” ”	” 29		E, W	36·84	38·08	58·8	59·0	1·0	1·3	1·69
28	1977 & 1985 Gr. 80	Mar. 25	5 25	E, W	73 45 10·09	+ 18 50·54	60·6				
	” ” ”	” 29		W, E	9·79	50·98	60·8	60·7	1·0	0·4	0·16
29	1996 & 2003 Gr. 80	Mar. 25	12 0	W, E	73 50 41·58	+ 13 18·96	60·5				
	” ” ”	” 29		E, W	41·30	19·21	60·5	60·5	1·0	0·2	0·04
30	2005 & 2017 Gr. 80	Mar. 25	12 5	E, W	73 56 24·18	+ 7 35·81	60·0				
	” ” ”	” 30		W, E	23·83	36·63	60·5	60·3	1·0	0·0	0·00
31	2039 & 2060 Gr. 80	Mar. 25	5 52	W, E	74 8 10·36	− 4 9·62	60·7				
	” ” ”	” 26		E, W	10·29	10·26	60·0				
	” ” ”	” 29		W, E	10·07	9·29	60·8				
	” ” ”	” 30		E, W	10·00	9·05	61·0	60·6	1·3	0·3	0·12
32	2097 & 2107 Gr. 80	Mar. 25	21 43	E, W	73 58 41·77	+ 5 18·42	60·2				
	” ” ”	” 26		W, E	41·71	18·45	60·2				
	” ” ”	” 29		E, W	41·51	19·09	60·6				
	” ” ”	” 30		W, E	41·45	19·62	61·1	60·5	1·3	0·2	0·05
33	2129 & 2173 Gr. 80	Mar. 25	11 59	W, E	73 56 39·99	+ 7 20·92	60·9				
	” ” ”	” 26		E, W	39·92	20·46	60·4				
	” ” ”	” 29		W, E	39·72	20·88	60·6				
	” ” ”	” 30		E, W	39·65	21·05	60·7	60·7	1·3	0·4	0·21
34	2243 & 2250 Gr. 80	Mar. 25	22 36	W, E	73 48 56·89	+ 15 4·45	61·3				
	” ” ”	” 26		E, W	56·83	4·31	61·1				
	” ” ”	” 29		W, E	56·64	4·14	60·8				
	” ” ”	” 30		E, W	56·58	4·08	60·7	61·0	1·3	0·7	0·64

151. Danapa—*Co-latitude* 74° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
35	2270 & 2303 Gr. 80	Mar. 25	3 43	E, W	74 9 40·52	− 5 40·17	60·4				
	" " "	" 26		W, E	40·45	39·74	60·7				
	" " "	" 29		E, W	40·26	40·54	59·7				
	" " "	" 30		W, E	40·20	40·28	59·9	60·2	1·3	0·1	0·01
36	1852 Gr. 72 & 2327 Gr. 80	Mar. 25	24 27	W, E	73 38 8·60	+ 25 51·73	60·3				
	" " " "	" 26		E, W	8·54	50·60	59·1				
	" " " "	" 29		W, E	8·36	51·50	59·9				
	" " " "	" 30		E, W	8·30	51·63	59·9	59·8	0·9	0·5	0·23
37	2352 & 2357 Gr. 80	Mar. 25	13 42	E, W	74 7 47·74	− 3 47·55	60·2				
	" " "	" 26		W, E	47·68	47·06	60·6				
	" " "	" 29		E, W	47·50	46·72	60·8				
	" " "	" 30		W, E	47·45	47·53	59·9	60·4	0·9	0·1	0·01
38	2357 Gr. 80 & 1371 Gr. 72	Mar. 25	13 54	W, E	73 54 30·92	+ 9 30·40	61·3				
	" " " "	" 26		E, W	30·87	29·53	60·4				
	" " " "	" 29		W, E	30·69	30·00	60·7				
	" " " "	" 30		E, W	30·63	29·56	60·2	60·7	0·9	0·4	0·14
39	1371 Gr. 72 & 2387 Gr. 80	Mar. 25	13 53	E, W	73 53 13·59	+ 10 47·11	60·7				
	" " " "	" 26		W, E	13·53	48·15	61·7				
	" " " "	" 29		E, W	13·35	47·42	60·8				
	" " " "	" 30		W, E	13·29	47·35	60·6	60·9	0·9	0·6	0·32
40	2431 & 2443 Gr. 80	Mar. 25	0 19	E, W	73 56 2·37	+ 7 57·52	59·9				
	" " "	" 26		W, E	2·31	57·15	59·5				
	" " "	" 29		E, W	2·14	58·81	60·9				
	" " "	" 30		W, E	2·08	58·20	60·3	60·1	1·3	0·2	0·05
41	2451 & 2453 Gr. 80	Mar. 25	10 48	W, E	74 23 58·37	− 19 58·57	59·8				
	" " "	" 26		E, W	58·31	58·13	60·2				
	" " "	" 29		W, E	58·15	57·56	60·6				
	" " "	" 30		E, W	58·10	57·74	60·4	60·2	0·9	0·1	0·01
42	2453 & 2482 Gr. 80	Mar. 25	11 12	E, W	74 0 14·06	+ 3 45·79	59·8				
	" " "	" 26		W, E	14·01	45·61	59·6				
	" " "	" 29		E, W	13·85	46·20	60·0				
	" " "	" 30		W, E	13·80	47·31	61·1	60·1	0·9	0·2	0·04
43	2482 & 2487 Gr. 80	Mar. 25	11 14	W, E	74 2 26·31	+ 1 34·49	60·8				
	" " "	" 26		E, W	26·25	34·13	60·4				
	" " "	" 29		W, E	26·09	33·96	60·1				
	" " "	" 30		E, W	26·04	34·74	60·8	60·5	0·9	0·2	0·04
44	2514 & 2536 Gr. 80	Mar. 25	20 36	E, W	73 49 58·72	+ 14 1·11	59·8				
	" " "	" 26		W, E	58·67	0·91	59·6				
	" " "	" 29		E, W	58·53	1·81	60·3				
	" " "	" 30		W, E	58·48	2·19	60·7	60·1	1·3	0·2	0·05

151. Danapa—*Co-latitude* 74° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
45	2543 & 2550 Gr. 80	Mar. 25	14 56	W, E	73 47 19·44	+ 16 41·61	61·1				
	" " "	" 26		E, W	19·39	40·37	59·8				
	" " "	" 29		W, E	19·24	42·34	61·6				
	" " "	" 30		E, W	19·19	41·25	60·4	60·7	1·3	0·4	0·21
								Σ P = 50·9		Σ Pvv = 13·21	

Summary.

No. of pairs 45

No. of observations 172

Mean difference between observations taken E, W and those taken W, E = − 0″·32

Observed Co-latitude (weighted mean) 74° 3′ 60″·31 ± 0″·052

Correction for Height above Sea-level 0″·00

Final Co-latitude 74° 3′ 60″·31

		° ′ ″	″
Astronomical Latitude (A)	=	15 55 59·69	± 0·052
Geodetic Latitude (G)	=	15 56 0·14	
Deflection of plumb-line (A − G)	=	− 0·45	

152. Dargawa—*Co-latitude* 65° 22′ +

Latitude ... 24° 37′ *Instrument*—Zenith Telescope

Longitude ... 79 4 *Mean Height of Barometer* 28·90 in.

Height ... 1152 feet *Mean Temperature* 61°·8

Observer—Lieut. H. M. Cowie, R. E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v²
		1903	° ′		° ′ ″	′ ″	″	″			
1	73 & 81 Newcomb	Jan 18	3 52	E, W	65 37 23·92	− 14 41·05	42·87	42·87	0·7	0·24	0·0403
2	97 & 108 Newcomb	Jan. 18	16 8	W, E	65 12 13·16	+ 10 29·33	42 49				
	" " "	" 19		E, W	13 23	29 86	43 00				
	" " "	" 20		W, E	13 30	28 50	41 80				
	" " "	" 23		E, W	13·52	29·44	42 96	42·59	0 9	0 04	0·0014
3	102 & 108 Newcomb	Jan 18	15 43	W, E	65 37 15 48	− 14 32·77	42 71				
	" " "	" 19		E, W	15 55	32 19	43 36				
	" " "	" 20		W, E	15 62	33 63	41 09				
	" " "	" 23		E, W	15 83	32 78	43·05	42 78	0·9	0·15	0·0203
4	118 & 121 Newcomb	Jan. 18	4 23	E, W	65 16 42 87	+ 5 59 55	42·42				
	" " "	" 19		W, E	42 94	59·07	42 91				
	" " "	" 20		E, W	43 01	59 71	42 72				
	" " "	" 23		W, E	43 21	58·64	41·85				
	" " "	" 24		E, W	43 28	58·75	42 03	42·39	1·4	0 24	0·0806
5	131 Newc. & 332 Gr 80	Jan 18	16 53	W, E	65 0 32·11	+ 22 10·24	42·35				
	" " " "	" 19		E, W	32 17	11 05	43 22				
	" " " "	" 20		W, E	32 23	10 22	42 45				
	" " " "	" 23		E, W	32 41	9 04	41 45				
	" " " "	" 24		W, E	32 47	10 05	42 52				
	" " " "	" 27		E, W	32 65	9 74	42 39	42·40	1·5	0·23	0·0794
6	339 & 353 Gr 80	Jan. 18	3 44	E, W	65 31 26·25	− 8 43·38	42 87				
	" " "	" 19		W, E	26·30	42·77	43 53				
	" " "	" 20		E, W	26·36	43·42	42 94				
	" " "	" 23		W, E	26 53	43·37	43·16				
	" " "	" 24		E, W	26 59	43 75	42 84				
	" " "	" 27		W, E	26 76	43 30	43 46	43 13	1·5	0·50	0·3750
7	368 & 373 Gr. 80	Jan. 18	4 55	W, E	65 40 7·01	− 17 24·35	42·66				
	" " "	" 19		E, W	7 06	24 76	42 30				
	" " "	" 20		W, E	7·11	24·52	42·59				
	" " "	" 23		E, W	7·26	25·32	41 94				
	" " "	" 24		W, E	7·32	25·66	41 66				
	" " "	" 27		E, W	7 48	24 56	42·92	42·35	1·5	0·28	0·1176
8	161 & 171 Newcomb	Jan. 18	2 53	W, E	65 34 51·89	− 12 9·03	42·86				
	" " "	" 19		E, W	51·93	8·64	43·29				
	" " "	" 20		W, E	51 98	8·56	43 42				
	" " "	" 23		E, W	52 11	8·52	43 59				
	" " "	" 24		W, E	52·16	9·89	42·27				
	" " "	" 25		E, W	52·20	9·15	43·05				
	" " "	" 27		W, E	52·30	9 83	42·47	43·04	1·0	0·41	0·1681

752. Dargawa—*Co-latitude* 65° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
9	161 & 178 Newcomb	Jan. 18	2 40	W, E	65 47 52·67	− 25 9·20	43·47				
	" " "	" 19		E, W	52·72	9·83	42·89				
	" " "	" 20		W, E	52·76	9·24	43·52				
	" " "	" 23		E, W	52·90	9·86	43·04				
	" " "	" 24		W, E	52·94	10·24	42·70				
	" " "	" 25		E, W	52·97	10·20	42·77				
	" " "	" 27		W, E	53·07	10·77	42·30	42·95	1·0	0·32	0·1024
10	471 Gr. 80 & 203 Newc.	Jan. 18	4 1	W, E	65 18 14·24	+ 4 28·88	43·12				
	" " " "	" 19		E, W	14·27	28·64	42·91				
	" " " "	" 20		W, E	14·30	28·67	42·97				
	" " " "	" 24		E, W	14·41	29·04	43·45				
	" " " "	" 25		E, W	14·44	28·31	42·75				
	" " " "	" 27		W, E	14·51	27·78	42·29				
	" " " "	" 28		E, W	14·55	28·26	42·81	42·89	1·0	0·26	0·0676
11	471 Gr. 80 & 209 Newc.	Jan. 18	3 57	W, E	65 14 51·98	+ 7 50·87	42·85				
	" " " "	" 19		E, W	52·01	50·51	42·52				
	" " " "	" 20		W, E	52·03	50·89	42·92				
	" " " "	" 24		E, W	52·14	50·82	42·96				
	" " " "	" 25		E, W	52·17	50·70	42·87				
	" " " "	" 27		W, E	52·23	50·27	42·50				
	" " " "	" 28		E, W	52·27	50·46	42·73	42·77	1·0	0·14	0·0196
12	214 & 221 Newcomb	Jan. 18	34 42	E, W	65 5 31·76	+ 17 10·33	42·09				
	" " "	" 19		W, E	31·77	11·23	43·00				
	" " "	" 20		E, W	31·78	10·57	42·35				
	" " "	" 23		W, E	31·80	10·71	42·51				
	" " "	" 24		E, W	31·82	10·41	42·23				
	" " "	" 27		W, E	31·86	11·12	42·98				
	" " "	" 28		W, E	31·88	10·07	41·95	42·42	1·6	0·21	0·0706
13	229 & 236 Newcomb	Jan. 18	0 37	W, E	65 35 16·87	− 12 33·56	43·31				
	" " "	" 19		E, W	16·88	34·87	42·01				
	" " "	" 20		W, E	16·89	34·24	42·65				
	" " "	" 23		E, W	16·93	34·93	42·00				
	" " "	" 24		W, E	16·95	34·26	42·69				
	" " "	" 27		E, W	17·02	34·35	42·67				
	" " "	" 28		E, W	17·06	34·55	42·51	42·59	1·0	0·04	0·0016
14	229 & 238 Newcomb	Jan. 18	0 37	W, E	65 35 22·61	− 12 39·38	43·23				
	" " "	" 19		E, W	22·63	40·85	41·78				
	" " "	" 20		W, E	22·64	39·69	42·95				
	" " "	" 23		E, W	22·68	40·83	41·85				
	" " "	" 24		W, E	22·70	40·19	42·51				
	" " "	" 27		E, W	22·76	40·73	42·03				
	" " "	" 28		E, W	22·79	40·04	42·75	42·50	1·0	0·13	0·0169
15	749 & 776 Gr. 80	Jan. 18	12 40	E, W	65 20 20·64	+ 2 22·17	42·81				
	" " "	" 19		W, E	20·62	22·25	42·87				
	" " "	" 20		E, W	20·61	22·75	43·36				
	" " "	" 21		W, E	20·61	21·84	42·45				
	" " "	" 22		W, E	20·59	21·74	42·33				
	" " "	" 23		E, W	20·58	21·68	42·26				
	" " "	" 24		E, W	20·58	22·60	43·18				
	" " "	" 25		W, E	20·57	22·05	42·62				
	" " "	" 27		W, E	20·57	22·55	43·12	42·79	1·7	0·16	0·0435
16	305 & 313 Newcomb	Jan. 18	19 8	W, E	65 26 30·19	− 3 47·32	42·87				
	" " "	" 19		E, W	30·18	47·49	42·69				
	" " "	" 20		W, E	30·16	47·31	42·85				
	" " "	" 21		E, W	30·15	46·92	43·23				
	" " "	" 22		E, W	30·13	48·02	42·11				
	" " "	" 23		W, E	30·12	45·86	44·26				
	" " "	" 24		W, E	30·11	47·79	42·32				
	" " "	" 25		E, W	30·10	47·70	42·40				
	" " "	" 26		E, W	30·09	47·41	42·68	42·85	1·7	0·22	0·0823

152. Dargawa—*Co-latitude* 65° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
17	318 Newc. & 874 Gr. 80	Jan. 18	9 11	E, W	65 32 39·48	− 9 56 34	43 14				
	„ „ „ „	„ 19		W, E	39 47	56 77	42 70				
	„ „ „ „	„ 20		E, W	39·45	56 62	42 83				
	„ „ „ „	„ 21		W, E	39 43	58 58	40 85				
	„ „ „ „	„ 22		W, E	39 41	56 84	42 57				
	„ „ „ „	„ 25		E, W	39 37	56 22	43 15				
	„ „ „ „	„ 26		W, E	39 36	56 00	43 36				
	„ „ „ „	„ 27		E, W	39 35	56 63	42 72	42·67	1·6	0·04	0·0026
18	336 & 344 Newcomb	Jan. 18	38 8	W, E	65 8 49 22	+ 13 53·47	42 69				
	„ „ „	„ 19		E, W	49 20	53 58	42 78				
	„ „ „	„ 20		W, E	49 18	52 90	42 08				
	„ „ „	„ 22		E, W	49 14	53 62	42 76				
	„ „ „	„ 24		W, E	49 10	52 77	41 87				
	„ „ „	„ 25		E, W	49 09	53 16	42 25				
	„ „ „	„ 26		E, W	49 06	53 73	42 79				
	„ „ „	„ 27		W, E	49·04	53 81	42 85	42 51	1·6	0·12	0·0230
19	348 Newc & 943 Gr. 80	Jan. 18	7 35	E, W	65 27 5·44	− 4 22 17	43 27				
	„ „ „ „	„ 19		W, E	5 43	22 52	42·91				
	„ „ „ „	„ 20		E, W	5 41	22·17	43 24				
	„ „ „ „	„ 22		W, E	5 38	22 35	43 03				
	„ „ „ „	„ 24		E, W	5 35	21 85	43 50				
	„ „ „ „	„ 25		W, E	5 33	22 71	42 62				
	„ „ „ „	„ 26		W, E	5 31	22·99	42 32				
	„ „ „ „	„ 27		E, W	5 30	22 62	42 68	42 95	1 6	0·32	0·1638
20	956 Gr. 80 & 377 Newc.	Jan. 18	31 29	W, E	65 47 36 14	− 24 52·15	43·99				
	„ „ „ „	„ 19		E, W	36 12	53·06	43 06				
	„ „ „ „	„ 20		W, E	36 10	52·93	43 17				
	„ „ „ „	„ 22		E, W	36 04	53 00	43·04				
	„ „ „ „	„ 24		W, E	36 00	52 50	43 50				
	„ „ „ „	„ 25		E, W	35 98	53 33	42 65				
	„ „ „ „	„ 26		E, W	35 96	52 86	43 10				
	„ „ „ „	„ 27		W, E	35 94	52·73	43·21	43·22	1·6	0·59	0·5570
21	1035 & 1046 Gr 80	Jan. 20	35 48	W, E	65 20 0·07	+ 2 42·47	42 54				
	„ „ „	„ 23		E, W	19 59 98	42 11	42 09				
	„ „ „	„ 24		E, W	59·96	42·59	42 55	42·43	1·2	0·20	0·0480
22	426 & 430 Newcomb	Jan. 18	14 45	W, E	65 16 18·13	+ 6 24·53	42 66				
	„ „ „	„ 19		E, W	18·11	24 01	42 12				
	„ „ „	„ 20		W, E	18·09	24·22	42 31				
	„ „ „	„ 22		E, W	18·04	24·12	42 16				
	„ „ „	„ 23		E, W	18 02	23 48	41 50				
	„ „ „	„ 24		W, E	17 99	24 85	42 84				
	„ „ „	„ 25		E, W	17·97	24 22	42 19				
	„ „ „	„ 27		W, E	17 93	24·72	42 65	42 31	1 6	0 32	0·1638
23	431 Newc & 1197 Gr. 80	Jan. 18	0 26	E, W	65 12 44·47	+ 9 57·90	42·37				
	„ „ „ „	„ 19		W, E	44 45	58 32	42 77				
	„ „ „ „	„ 20		E, W	44 42	57 63	42 05				
	„ „ „ „	„ 23		W, E	44·35	57·87	42 22				
	„ „ „ „	„ 24		E, W	44 33	58 23	42 56				
	„ „ „ „	„ 25		W, E	44·30	57 60	41 90				
	„ „ „ „	„ 26		E, W	44 28	58·10	42 38				
	„ „ „ „	„ 27		W, E	44·25	58·41	42 66	42·37	1·1	0·26	0·0744
24	1186 & 1197 Gr. 80	Jan. 18	0 34	E, W	65 4 39·20	+ 18 3·20	42·40				
	„ „ „	„ 19		W, E	39·18	3 81	42·99				
	„ „ „	„ 20		E, W	39·15	2·61	41 76				
	„ „ „	„ 23		W, E	39·07	3·27	42·34				
	„ „ „	„ 24		E, W	39 05	3·20	42·25				
	„ „ „	„ 25		W, E	39·03	3·54	42·57				
	„ „ „	„ 26		E, W	39 00	3·98	42 98				
	„ „ „	„ 27		W, E	38·98	3·77	42·75	42·51	1·1	0·12	0·0158

152. Dargawa—*Co-latitude* 65° 22′ +·

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
25	1227 Gr. 80 & 2177 Gr. 90	Jan. 18	0 23	W, E	65 19 51·41	+ 2 51·20	42·61				
	” ” ” ”	” 19		E, W	51·39	51·16	42·55				
	” ” ” ”	” 20		W, E	51·37	50·70	42·07				
	” ” ” ”	” 23		E, W	51·29	51·68	42·97				
	” ” ” ”	” 24		W, E	51·27	51·48	42·75				
	” ” ” ”	” 25		E, W	51·25	50·43	41·68				
	” ” ” ”	” 26		W, E	51·22	51·11	42·33				
	” ” ” ”	” 27		E, W	51·20	51·64	42·84	42·48	1·6	0·15	0·0360
26	468 & 479 Newcomb	Jan. 18	16 17	E, W	65 13 58·46	+ 8 43·73	42·19				
	” ” ”	” 19		W, E	58·44	44·16	42·60				
	” ” ”	” 20		E, W	58·42	43·43	41·85				
	” ” ”	” 23		W, E	58·36	44·28	42·64				
	” ” ”	” 25		W, E	58·31	43·42	41·73				
	” ” ”	” 26		E, W	58·29	43·01	41·30				
	” ” ”	” 27		W, E	58·26	44·78	43·04	42·14	1·0	0·49	0·2401
27	475 & 479 Newcomb	Jan. 18	16 11	E, W	65 19 51·59	+ 2 50·13	41·72				
	” ” ”	” 19		W, E	51·57	50·17	41·74				
	” ” ”	” 20		E, W	51·55	50·07	41·62				
	” ” ”	” 23		W, E	51·50	50·36	41·86				
	” ” ”	” 25		W, E	51·45	50·19	41·64				
	” ” ”	” 26		E, W	51·43	49·98	41·41				
	” ” ”	” 27		W, E	51·41	51·32	42·73	41·79	1·0	0·84	0·7056
28	493 & 494 Newcomb	Jan. 18	34 8	E, W	65 11 48·98	+ 10 54·37	43·35				
	” ” ”	” 19		W, E	48·97	53·01	41·98				
	” ” ”	” 20		E, W	48·95	55·10	44·05				
	” ” ”	” 23		W, E	48·92	53·10	42·02				
	” ” ”	” 24		E, W	48·00	53·97	42·87				
	” ” ”	” 25		W, E	48·88	53·62	42·50				
	” ” ”	” 26		E, W	48·87	53·73	42·60				
	” ” ”	” 27		W, E	48·85	53·68	42·53	42·74	1·6	0·11	0·0194
								Σ P = 36·0		Σ P v v = 3·3367	

Summary.

No. of pairs 28

No. of observations 188

Mean difference between observations taken E, W and those taken W, E = − 0″·03

Observed Co-latitude (weighted mean) 65° 22′ 42″·63 ± 0″·040

Correction for Height above Sea-level + 0″·05

Final Co-latitude 65° 22′ 42″·68

		°	′	″	″
Astronomical Latitude (A)	=	24	37	17·32	± 0·040
Geodetic Latitude (G)	=	24	37	13·21	
Deflection of plumb-line (A − G)	=		+	4·11	

153. Dariapur—*Co-latitude* 68° 12′ +

Latitude ... 21° 47′ *Instrument*—Zenith Telescope

Longitude 87 55 *Mean Height of Barometer* 29·71 in.

Height ... 63 feet *Mean Temperature* 78°·3

Observer—Lieut. E A. Tandy, R E.

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	1155 & 1159 Gr 80	Mar 22	3 45	W, E	68 30 45 05	− 18 14 97	30 98				
	" " "	" 23		E, W	45 06	15 31	30 65	30 82	1 0	0 36	0·1296
2	1184 & 1221 Gr. 80	Mar 24	8 33	E, W	68 8 31 80	+ 3 59·23	31 03				
	" " "	" 25		W, E	31 80	59·79	31 59	31·31	1 0	0 13	0 0169
3	1233 & 1240 Gr 80	Mar 24	5 53	W, E	67 47 56 67	+ 24 32 79	20 46				
	" " "	" 25		E, W	56 66	32 83	20 41				
	" " "	" 26		E, W	56 64	33 65	30 29	29 68	1 2	1 50	2 7000
4	1272 & 1284 Gr. 80	Mar 24	10 4	E, W	68 4 28·56	+ 8 1·12	29 68				
	" " "	" 26		W, E	28 52	2·89	31·41	30 55	1·0	0 63	0 3969
5	1297 & 1324 Gr. 80	Mar. 22	6 7	E, W	67 50 39 38	+ 21 51·39	30 77				
	" " "	" 23		W E	39 35	52 36	31 71	31 24	1·0	0 06	0·0036
6	1343 & 1368 Gr. 80	Mar. 22	5 9	W, E	68 7 15 87	+ 5 15 38	31 25				
	" " "	" 23		E, W	15·85	15 66	31 51	31·38	1·0	0 20	0 0400
7	1390 & 1395 Gr. 80	Mar 22	3 56	W, E	68 7 7·40	+ 5 24 23	31 63				
	" " "	" 23		E, W	7·37	23·18	30 55	31 09	0 7	0·09	0·0057
8	1413 & 1390 Gr 80	Mar. 22	4 13	E, W	68 24 20 48	− 11 47·63	32·85				
	" " "	" 23		W, E	20·45	49 94	30 51	31·68	0·7	0 50	0·1750
9	1432 & 1461 Gr. 80	Mar. 24	2 16	W, E	67 50 25 08	+ 22 5 70	30 78				
	" " "	" 26		E, W	24 97	5 63	30 60	30·69	1 0	0·49	0 2401
10	1476 & 1490 Gr. 80	Mar. 24	9 45	E, W	68 16 52·59	− 4 21·49	31 10				
	" " "	" 25		W, E	52·53	19 66	32 87				
	" " "	" 26		W, E	52 47	20 14	32 33	31·85	0·8	0·67	0·3591
11	1490 & 1494 Gr. 80	Mar. 24	9 29	W, E	68 30 56 37	− 18 23·44	32 93				
	" " "	" 25		E, W	56 32	25 25	31 07				
	" " "	" 26		E, W	56·26	25·30	30·96	31·98	0·8	0·80	0·5120
12	1499 & 1504 Gr. 80	Mar. 24	9 12	E, W	68 34 2·28	− 21 30·92	31 36				
	" " "	" 25		W, E	2·22	30·64	31 58				
	" " "	" 26		W, E	2 16	29 29	32 87	31·80	1·2	0·62	0·4613
13	1507 & 1522 Gr. 80	Mar. 24	10 47	W, E	68 8 30 23	+ 4 0·99	31·22				
	" " "	" 25		E, W	30·18	0 96	31 14				
	" " "	" 26		E, W	30 12	0·85	30·97	31·14	1·2	0 04	0·0019

153. Dariapur—*Co-latitude* 68° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
14	1529 & 1536 Gr. 80	Mar. 24	0 22	E, W	67 56 59·80	+ 15 31·83	31·63				
	" " "	" 25		W, E	59·74	31·73	31·47	31·55	1·0	0·37	0·1369
15	1547 & 1554 Gr. 80	Mar. 24	3 45	W, E	68 7 43·90	+ 4 47·69	31·59	31·59	0·7	0·41	0·1177
16	1567 & 1573 Gr. 80	Mar. 24	11 58	E, W	67 52 20·90	+ 20 9·93	30·83				
	" " "	" 25		W, E	20·85	9·82	30·67				
	" " "	" 26		W, E	20·78	9·41	30·19	30·63	1·2	0·55	0·3630
17	1583 & 1595 Gr. 80	Mar. 24	4 45	W, E	68 22 18·47	− 9 45·92	32·55				
	" " "	" 25		E, W	18·41	46·68	31·73				
	" " "	" 26		E, W	18·33	46·99	31·34	32·05	0·8	1·87	0·6055
18	1621 & 1583 Gr. 80	Mar. 24	4 48	E, W	68 19 0·19	− 6 28·89	31·30				
	" " "	" 25		W, E	0·11	29·76	30·35	30·83	0·7	0·35	0·0858
19	1636 & 1646 Gr. 80	Mar. 24	13 37	E, W	67 52 14·33	+ 20 16·22	30·55				
	" " "	" 25		W, E	14·25	16·80	31·05				
	" " "	" 26		W, E	14·17	17·14	31·31	30·87	1·2	0·31	0·1153
20	1668 & 1672 Gr. 80	Mar. 24	1 49	W, E	68 12 20·52	+ 0 11·12	31·64				
	" " "	" 26		E, W	20·35	9·79	30·14	30·89	1·0	0·29	0·0841
21	1685 & 1686 Gr. 80	Mar. 24	14 27	E, W	68 30 23·26	− 17 51·70	31·56	31·56	0·7	0·38	0·1011
22	1691 & 1701 Gr. 80	Mar. 24	11 19	W, E	68 24 58·59	− 12 27·46	31·13				
	" " "	" 26		E, W	58·43	27·10	31·33	31·23	1·0	0·05	0·0025
23	1862 & 1884 Gr. 80	Mar. 24	0 57	W, E	68 17 11·11	− 4 40·00	31·11				
	" " "	" 26		E, W	10·91	40·42	30·49	30·80	1·0	0·38	0·1444
24	1708 & 1709 Gr. 80	Mar. 24	14 41	W, E	67 50 30·57	+ 22 0·89	31·46				
	" " "	" 26		E, W	30·41	0·22	30·63	31·05	0·7	0·13	0·0118
25	1709 & 1729 Gr. 80	Mar. 24	14 58	E, W	68 7 33·54	+ 4 57·65	31·19	31·19	0·5	0·01	0·0001
26	1758 & 1767 Gr. 80	Mar. 24	17 19	W, E	68 31 54·48	− 19 22·06	32·42				
	" " "	" 26		E, W	54·32	22·36	31·96	32·19	1·0	1·01	1·0201
27	1799 & 1810 Gr. 80	Mar. 24	10 31	W, E	68 24 46·87	− 12 16·98	29·89				
	" " "	" 26		E, W	46·68	15·75	30·93	30·41	1·0	0·77	0·5929
28	1825 & 1842 Gr. 80	Mar. 24	22 0	E, W	68 16 25·83	− 3 54·85	30·98				
	" " "	" 26		W, E	25·67	54·14	31·53	31·26	0·7	0·08	0·0045
29	1842 & 1843 Gr. 80	Mar. 24	22 14	W, E	68 2 41·94	+ 9 48·81	30·75				
	" " "	" 26		E, W	41·76	49·87	31·63	31·19	0·7	0·01	0·0001
30	1892 & 1911 Gr. 80	Mar. 24	19 23	E, W	68 9 41·77	+ 2 50·39	32·16				
	" " "	" 26		W, E	41·57	50·11	31·68	31·92	1·0	0·74	0·5476
31	1929 & 1954 Gr. 80	Mar. 24	3 24	W, E	68 16 1·45	− 3 30·84	30·61				
	" " "	" 26		E, W	1·24	30·43	30·81	30·71	0·7	0·47	0·1546

153. Dariapur—*Co-latitude* 68° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
32	1954 & 1965 Gr. 80 " " "	Mar. 24 " 26	3 6	E, W W, E	67 58 34·07 33·87	+ 13 56·26 58·13	30·33 32·00	31·17	0·7	0·01	0·0001
33	1977 & 2008 Gr. 80 " " "	Mar. 24 " 26	0 6	W, E E, W	68 17 58·37 58·18	− 5 27·93 27·91	30·44 30·27	30·36	1·0	0·82	0·6724
34	2017 & 2019 Gr. 80 " " "	Mar. 24 " 26	17 28	E, W W, E	68 36 1·26 1·05	− 23 31·00 29·46	30·26 31·59	30·93	1·0	0·25	0·0625
35	2029 & 2032 Gr. 80 " " "	Mar. 24 " 26	9 55	W, E E, W	68 35 22·80 22·60	− 22 51·69 50·56	31·11 32·04	31·58	1·0	0·40	0·1600
36	2150 & 2173 Gr. 80 " " "	Mar. 21 " 22	5 51	E, W W, E	67 51 46·42 46·33	+ 20 47·72 43·93	34·14 30·26	32·20	1·0	1·02	1·0404
37	2225 & 2248 Gr. 80 " " "	Mar. 21 " 22	8 41	W, E E, W	67 51 48·69 48·61	+ 20 42·34 42·00	31·03 30·61	30·82	1·0	0·36	0·1296
38	2256 & 2268 Gr. 80 " " "	Mar. 21 " 22	8 1	E, W W, E	67 49 59·48 59·40	+ 22 31·90 31·80	31·38 31·20	31·29	1·0	0·11	0·0121
39	2281 & 2325 Gr. 80 " " "	Mar. 21 " 22	4 1	W, E E, W	68 36 22·64 22·57	− 23 51·47 52·83	31·17 29·74	30·46	1·0	0·72	0·5184
40	2364 & 2370 Gr. 80 " " "	Mar. 21 " 22	8 32	E, W W, E	68 33 0·44 0·39	− 20 28·69 28·90	31·75 31·49	31·62	1·0	0·44	0·1936
41	2387 & 2398 Gr. 80	Mar. 22	19 30	E, W	68 19 14·07	− 6 42·21	31·86	31·86	0·7	0·68	0·3237
42	2410 & 2414 Gr. 80 " " "	Mar. 21 " 22	5 18	E, W W, E	68 15 6·72 6·65	− 2 35·50 34·79	31·22 31·86	31·54	0·7	0·36	0·0907
43	2414 & 2437 Gr. 80 " " "	Mar. 21 " 22	5 5	W, E E, W	68 28 15·36 15·31	− 15 45·13 45·58	30·23 29·73	29·98	0·7	1·20	1·0080
44	2534 & 2555 Gr. 80 " " "	Mar. 21 " 22	7 34	E, W W, E	68 10 21·25 21·19	+ 2 9·35 9·29	30·60 30·48	30·54	1·0	0·64	0·4096
45	2576 & 2608 Gr. 80 " " "	Mar. 21 " 22	10 2	E, W W, E	68 15 36·65 36·62	− 3 5·70 4·94	30·95 31·68	31·32	0·7	0·14	0·0137
46	2632 & 2576 Gr. 80 " " "	Mar. 21 " 22	10 5	W, E E, W	68 13 6·66 6·62	− 0 35·67 35·42	30·99 31·20	31·10	0·7	0·08	0·0045
47	2640 & 2643 Gr. 80 " " "	Mar. 21 " 22	3 28	W, E E, W	67 57 13·24 13·21	+ 15 19·34 18·54	32·58 31·75	32·17	1·0	0·99	0·9801
48	2656 & 2689 Gr. 80 " " "	Mar. 21 " 22	11 28	E, W W, E	67 47 38·79 38·76	+ 24 50·59 54·09	29·38 32·85	31·12	0·7	0·06	0·0025
49	2689 & 2710 Gr. 80 " " "	Mar. 21 " 22	11 38	W, E E, W	68 2 48·72 48·70	+ 9 42·43 41·28	31·15 29·98	30·57	0·7	0·61	0·2605

153. Dariapur—*Co-latitude* 68° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
50	2807 & 2828 Gr. 80	Mar. 21	18 39	E, W	68 37 5·87	− 24 35·03	30·84				
	” ” ”	” 22		W, E	5·86	33·62	32·24	31·54	1·0	0·36	0·1296
51	2831 & 2847 Gr. 80	Mar. 21	4 39	W, E	68 35 35·39	− 23 3·48	31·91				
	” ” ”	” 22		E, W	35·38	3·73	31·65	31·78	1·0	0·60	0·3600
								Σ P = 45·8		Σ Pvv = 15·5021	

Summary.

No. of pairs 51

No. of observations 106

Mean difference between observations taken E, W and those taken W, E = − 0″·35

Observed Co-latitude (weighted mean) 68° 12′ 31″·18 ± 0″·056

Correction for Height above Sea-level 0″·00

Final Co-latitude 68° 12′ 31″·18

		°	′	″	″
Astronomical Latitude (A)	=	21	47	28·82	± 0·056
Geodetic Latitude (G)	=	21	47	27·95	
Deflection of plumb-line (A − G)	=	+		0·87	

154. Darutippa—*Co-latitude* 74° 59′ +

Latitude	... 15° 1′	*Instrument*—Zenith Telescope	
Longitude	... 79 57	*Mean Height of Barometer*	in. 29·91
Height	... 195 feet	*Mean Temperature*	73°·1

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
1	875 & 888 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	22 8	E, W W, E	74 50 23·51 23·52	+ 9 3·70 2·91	27·2 26·4	26·8	1·0	0·3	0·09
2	896 & 915 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	17 19	W, E E, W	75 11 36·18 36·19	− 12 9·65 10·28	26·5 25·9	26·2	1·0	0·3	0·09
3	928 & 946 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	5 50	E, W W, E	74 45 16·76 16·78	+ 14 10·22 10·49	27·0 27·3	27·1	1·0	0·6	0·36
4	544 Gr. 72 & 975 Gr. 80 ,, ,, ,, ,,	Feb. 21 ,, 25	0 48	E, W W, E	74 45 24·86 24·87	+ 14 2·33 1·60	27·2 26·5	26·9	1·0	0·4	0·16
5	982 & 984 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	24 25	W, E E, W	75 17 46·84 46·83	− 18 20·65 19·52	26·2 27·3	26·8	1·0	0·3	0·09
6	1001 & 1021 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	7 31	W, E E, W	75 6 29·26 29·26	− 7 2·36 2·03	26·9 27·2	27·1	1·0	0·6	0·36
7	580 Gr. 72 & 1076 Gr. 80 ,, ,, ,, ,,	Feb. 21 ,, 25	23 9	E, W W, E	74 38 33·20 33·20	+ 20 53·35 54·14	26·6 27·3	26·9	1·0	0·4	0·16
8	1082 Gr. 80 & 637 Gr. 72 ,, ,, ,, ,,	Feb. 21 ,, 25	7 28	W, E E, W	74 53 13·00 12·99	+ 6 13·01 13·33	26·0 26·3	26·2	1·0	0·3	0·09
9	1139 & 1162 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	1 35	E, W W, E	75 5 7·02 7·00	− 5 40·27 39·77	26·8 27·2	27·0	1·0	0·5	0·25
10	1173 & 1181 Gr. 80	Feb. 25	6 52	E, W	74 58 41·44	+ 0 45·58	27·0	27·0	0·7	0·5	0·18
11	1221 & 1232 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	15 22	W, E E, W	74 56 40·31 40·27	+ 2 45·99 45·81	26·3 26·1	26·2	1·0	0·3	0·09
12	1256 & 1282 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	6 51	E, W W, E	74 39 15·87 15·83	+ 20 10·27 12·06	26·1 27·9	27·0	1·0	0·5	0·25
13	1289 Gr. 80 & 937 Gr. 64 ,, ,, ,, ,,	Feb. 21 ,, 25	12 59	W, E E, W	74 51 24·97 24·93	+ 8 0·17 0·73	25·1 25·7	25·4	1·0	1·1	1·21
14	1313 & 1323 Gr. 80 ,, ,, ,,	Feb. 21 ,, 25	9 35	E, W W, E	74 55 6·90 6·85	+ 4 19·99 19·64	26·9 26·5	26·7	1·0	0·2	0·04
15	1327 Gr. 80 & 764 Gr. 72 ,, ,, ,, ,,	Feb. 21 ,, 25	3 52	W, E E, W	75 5 43·25 43·21	− 6 17·30 17·21	26·0 26·0	26·0	1·0	0·5	0·25

154. Darutippa—*Co-latitude* 74° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
16	1343 & 1359 Gr. 80 " " "	Feb. 21 " 25	12 16	E, W W, E	75 13 7·63 7·59	− 13 41·23 41·15	26·4 26·4	26·4	1·0	0·1	0·01
17	1370 & 1405 Gr. 80 " " "	Feb. 21 " 25	12 28	W, E E, W	74 53 53·50 53·44	+ 5 32·89 32·75	26·4 26·2	26·3	0·7	0·2	0·03
18	1405 Gr. 80 & 818 Gr. 72 " " " "	Feb. 21 " 25	12 33	E, W W, E	74 59 10·91 10·87	+ 0 14·29 15·05	25·2 25·9	25·6	0·7	0·9	0·57
19	1442 & 1449 Gr. 80 " " "	Feb. 21 " 25	4 58	W, E E, W	75 0 4·10 4·05	− 0 37·00 35·66	27·1 28·4	27·8	1·0	1·3	1·69
20	1463 Gr. 80 & 1081 Gr. 64 " " " "	Feb. 21 " 25	4 45	E, W W, E	74 46 44·39 44·34	+ 12 41·30 42·42	25·7 26·8	26·3	1·0	0·2	0·04
21	1090 Gr. 64 & 1483 Gr. 80 " " " "	Feb. 21 " 25	17 58	W, E E, W	75 4 42·36 42·32	− 5 15·61 16·18	26·8 26·1	26·5	1·0	0·0	0·00
22	1504 Gr. 80 & 1119 Gr. 64 " " " "	Feb. 21 " 25	2 37	W, E E, W	75 6 23·53 23·49	− 6 58·28 56·51	25·2 27·0	26·1	1·0	0·4	0·16
23	1511 & 1517 Gr. 80 " " "	Feb. 22 " 26	9 41	E, W W, E	74 47 44·53 44·48	+ 11 41·35 41·85	25·9 26·3	26·1	1·0	0·4	0·16
24	1539 & 1543 Gr. 80 " " "	Feb. 22 " 26	20 30	W, E E, W	75 24 29·60 29·57	− 25 2·89 3·27	26·7 26·3	26·5	1·0	0·0	0·00
25	1547 & 1572 Gr. 80 " " "	Feb. 22 " 26	3 12	E, W W, E	75 1 32·60 32·55	− 2 7·13 6·16	25·5 26·4	26·0	1·0	0·5	0·25
26	1585 & 1590 Gr. 80 " " "	Feb. 22 " 26	10 1	E, W W, E	74 50 60·02 59·98	+ 8 25·89 25·86	25·9 25·8	25·9	1·0	0·6	0·36
27	1592 & 1599 Gr. 80 " " "	Feb. 22 " 26	15 34	W, E E, W	75 5 12·84 12·80	− 5 46·97 46·14	25·9 26·7	26·3	1·0	0·2	0·04
28	1617 & 1636 Gr. 80 " " "	Feb. 22 " 26	6 34	E, W W, E	74 52 24·80 24·76	+ 7 0·63 2·47	25·4 27·2	26·3	1·0	0·2	0·04
29	1648 Gr. 80 & 5490 Cape 80 " " " "	Feb. 22 " 26	2 24	W, E E, W	75 6 14·08 14·03	− 6 47·02 47·37	27·1 26·6	26·8	1·0	0·3	0·09
30	961 & 962 Gr. 72 " " "	Feb. 22 " 26	1 11	E, W W, E	74 55 59·81 59·78	+ 3 26·08 26·18	25·9 26·0	26·0	1·0	0·5	0·25
31	1667 & 1681 Gr. 80 " " "	Feb. 22 " 26	0 38	W, E E, W	75 6 9·72 9·70	− 6 41·66 42·75	28·1 27·0	27·5	0·7	1·0	0·70
32	1681 Gr. 80 & 989 Gr. 72 " " " "	Feb. 23 " 26	0 19	E, W W, E	74 47 18·27 18·25	+ 12 8·94 9·51	27·2 27·8	27·5	0·7	1·0	0·70
33	1695 & 1713 Gr. 80 " " "	Feb. 23 " 26	17 22	W, E E, W	74 49 13·31 13·30	+ 10 12·79 12·44	26·1 25·7	25·9	1·0	0·6	0·36

154. Darutippa—*Co-latitude* 74° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
34	1012 Gr. 72 & 1729 Gr 80	Feb. 23	8 25	E, W	74 38 52·47	+ 20 34·03	26·5				
	" " " "	" 26		W, E	52·46	34·94	27·4	27·0	1·0	0·5	0·25
35	1733 & 1748 Gr. 80	Feb. 23	13 37	W, E	75 4 2·78	− 4 36·00	26·8				
	" " "	" 26		E, W	2·78	36·37	26·4	26·6	1·0	0·1	0·01
36	1758 & 1780 Gr. 80	Feb 23	10 32	E, W	75 16 32·37	− 17 5·99	26·4				
	" " "	" 26		W, E	32·37	5·64	26·7	26·5	1·0	0·0	0·00
37	1794 & 1807 Gr 80	Feb. 23	8 32	W, E	74 50 35·62	+ 8 50·86	26·5				
	" " "	" 26		E, W	35·63	50·80	26·4	26·4	1·0	0·1	0·01
38	1810 & 1827 Gr 80	Feb. 23	3 57	E, W	74 55 53·95	+ 3 31·56	25·5				
	" " "	" 26		W, E	53·97	32·30	26·3	25·9	1·0	0·6	0·36
39	1844 & 1850 Gr. 80	Feb. 23	6 37	E, W	74 39 13·30	+ 20 13·05	26·4				
	" " "	" 26		W, E	13·32	14·48	27·8	27·1	0·7	0·6	0·25
40	1850 & 1861 Gr. 80	Feb. 23	6 34	W, E	74 35 48·63	+ 23 38·02	26·7				
	" " "	" 26		E, W	48·65	38·52	27·2	26·9	0·7	0·4	0·11
41	1882 & 1884 Gr. 80	Feb 24	7 45	W, E	75 2 23·54	− 2 57·53	26·0				
	" " "	" 26		E, W	23·57	57·35	26·2	26·1	1·0	0·4	0·16
42	1898 & 1926 Gr 80	Feb 24	11 17	E, W	74 48 11·18	+ 11 14·72	25·0				
	" " "	" 26		W, E	11·20	15·79	27·0	26·4	0·7	0·1	0·01
43	1926 & 1933 Gr. 80	Feb. 24	11 16	W, E	74 48 58·75	+ 10 27·09	25·8				
	" " "	" 26		E, W	58·78	27·37	26·2	26·0	0·7	0·5	0·18
44	1939 & 1960 Gr 80	Feb. 24	24 14	E, W	74 36 55·69	+ 22 30·15	25·8				
	" " "	" 26		W, E	55·72	31·00	26·7	26·3	1·0	0·2	0·04
45	1965 & 1985 Gr 80	Feb. 24	4 5	W, E	75 5 43·25	− 6 16·46	26·8				
	" " "	" 26		E, W	43·29	16·77	26·5	26·7	1·0	0·2	0·04
46	1990 Gr. 80 & 1185 Gr. 72	Feb. 24	24 48	E, W	74 56 19·03	+ 3 7·27	26·3				
	" " " "	" 27		W, E	19·10	6·42	25·5	25·9	1·0	0·6	0·36
47	2011 & 2019 Gr. 80	Feb. 24	23 56	W, E	75 1 18·99	− 1 51·90	27·1				
	" " "	" 27		E, W	19·08	52·74	26·3	26·7	1·0	0·2	0·04
48	2024 & 2032 Gr. 80	Feb. 24	3 14	E, W	75 13 52·40	− 14 26·30	26·1				
	" " "	" 27		W, E	52·48	25·54	26·9	26·5	1·0	0·0	0·00
49	2048 & 2061 Gr. 80	Feb. 24	24 32	W, E	75 26 55·30	− 27 29·03	25·4				
	" " "	" 27		E, W	55·39	29·44	25·9	25·6	1·0	0·9	0·81
50	1243 Gr. 72 & 2107 Gr. 80	Feb. 24	22 24	W, E	74 39 46·80	+ 19 39·40	26·2				
	" " " "	" 27		E, W	46·90	38·89	25·8	26·0	0·7	0·5	0·18
51	2107 & 2114 Gr. 80	Feb. 24	22 32	E, W	74 47 23·06	+ 12 3·16	26·2				
	" " "	" 27		W, E	23·16	2·77	25·9	26·1	0·7	0·4	0·11

154. Darutippa—*Co-latitude* 74° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
52	2129 & 2143 Gr. 80 " " "	Feb. 24 " 27	11 5	W, E E, W	74 49 59·44 59·55	+ 9 27·08 27·98	26·5 27·5	27·0	1·0	0·5	0·25
53	2173 Gr. 80 & 1280 Gr. 72 " " " "	Feb. 24 " 27	12 59	E, W W, E	74 57 12·02 12·14	+ 2 14·91 14·89	26·9 27·0	27·0	1·0	0·5	0·25
54	2207 & 2214 Gr. 80 " " "	Feb. 24 " 27	4 34	W, E E, W	74 49 15·45 15·61	+ 10 11·78 10·63	27·2 26·2	26·7	1·0	0·2	0·04
55	2225 & 2227 Gr. 80 " " "	Feb. 24 " 27	1 39	E, W W, E	74 50 46·31 46·45	+ 8 40·52 39·96	26·8 26·4	26·6	1·0	0·1	0·01
56	2228 & 2248 Gr. 80 " " "	Feb. 24 " 27	16 10	W, E E, W	75 19 21·32 21·48	− 19 55·39 55·65	25·9 25·8	25·9	1·0	0·6	0·36
57	2270 & 2281 Gr. 80 " " "	Feb. 24 " 27	2 39	E, W W, E	75 13 29·09 29·25	− 14 2·74 3·04	26·4 26·2	26·3	1·0	0·2	0·04
58	2302 Gr. 80 & 1352 Gr. 72 " " " "	Feb. 24 " 27	22 54	W, E E, W	75 11 10·39 10·55	− 11 44·54 44·31	25·9 26·2	26·0	1·0	0·5	0·25
59	2324 & 2332 Gr. 80 " " "	Feb. 24 " 27	12 26	E, W W, E	75 3 25·37 25·54	− 3 59·53 58·78	25·8 26·8	26·3	1·0	0·2	0·04
60	2349 & 2377 Gr. 80 " " "	Feb. 24 " 27	15 49	W, E E, W	75 7 36·41 36·62	− 8 9·93 10·38	26·5 26·2	26·4	1·0	0·1	0·01
61	953 & 955 Gr. 80 " " "	Feb. 21 " 25	10 54	W, E E, W	75 3 10·07 10·08	− 3 43·25 43·15	26·8 26·9	26·9	1·0	0·4	0·16
								Σ P = 57·7		Σ Pvv = 13·45	

Summary.

No. of pairs 61
No. of observations 121

Mean difference between observations taken E, W and those taken W, E = − 0″·16

Observed Co-latitude (weighted mean) 74° 59′ 26″·47 ± 0″·044

Correction for Height above Sea-level + 0″·01

Final Co-latitude 74° 59′ 26″·48

		°	′	″	″
Astronomical Latitude (A)	=	15	0	33·52	± 0·044
Geodetic Latitude (G)	=	15	0	36·47	
Deflection of plumb-line (A − G)	=		−	2·95	

155. Deesa—*Co-latitude* 65° 44′ +

Latitude .. 24° 15′ — *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude .. 72 14 — *Mean Height of Barometer* 29·55 in.

Height ... 443 feet — *Mean Temperature* 72°·0

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	1240 Gr. 80 & 716 Gr. 72	Mar. 8	3 43	E, W	65 38 1·47	+ 6 36·90	38·37				
	" " " "	" 10		W, E	1·39	38·48	39·87				
	" " " "	" 11		W, E	1·35	37·16	38·51				
	" " " "	" 12		E, W	1·31	38·04	39·35	39·02	1·3	0·22	0·0629
2	1265 & 1266 Gr. 80	Mar. 8	1 3	W, E	65 47 41·66	− 3 3·18	38·48				
	" " "	" 10		E, W	41·58	3·77	37·81				
	" " "	" 11		E, W	41·53	1·24	40·29				
	" " "	" 12		W, E	41·49	2·54	38·05	38·88	1·3	0·08	0·0083
3	1281 & 1297 Gr. 80	Mar. 8	7 59	E, W	65 58 17·86	− 13 39·76	38·10				
	" " "	" 10		W, E	17·77	40·02	37·75				
	" " "	" 11		W, E	17·73	39·54	38·19				
	" " "	" 12		E, W	17·68	38·39	39·29	38·33	1·3	0·47	0·2872
4	1300 & 1311 Gr. 80	Mar. 8	6 39	W, E	65 26 33·96	+ 18 4·58	38·54				
	" " "	" 10		E, W	33·86	5·16	39·02				
	" " "	" 11		E, W	33·81	6·55	40·36				
	" " "	" 12		W, E	33·77	4·44	38·21	39·03	1·3	0·23	0·0688
5	757 Gr. 72 & 1327 Gr. 80	Mar. 8	5 11	E, W	66 2 31·01	− 17 52·68	38·33				
	" " " "	" 10		W, E	30·91	53·64	37·27				
	" " " "	" 11		W, E	30·86	52·68	38·18				
	" " " "	" 12		E, W	30·81	52·46	38·35	38·03	1·3	0·77	0·7708
6	1363 & 1342 Gr. 80	Mar. 8	1 40	E, W	65 51 4·66	− 6 26·35	38·31				
	" " "	" 10		W, E	4·55	25·92	38·63				
	" " "	" 12		E, W	4·44	26·31	38·13	38·36	0·8	0·44	0·1549
7	1363 & 1373 Gr. 80	Mar. 8	1 40	E, W	65 58 14·83	− 13 36·64	38·19				
	" " "	" 10		W, E	14·72	37·25	37·47				
	" " "	" 12		E, W	14·61	36·69	37·92	37·86	0·8	0·94	0·7069
8	1399 & 1387 Gr. 80	Mar. 8	48 22	E, W	65 37 38·39	+ 6 59·87	38·26				
	" " "	" 10		W, E	38·31	61·63	39·94				
	" " "	" 12		E, W	38·23	60·73	38·96	39·05	1·2	0·25	0·0750
9	1473 & 1461 Gr. 80	Mar. 10	4 37	W, E	65 27 33·90	+ 17 5·58	39·48				
	" " "	" 12		E, W	33·76	4·96	38·72	39·10	1·0	0·30	0·0900

155. Deesa—*Co-latitude* 65° 44′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
10	1474 & 1463 Gr. 80	Mar. 10	4 36	W, E	65 26 37·78	+ 18 1·08	38·86				
	,, ,, ,,	,, 12		E, W	37·64	1·04	38·68	38·77	1·0	0·03	0·0009
11	1483 & 1482 Gr. 80	Mar. 10	8 34	E, W	65 41 17·28	+ 3 20·59	37·87				
	,, ,, ,,	,, 12		W, E	17·15	21·59	38·74	38·30	0·7	0·50	0·1750
12	1483 & 1498 Gr. 80	Mar. 10	8 34	E, W	65 41 43·37	+ 2 55·05	38·42				
	,, ,, ,,	,, 12		W, E	43·24	54·94	38·18	38·30	0·7	0·50	0·1750
13	1505 & 1498 Gr. 80	Mar. 8	8 33	W, E	65 42 57·58	+ 1 43·25	40·83				
	,, ,, ,,	,, 10		E, W	57·43	41·14	38·57				
	,, ,, ,,	,, 12		W, E	57·29	41·55	38·84	39·41	0·8	0·61	0·2977
14	1507 & 1498 Gr. 80	Mar. 8	8 28	W, E	65 47 52·24	− 3 12·15	40·09				
	,, ,, ,,	,, 10		E, W	52·09	14·17	37·92				
	,, ,, ,,	,, 12		W, E	51·95	13·23	38·72	38·91	0·8	0·11	0·0097
15	1520 & 1532 Gr. 80	Mar. 8	5 48	W, E	65 42 58·10	+ 1 40·27	38·46				
	,, ,, ,,	,, 10		E, W	58·04	39·70	37·74				
	,, ,, ,,	,, 12		W, E	57·89	39·53	37·42	37·87	1·2	0·93	1·0379
16	1538 & 1543 Gr. 80	Mar. 8	30 11	E, W	65 43 16·36	+ 1 23·14	39·50				
	,, ,, ,,	,, 10		W, E	16·23	22·69	38·92				
	,, ,, ,,	,, 12		E, W	16·11	22·30	38·41	38·94	1·2	0·14	0·0235
17	1197 & 1227 Gr. 80	Mar. 8	0 5	E, W	65 39 38·46	+ 5 0·83	39·29				
	,, ,, ,,	,, 11		E, W	38·35	1·23	39·58				
	,, ,, ,,	,, 12		W, E	38·31	1·82	40·13	39·67	0·8	0·87	0·6055
18	1407 & 1425 Gr. 80	Mar. 8	0 11	E, W	65 34 10·26	+ 10 29·68	39·94				
	,, ,, ,,	,, 10		W, E	10·14	28·44	38·58				
	,, ,, ,,	,, 12		E, W	10·01	28·63	38·64	39·05	0·8	0·25	0·0500
19	1425 & 1432 Gr. 80	Mar. 8	0 13	W, E	65 31 41·65	+ 12 57·90	39·55				
	,, ,, ,,	,, 10		E, W	41·51	58·23	39·74				
	,, ,, ,,	,, 12		W, E	41·38	57·26	38·64	39·31	0·8	0·51	0·2081
20	1197 Gr. 80	Mar. 8	0 7	E, W	65 37 49·53	+ 6 49·52	39·05				
	,, ,,	,, 10		W, E	49·46	48·76	38·22				
	,, ,,	,, 11		W, E	49·42	49·84	39·26				
	,, ,,	,, 12		E, W	49·39	50·02	39·41	38·98	0·9	0·18	0·0292
21	1227 Gr. 80	Mar. 8	0 3	W, E	65 41 27·39	+ 3 11·59	38·98				
	,, ,,	,, 10		E, W	27·32	11·92	39·24				
	,, ,,	,, 11		E, W	27·28	12·23	39·51				
	,, ,,	,, 12		W, E	27·24	12·50	39·74	39·37	0·9	0·57	0·2924
22	1407 Gr. 80	Mar. 10	0 7	W, E	65 38 23·20	+ 6 14·64	37·84				
	,, ,,	,, 12		E, W	23·07	15·08	38·15	37·99	0·7	0·81	0·4593

155. Deesa—*Co-latitude* 65° 44′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
23	1425 Gr. 80	Mar 8	0 15	W, E	65 29 57·21	+ 14 41·85	39·06				
	" "	" 10		E, W	57·08	42 40	39·48				
	" "	" 12		W, E	56·95	42 48	39·43	39·32	0·8	0·52	0·2163
24	1432 Gr. 80	Mar. 8	0 11	E, W	65 33 26·00	+ 11 12 69	38·78				
	" "	" 10		W, E	25 95	13·73	39·68				
	" "	" 12		E, W	25 82	14·96	40·78	39·75	0 8	0·95	0·7220
								ΣP = 23·2		ΣPvv = 6·5273	

Summary.

No. of pairs 24
No. of observations 71

Mean difference between observations taken E, W and those taken W, E = − 0″·36

Observed Co-latitude (weighted mean) 65° 44′ 38″·80 ± 0″·074

Correction for Height above Sea-level + 0″·02

Corrected Co-latitude 65° 44′ 38″·82 ± 0″·074

For final Co-latitude and deduction of (A—G) see page (230).

755. Deesa—*Co-latitude* 65° 44′ +

Latitude ... 24° 15′	*Maximum recorded Height of Barometer*	=	29·58 in.*
Longitude ... 72 14	*Minimum* „ „ „	=	29·53
Height ... 443 feet*	*Maximum* „ *Reading of Thermometer*	=	79°·4
Instrument—Zenith Sector No. 1	*Minimum* „ „ „	=	69 ·5

Observer—Captain S. G. Burrard, R.E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	Seconds of Co-lat. corrected for error of Limb*	v	v v
		1893			° ′ ″	° ′ ″	″	″	″	″		
1	1197 Gr. 80	Mar. 8	N	E, W	0 6 49·64	65 37 49·53	39·17					
	„ „	„ 10	„	W, E	49·53	49·46	38·99					
	„ „	„ 11	S	W, E	49·11	49·42	38·53					
	„ „	„ 12	„	E, W	49·98	49·39	39·37	39·02	...	39·00	0·15	0·0225
2	1227 Gr. 80	Mar. 10	N	E, W	0 3 11·68	65 41 27·32	39·00					
	„ „	„ 11	S	E, W	11·43	27·28	38·71					
	„ „	„ 12	„	W, E	12·28	27·24	39·52	39·08	...	39·07	0·22	0·0484
3	1407 Gr. 80	Mar. 10	N	W, E	0 6 14·87	65 38 23·20	38·07					
	„ „	„ 12	S	E, W	14·99	23·08	38·07	38·07	...	38·05	0·80	0·6400
4	1425 Gr. 80	Mar. 8	N	W, E	0 14 42·53	65 29 57·21	39·74					
	„ „	„ 10	„	E, W	42·18	57·08	39·26					
	„ „	„ 12	S	W, E	42·05	56·95	39·00	39·33	...	39·28	0·43	0·1849
5	1432 Gr. 80	Mar. 8	N	E, W	0 11 13·41	65 33 26·09	39·50					
	„ „	„ 10	„	W, E	12·26	25·96	38·22	38·86	...	38·83	0·02	0·0004
								Σ vv by N. Stars = 0·8962				

* *See* Appendix 3.

Summary.

No. of North Stars 5 No. of South Stars *nil*

No. of observations 14

	°	′	″	″
Co-latitude by Sector Method	65	44	38·85	± 0·128
Correction for Height above Sea-level		+	0·02	
Corrected Co-latitude by Sector Method	65	44	38·87	± 0·128
Corrected Co-latitude by Talcott Method, p. (229)	65	44	38·82	± 0·074

Final Co-latitude 65° 44′ 38″·85

		°	′	″	″
Astronomical Latitude (A)	=	24	15	21·15	± 0·074
Geodetic Latitude (G)	=	24	15	29·35	
Deflection of plumb-line (A − G)	=		−	8·20	

156. Dehra Dun Base-line East End—*Co-latitude* 59° 43′ +

Latitude ... 30° 17′ *Instrument*—Zenith Telescope

Longitude ... 78 1 *Mean Height of Barometer* 28·00 in.

Height ... 1958 feet *Mean Temperature* 48°·8

Observer—Lieut. G. P. Lenox Conyngham, R. E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
1	5 & 25 Gr. 80	Nov. 2	2 3	W, E	59 26 35·67	+ 16 47·75	23·4				
	" " "	" 4		E, W	35·43	46·11	21·5	22·4	1·0	0·3	0·09
2	52 & 114 Gr. 80	Nov. 2	6 51	E, W	59 28 6·27	+ 15 16·54	22·8				
	" " "	" 4		W, E	6·03	16·00	22·0	22·4	1·0	0·3	0·09
3	137 & 145 Gr. 80	Nov. 2	7 26	W, E	59 30 54·14	+ 12 28·09	22·2				
	" " "	" 4		E, W	53·89	29·74	23·6	22·9	0·7	0·2	0·03
4	145 & 146 Gr. 80	Nov. 2	7 33	E, W	59 37 10·10	+ 6 12·31	22·4				
	" " "	" 4		W, E	9·85	14·46	24·3	23·3	0·7	0·6	0·25
5	181 & 196 Gr. 80	Nov. 2	0 58	E, W	59 31 2·84	+ 12 18·87	21·7				
	" " "	" 4		W, E	2·58	19·88	22·5	22·1	1·0	0·6	0·36
6	214 & 264 Gr. 80	Nov. 2	10 34	W, E	59 41 22·71	+ 1 58·94	21·6				
	" " "	" 4		E, W	22·46	59·70	22·2	21·9	1·0	0·8	0·64
7	234 Gr. 64 & 326 Gr 80	Nov. 2	7 14	E, W	59 48 37·89	− 5 14·55	23·3				
	" " " "	" 4		W, E	37·71	15·30	22·4	22·8	0·7	0·1	0·01
8	326 Gr. 80 & 278 Gr. 64	Nov. 2	7 12	W, E	59 50 41·66	− 7 18·79	22·9				
	" " " "	" 4		E, W	41·40	18·74	22·7	22·8	0·7	0·1	0·01
9	285 Gr. 64 & 334 Gr. 80	Nov. 2	0 37	E, W	59 35 13·68	+ 8 9·80	23·5				
	" " " "	" 4		W, E	13·41	9·53	22·9	23·2	1·0	0·5	0·25
10	347 & 353 Gr. 80	Nov. 2	2 21	E, W	59 29 37·67	+ 13 43·47	21·1				
	" " "	" 4		E, W	37·41	45·51	22·9	22·0	1·0	0·7	0·49
11	376 & 388 Gr. 80	Nov. 3	5 45	W, E	60 4 18·03	− 20 55·43	22·6				
	" " "	" 4		E, W	17·91	55·96	21·9	22·2	1·0	0·5	0·25
12	401 & 444 Gr. 80	Nov. 3	9 25	E, W	59 40 19·72	+ 3 2·29	22·0				
	" " "	" 4		W, E	19·60	3·38	23·0	22·5	0·7	0·2	0·03
13	444 & 472 Gr. 80	Nov. 3	9 10	W, E	59 56 25·24	− 13 1·94	23·3				
	" " "	" 4		E, W	25·12	2·65	22·5	22·9	0·7	0·2	0·03
14	472 & 488 Gr. 80	Nov. 3	9 17	E, W	60 4 21·04	− 20 58·84	22·2				
	" " "	" 4		W, E	20·93	57·89	23·0	22·6	0·7	0·1	0·01
15	451 Gr. 64 & 581 Gr. 80	Nov. 3	6 49	W, E	59 34 25·97	+ 8 56·26	22·2				
	" " " "	" 4		E, W	25·86	56·58	22·4	22·3	1·0	0·4	0·16

156. Dehra Dun Base-line East End—*Co-latitude* 59° 43′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
16	1664 Cape 80 & 643 Gr. 80	Nov. 3	7 27	E, W	59 41 12·64	+ 2 9·95	22·6				
	" " " "	" 4		W, E	12·55	10·02	22·6	22·6	1·0	0·1	0·01
17	681 & 693 Gr. 80	Nov. 3	3 24	E, W	59 30 36·76	+ 12 47·72	24·5				
	" " "	" 4		W, E	36·67	46·16	22·8	23·6	1·0	0·9	0·81
18	590 Gr. 64 & 776 Gr. 80	Nov. 3	6 43	E, W	59 24 22·35	+ 19 0·91	23·3	23·3	0·5	0·6	0·18
19	776 Gr. 80 & 622 Gr. 64	Nov. 3	6 46	W, E	59 27 31·21	+ 15 52·47	23·7	23·7	0·5	1·0	0·50
								Σ P = 15·9		Σ Pvv = 4·20	

Summary.

No. of pairs 19
No. of observations 36

Mean difference between observations taken E, W and those taken W, E = + 0″·21

Observed Co-latitude (weighted mean) 59° 43′ 22″·65 ± 0″·082

Correction for Height above Sea-level + 0″·09

Final Co-latitude 59° 43′ 22″·74

	°	′	″	″
Astronomical Latitude (A)	= 30	16	37·26	± 0·082
Geodetic Latitude (G)	= 30	17	7·35	
Deflection of plumb-line (A−G)	=		− 30·09	

157. Dehra Dun Haig Observatory—*Co-latitude* 59° 41′ +

Latitude ... 30° 19′ *Instrument*—Zenith Telescope

Longitude ... 78 6 *Mean Height of Barometer* 27·74 in.

Height ... 2240 feet *Mean Temperature* 55°·5

Observer—Captain H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1904	° ′		° ′ ″	′ ″	″	″			
1	3792 Gr. 80 & 1499 Newc.	Dec. 6	20 22	E, W	59 18 7·36	+ 23 1·22	8·58				
	" " " "	" 7		W, E	7·45	0·36	7·81	8·20	1·0	0·10	0·0100
2	1517 & 1529 Newcomb	Dec. 6	18 47	E, W	59 59 51·98	− 18 42·81	9·17				
	" " "	" 7		W, E	52·04	43·55	8·49				
	" " "	" 13		E, W	52·38	44·50	7·88				
	" " "	" 15		W, E	52·52	43·81	8·71	8·56	1·3	0·46	0·2751
3	1536 & 1544 Newcomb	Dec. 6	37 5	W, E	59 28 57·13	+ 12 10·84	7·97				
	" " "	" 7		E, W	57·16	10·33	7·49				
	" " "	" 13		W, E	57·34	10·29	7·63				
	" " "	" 19		E, W	57·60	9·84	7·44	7·63	1·3	0·47	0·2872
4	1550 & 1562 Newcomb	Dec. 6	31 46	E, W	60 0 11·70	− 19 4·34	7·36				
	" " "	" 7		W, E	11·74	3·18	8·56				
	" " "	" 13		E, W	11·94	3·24	8·70				
	" " "	" 15		W, E	12·03	3·69	8·34				
	" " "	" 20		W, E	12·27	4·56	7·71	8·12	1·4	0·02	0·0006
5	1568 & 1583 Newcomb	Dec. 6	12 5	W, E	59 19 48·29	+ 21 20·03	8·32				
	" " "	" 7		E, W	48·32	19·01	7·33				
	" " "	" 13		W, E	48·52	19·27	7·79				
	" " "	" 15		E, W	48·62	18·80	7·42				
	" " "	" 19		W, E	48·84	18·86	7·70				
	" " "	" 20		E, W	48·89	18·25	7·14	7·62	1·5	0·48	0·3456
6	4029 Gr. 80 & 1592 Newc.	Dec. 6	24 25	E, W	59 14 27·07	+ 26 41·74	8·81				
	" " " "	" 7		W, E	26·88	41·69	8·57				
	" " " "	" 13		E, W	26·98	41·39	8·37				
	" " " "	" 15		W, E	27·04	41·40	8·44				
	" " " "	" 19		E, W	27·17	40·97	8·14				
	" " " "	" 20		W, E	27·20	41·19	8·39	8·45	1·5	0·35	0·1838
7	6 & 10 Newcomb	Dec. 6	15 27	W, E	59 53 54·28	− 12 46·48	7·80				
	" " "	" 7		E, W	54·29	45·97	8·32				
	" " "	" 13		W, E	54·37	46·70	7·67				
	" " "	" 15		E, W	54·42	46·21	8·21				
	" " "	" 19		W, E	54·54	46·41	8·13				
	" " "	" 20		E, W	54·57	45·85	8·72	8·14	1·5	0·04	0·0024
8	11 Newc. & 56 Gr. 80	Dec. 13	22 7	E, W	59 35 28·67	+ 5 39·36	8·03				
	" " " "	" 15		W, E	28·71	39·64	8·35				
	" " " "	" 19		E, W	28·78	39·29	8·07				
	" " " "	" 20		W, E	28·80	38·75	7·55	8·00	0·9	0·10	0·0090
9	17 Newc. & 56 Gr. 80	Dec. 13	22 26	E, W	59 54 24·32	− 13 16·16	8·16				
	" " " "	" 19		E, W	24·44	15·97	8·47				
	" " " "	" 20		W, E	24·46	16·03	8·43	8·38	0·9	0·28	0·0706

157. Dehra Dun Haig Observatory—*Co-latitude* 59° 41′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1904-05	° ′		° ′ ″	′ ″	″	″			
10	71 & 74 Gr. 80	Dec. 19	23 48	W, E	59 47 2·66	− 5 55·20	7·46				
	" " "	" 20		E, W	2·67	54·72	7·95	7·71	1·0	0·39	0·1521
11	74 & 80 Gr. 80	Dec. 19	23 37	E, W	59 57 37·65	− 16 29·30	8·35				
	" " "	" 20		W, E	37·66	29·45	8·21	8·28	1·0	0·18	0·0324
12	327 Newc. & 877 Gr. 80	Mar. 1	8 12	E, W	59 48 57·76	− 7 49·45	8·31	8·31	1·0	0·21	0·0441
13	340 & 344 Newcomb	Mar. 1	32 45	W, E	59 44 57·91	− 3 50·35	7·56	7·56	0·5	0·54	0·1458
14	344 & 364 Newcomb	Mar. 1	32 50	E, W	59 50 4·65	− 8 57·34	7·31	7·31	0·5	0·79	0·3121
15	382 & 383 Newcomb	Mar. 1	23 27	W, E	59 10 3·81	+ 31 3·66	7·47	7·47	0·7	0·63	0·2778
16	387 & 396 Newcomb	Mar. 1	15 5	E, W	60 8 32·76	− 27 23·32	9·44	9·44	0·7	1·34	1·2569
								ΣP = 16·7		ΣPvv = 3·4055	

Summary.

No. of pairs 16
No. of observations 49

Mean difference between observations taken E, W and those taken W, E = + 0″·09

Observed Co-latitude (weighted mean) 59° 41′ 8″·10 ± 0″·079

Correction for Height above Sea-level + 0″·10

Final Co-latitude 59° 41′ 8″·20

		°	′	″	
Astronomical Latitude (A)	=	30	18	51·80	± 0·079
Geodetic Latitude (G)	=	30	19	28·73	
Deflection of plumb-line (A−G)	=			− 36·93	

158. Dera Din Panah—*Co-latitude* 59° 25′ +

Latitude	... 30° 34′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 70 59	*Mean Height of Barometer* in	29·58
Height	... 490 feet	*Mean Temperature*	50°·2

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	525 & 539 Gr 80 " " "	Feb. 2 " 5	18 4	E, W W, E	59 21 49·22 49 30	+ 4 13 39 10 25	62 61 59 55	61·08	0·7	0·73	0·3730
2	528 & 539 Gr. 80	Feb. 5	18 17	W, E	59 8 22·00	+ 17 39·44	61·44	61·44	0·5	1·09	0·5941
3	565 & 572 Gr. 80 " " "	Feb. 2 " 5	11 27	W, E E, W	59 11 40·44 40·49	+ 14 20·94 18·81	61 38 59·30	60·34	1·0	0·01	0·0001
4	597 & 604 Gr. 80 " " "	Feb. 2 " 5	32 17	E, W W, E	59 30 16·08 16 08	− 4 16·49 16·97	59·59 59 11	59·35	1·0	1·00	1·0000
5	610 & 630 Gr. 80 " " "	Feb. 2 " 5	8 57	W, E E, W	59 14 55·78 55·80	+ 11 4·72 4·79	60·50 60·59	60·54	0·7	0·19	0·0253
6	610 & 633 Gr. 80 " " "	Feb. 2 " 5	8 59	W, E E, W	59 17 0·94 0·96	+ 8 59·31 59 21	60·25 60·17	60·21	0 7	0·14	0·0137
7	660 & 677 Gr. 80 " " "	Feb. 2 " 5	9 21	E, W W, E	59 7 49·93 49·92	+ 18 11·23 11·13	61·16 61·05	61·10	1·0	0·75	0·5625
8	698 & 720 Gr. 80 " " "	Feb. 5 " 8	12 0	E, W W, E	59 11 38·91 38 87	+ 14 20·42 21·15	59·33 60·02	59·67	0·7	0·68	0·3237
9	712 & 721 Gr. 80 " " " " " "	Feb. 2 " 5 " 8	11 57	W, E E, W W, E	59 6 20·15 20·12 20·09	+ 19 40·69 41·90 40·78	60·84 62·02 60·87	61·24	0·8	0·89	0·6337
10	698 & 721 Gr. 80 " " " " " "	Feb. 2 " 5 " 8	12 1	W, E E, W W, E	59 10 44·60 44·57 44·54	+ 15 15·72 15·48 16·42	60·32 60 05 60·90	60·44	0·8	0·09	0·0065
11	712 & 720 Gr. 80 " " "	Feb. 5 " 8	11 56	E, W W, E	59 7 14·46 14·42	+ 18 46·84 45·51	61·30 59·93	60·61	0·7	0·26	0·0473
12	745 & 746 Gr. 80 " " " " " "	Feb. 2 " 5 " 8	45 8	E, W W, E E, W	59 22 44·24 44·17 44·09	+ 3 16·87 16·32 16·52	61·11 60·49 60·61	60·74	1·2	0·39	0·1825
13	764 & 789 Gr. 80 " " " " " "	Feb. 2 " 5 " 8	25 0	W, E E, W W, E	59 34 42·69 42·64 42·58	− 8 42·31 43 12 44·18	60·38 59·52 58·40	59·43	1·2	0·92	1·0157
14	810 & 828 Gr. 80	Feb. 8	9 2	E, W	59 31 50·06	− 5 50·66	59·40	59·40	0·7	0·95	0·6318

158. Dera Din Panah—*Co-latitude* 59° 25′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
15	828 & 835 Gr. 80	Feb. 2	10 24	W, E	59 18 44·61	+ 7 17·46	62·07				
	" " "	" 8		W, E	44·44	15·79	60·23	61·15	1·0	0·80	0·6400
16	547 & 575 Gr. 80	Feb. 6	40 25	E, W	59 24 11·16	+ 1 49·11	60·27				
	" " "	" 8		W, E	11·16	49·40	60·56	60·41	1·0	0·06	0·0036
17	581 & 643 Gr. 80	Feb. 7	7 5	E, W	59 18 24·68	+ 7 35·23	59·91				
	" " "	" 8		W, E	24·69	34·60	59·29	59·60	0·7	0·75	0·3938
18	584 & 643 Gr. 80	Feb. 7	7 0	E, W	59 13 37·66	+ 12 23·82	61·48				
	" " "	" 8		W, E	37·67	21·18	58·85	60·16	0·7	0·19	0·0253
19	590 & 643 Gr. 80	Feb. 7	7 1	E, W	59 15 4·44	+ 10 57·01	61·45				
	" " "	" 8		W, E	4·45	55·49	59·94	60·69	0·7	0·34	0·0809
20	591 & 643 Gr. 80	Feb. 7	6 59	E, W	59 12 33·80	+ 13 27·22	61·02				
	" " "	" 8		W, E	33·81	25·14	58·95	59·98	0·7	0·37	0·0958
21	646 & 675 Gr. 80	Feb. 7	11 7	W, E	59 33 22·96	− 7 23·59	59·37				
	" " "	" 8		E, W	22·96	22·56	60·40	59·88	1·0	0·47	0·2209
22	714 & 744 Gr. 80	Feb. 6	23 1	E, W	59 19 33·32	+ 6 27·48	60·80				
	" " "	" 7		W, E	33·31	27·94	61·25	61·02	0·7	0·67	0·3142
23	715 & 744 Gr. 80	Feb. 6	23 1	E, W	59 19 36·65	+ 6 24·74	61·39				
	" " "	" 7		W, E	36·64	24·32	60·96	61·17	0·7	0·82	0·4707
24	784 & 785 Gr. 80	Feb. 6	11 52	E, W	59 27 49·31	− 1 48·95	60·36				
	" " "	" 7		W, E	49·30	49·02	60·28	60·32	1·0	0·03	0·0009
25	809 & 836 Gr. 80	Feb. 6	6 49	E, W	59 4 10·32	+ 21 50·67	60·99				
	" " "	" 7		W, E	10·29	47·98	58·27	59·63	1·0	0·72	0·5184
								ΣP = 20·9		ΣPvv = 8·1744	

Summary.

No. of pairs 25
No. of observations 52

Mean difference between observations taken E, W and those taken W, E = + 0″·42

Observed Co-latitude (weighted mean) 59° 25′ 60″·35 ± 0″·086

Correction for Height above Sea-level + 0″·02

Final Co-latitude 59° 25′ 60″·37

	° ′ ″
Astronomical Latitude (A)	= 30 33 59·63 ± 0·086
Geodetic Latitude (G)	= 30 34 1·87
Deflection of plumb-line (A−G)	= − 2·24

159. Dhauleshvar—Co-latitude 71° 34′ +

Latitude	... 18° 26′	*Instrument*—Zenith Telescope	
Longitude	... 74 12	*Mean Height of Barometer*	in. 27·21
Height	... 2939 feet	*Mean Temperature*	66°·0

Observer—Lieut. G. P. Lenox Conyngham, R. E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892-93	° ′		° ′ ″	′ ″	″	″			
1	173 & 184 Gr. 80	Dec. 28	13 16	E, W	71 39 10·37	− 4 53·07	17·3	17·3	0·7	0·2	0·03
2	188 & 194 Gr. 80 " " "	Dec. 28 Jan. 1	16 35	W, E E, W	71 32 3·59 3·76	+ 2 13·44 13·52	17·0 16·3	16·6	1·0	0·5	0·25
3	196 & 199 Gr. 80 " " "	Dec. 28 Jan. 1	11 16	E, W W, E	71 44 0·93 1·11	− 9 44·17 43·93	16·8 17·2	17·0	1·0	0·1	0·01
4	243 & 264 Gr. 80 " " "	Dec. 28 Jan. 1	1 26	E, W W, E	71 40 54·69 54·84	− 6 37·20 37·05	17·4 17·8	17·6	0·7	0·5	0·18
5	264 & 273 Gr. 80	Dec. 28	1 27	W, E	71 41 10·86	− 6 53·92	16·9	16·9	0·5	0·2	0·02
6	273 Gr. 80 & 43 Gr. 75	Dec. 28	1 43	E, W	71 25 5·56	+ 9 11·62	17·2	17·2	0·5	0·1	0·01
7	325 & 340 Gr. 80 " " "	Dec. 28 Jan. 1	3 41	W, E E, W	71 32 25·85 25·96	+ 1 51·14 50·90	17·0 16·9	16·9	1·0	0·2	0·04
8	353 & 369 Gr. 80 " " "	Dec. 28 Jan. 1	10 5	E, W W, E	71 56 2·88 2·97	− 21 46·00 45·25	16·9 17·7	17·3	1·0	0·2	0·04
9	1008 & 394 Gr. 80 " " "	Dec. 28 Jan. 1	3 29	E, W W, E	71 58 8·18 8·00	− 23 51·36 50·86	16·8 17·1	16·9	1·0	0·2	0·04
10	396 & 405 Gr. 80	Dec. 28	8 10	W, E	71 33 18·40	+ 0 58·87	17·4	17·4	0·5	0·3	0·05
11	405 & 406 Gr. 80	Dec. 28	8 29	E, W	71 13 47·58	+ 20 29·15	16·7	16·7	0·5	0·4	0·08
12	412 & 419 Gr. 80	Dec. 28	8 35	W, E	71 45 28·76	− 11 10·74	18·0	18·0	0·7	0·9	0·57
13	433 & 471 Gr. 80	Dec. 28	10 22	E, W	71 41 20·09	− 7 3·07	17·0	17·0	0·7	0·1	0·01
14	472 & 483 Gr. 80 " " "	Dec. 28 Jan. 1	20 24	W, E E, W	71 11 39·06 39·08	+ 22 37·31 38·04	16·4 17·1	16·7	1·0	0·4	0·16
15	517 & 539 Gr. 80 " " "	Dec. 28 Jan. 1	5 54	E, W W, E	71 32 27·77 27·66	+ 1 49·75 49·58	17·5 17·2	17·3	0·7	0·2	0·03
16	539 & 549 Gr. 80 " " "	Dec. 28 Jan. 1	5 46	W, E E, W	71 39 39·14 39·03	− 5 21·61 21·03	17·5 18·0	17·7	0·7	0·6	0·25

159. Dhauleshvar—*Co-latitude* 71° 34′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1892-93	° ′		° ′ ″	′ ″	″	″			
17	565 & 602 Gr. 80 „ „ „	Dec. 28 Jan. 1	1 11	E, W W, E	71 48 55·85 55·89	− 14 38·83 38·88	17·0 17·0	17·0	1·0	0·1	0·01
18	633 & 664 Gr. 80 „ „ „	Dec. 28 Jan. 1	3 18	W, E E, W	71 34 18·98 19·00	− 0 1·56 1·94	17·4 17·1	17·2	0·7	0·1	0·01
19	664 & 677 Gr. 80 „ „ „	Dec. 28 Jan. 1	3 12	E, W W, E	71 40 28·36 28·38	− 6 10·41 11·66	17·9 16·7	17·3	0·7	0·2	0·03
20	692 & 698 Gr. 80 „ „ „	Dec. 28 Jan. 1	0 46	W, E E, W	71 57 17·03 16·98	− 22 59·64 23 0·26	17·4 16·7	17·0	1·0	0·1	0·01
21	707 & 727 Gr. 80	Dec. 27	4 4	W, E	71 18 39·96	+ 15 35·85	15·8	15·8	0·5	1·3	0·85
22	727 & 754 Gr. 80 „ „ „	Dec. 26 „ 27	4 4	W, E E, W	71 18 46·50 46·50	+ 15 30·57 30·14	17·1 16·6	16·8	0·7	0·3	0·06
23	754 & 792 Gr. 80 „ „ „	Dec. 26 „ 27	4 21	E, W W, E	71 35 11·22 11·23	− 0 54·07 54·02	17·1 17·2	17·1	0·7	0·0	0·00
24	803 Gr. 80 & 622 Gr. 64 „ „ „ „	Dec. 26 „ 27	5 13	W, E E, W	71 26 6·15 6·16	+ 8 11·14 10·36	17·3 16·5	16·9	1·0	0·2	0·04
25	823 Gr. 80 & 639 Gr. 64 „ „ „ „	Dec. 26 „ 27	3 6	E, W W, E	71 39 8·65 8·66	− 4 51·53 51·64	17·1 17·0	17·0	1·0	0·1	0·01
26	833 & 836 Gr. 80 „ „ „	Dec. 26 „ 27	0 4	W, E E, W	71 29 49·44 49·45	+ 4 28·06 27·52	17·5 17·0	17·2	1·0	0·1	0·01
27	856 & 874 Gr. 80 „ „ „	Dec. 26 „ 27	15 27	E, W W, E	71 48 51·73 51·74	− 14 33·53 34·05	18·2 17·7	17·9	0·7	0·8	0·45
28	874 Gr. 80 & 678 Gr. 64 „ „ „ „	Dec. 26 „ 27	15 8	W, E E, W	71 27 37·56 37·58	+ 6 40·04 39·16	17·6 16·7	17·1	0·7	0·0	0·00
29	692 Gr. 64 & 916 Gr. 80	Dec. 27	0 20	W, E	71 48 21·92	− 14 4·15	17·8	17·8	0·7	0·7	0·34
30	946 & 962 Gr. 80 „ „ „	Dec. 26 „ 27	2 18	W, E E, W	71 13 14·64 14·66	+ 21 2·54 1·96	17·2 16·6	16·9	1·0	0·2	0·04
31	977 & 999 Gr. 80	Dec. 27	1 2	W, E	71 17 23·19	+ 16 54·51	17·7	17·7	0·7	0·6	0·25
32	1043 & 1053 Gr. 80 „ „ „	Dec. 26 „ 27	4 27	E, W W, E	71 19 0·72 0·74	+ 15 17·08 17·52	17·8 18·3	18·0	0·7	0·9	0·57
33	1053 & 1057 Gr. 80 „ „ „	Dec. 26 „ 27	4 9	W, E E, W	71 36 47·75 47·77	− 2 29·75 29·95	18·0 17·8	17·9	0·7	0·8	0·45
34	1161 & 1173 Gr. 80 „ „ „	Dec. 26 „ 27	10 28	W, E E, W	71 22 58·04 58·08	+ 11 18·57 17·94	16·6 16·0	16·3	1·0	0·8	0·64
35	1184 & 1197 Gr. 80	Dec. 27	5 32	W, E	71 9 28·75	+ 24 48·78	17·5	17·5	0·7	0·4	0·11

159. Dhauleshvar—*Co-latitude* 71° 34′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
36	1206 & 1218 Gr. 80	Dec. 26	2 19	W, E	71 35 3·97	− 0 46 86	17 1				
	" " "	" 27		E, W	4·01	47 19	16 8	16·9	1 0	0·2	0·04
37	1232 & 1261 Gr. 80	Dec. 26	18 39	E, W	71 40 32·78	− 6 16·53	16·2				
	" " "	" 27		W, E	32 82	15 61	17 2	16·7	1·0	0·4	0·16
38	1265 & 1272 Gr. 80	Dec. 26	6 41	W, E	71 25 52·81	+ 8 23·49	16 3				
	" " "	" 27		E, W	52·86	24 30	17 2	16·7	1·0	0·4	0·16
39	1282 & 1289 Gr. 80	Dec. 26	9 49	E, W	71 40 40 82	− 6 23·31	17 5				
	" " "	" 27		W, E	40 88	23·94	16·9	17·2	1·0	0·1	0·01
40	1311 & 1327 Gr 80	Dec. 26	0 26	E, W	71 39 15·53	− 4 57 85	17·7				
	" " "	" 27		W, E	15·60	58 63	17 0	17·3	1 0	0·2	0·04
41	1349 & 1368 Gr 80	Dec. 26	1 43	W, E	71 32 27 26	+ 1 49·78	17·0				
	" " "	" 27		E, W	27 33	50 41	17·7	17·3	1·0	0·2	0 04
42	1378 Gr 80 & 801 Gr. 72	Dec. 30	4 19	W, E	71 22 1·11	+ 12 15 61	16·7				
	" " " "	" 31		E, W	1·17	15 07	16·2	16·4	1·0	0 7	0·49
43	1402 & 1405 Gr 80	Dec. 30	9 2	E, W	71 27 34·41	+ 6 43 05	17·5				
	" " "	" 31		W, E	34·48	41 96	16·4	16 9	1·0	0·2	0·04
44	1413 & 1442 Gr. 80	Dec. 30	1 17	E, W	71 19 16·23	+ 15 1·21	17 4				
	" " "	" 31		W, E	16 30	2 13	18 4	17·9	1·0	0 8	0·64
45	1450 & 1453 Gr. 80	Dec. 30	14 44	W, E	71 33 11 74	+ 1 6·44	18·2				
	" " "	" 31		E, W	11 82	5 74	17 6	17 9	1·0	0·8	0 64
46	1470 Gr. 80	Dec. 30	0 7	E, W	71 27 7·42	+ 7 9·62	17 0	17·0	0·7	0·1	0·01
47	1480 & 1490 Gr 80	Dec. 30	12 23	W, E	71 23 26·05	+ 10 50·60	17·6				
	" " "	" 31		E, W	27 04	50·12	17 2	17 4	0·7	0·3	0 06
48	1490 & 1493 Gr. 80	Dec. 30	12 19	E, W	71 19 51·06	+ 14 26·10	17·2				
	" " "	" 31		W, E	51·14	25 75	16 9	17 0	0·7	0 1	0 01
49	1504 & 1511 Gr. 80	Dec. 30	6 18	W, E	71 25 35·66	+ 8 41·47	17·1				
	" " "	" 31		E, W	35·75	40 87	16 6	16 9	1·0	0·2	0·04
50	1533 & 1536 Gr. 80	Dec. 30	3 9	E, W	71 25 26 88	+ 8 49·79	16·7				
	" " "	" 31		W, E	26·98	50·83	17·8	17·2	0·7	0·1	0·01
51	1536 & 1541 Gr. 80	Dec. 30	3 10	W, E	71 26 42·49	+ 7 33·90	16·4				
	" " "	" 31		E, W	42·59	34·93	17·5	16·9	0·7	0·2	0·03
52	1555 & 1573 Gr. 80	Dec. 30	8 14	W, E	71 35 4·15	− 0 46·83	17·3				
	" " "	" 31		E, W	4·26	48·25	16 0	16·6	1·0	0·5	0·25
53	1577 & 1592 Gr. 80	Dec. 30	18 46	E, W	71 53 30·73	− 19 13·87	16·9				
	" " "	" 31		W, E	30·84	14·90	15 9	16·4	1·0	0·7	0·49
54	1603 & 1617 Gr. 80	Dec. 30	3 35	W, E	71 54 19·52	− 20 2·13	17·4				
	" " "	" 31		E, W	19·64	2·40	17·2	17·3	1·0	0·2	0·04

159. Dhauleshvar—*Co-latitude* 71° 34′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
55	1621 & 1628 Gr. 80	Dec. 30	8 33	E, W	72 1 28·05	− 27 11·15	16·9				
	" " "	" 31		W, E	28·16	10·69	17·5	17·2	1·0	0·1	0·01
56	1648 Gr. 80 & 959 Gr. 72	Dec. 30	0 54	W, E	71 49 45·14	− 15 29·52	15·6				
	" " " "	" 31		E, W	45·27	29·98	15·3	15·4	1·0	1·7	2·89
57	962 Gr. 72 & 1668 Gr. 80	Dec. 30	4 53	E, W	71 14 13·96	+ 20 3·34	17·3				
	" " " "	" 31		W, E	14·09	2·64	16·7	17·0	1·0	0·1	0·01
								Σ P = 47·9		Σ Pvv = 11·76	

Summary.

No. of pairs 57

No. of observations 102

Mean difference between observations taken E, W and those taken W, E = + 0″·13

Observed Co-latitude (weighted mean) 71° 34′ 17″·07 ± 0″·045

Correction for Height above Sea-level + 0″·09

Final Co-latitude 71° 34′ 17″·16

		° ′ ″	″
Astronomical Latitude (A)	=	18 25 42·84	± 0·045
Geodetic Latitude (G)	=	18 25 41·64	
Deflection of plumb-line (A−G)	=	+ 1·20	

160. Dhulipalla—*Co-latitude* 73° 34′ +

Latitude	... 16° 26′	*Maximum recorded Height of Barometer*	= 29·814 in.
Longitude	... 80 8	*Minimum* ,, ,, ,,	= 29·716
Height	... 245 feet	*Maximum* ,, *Reading of Thermometer*	= 86°·0
Instrument—Zenith Sector No. 2		*Minimum* ,, ,, ,,	= 74·5

Observer—J. Eccles, M. A.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
1	888 Gr. 72	Mar 30	N	E, W	5 19 7·4	78 53 12·9	5 5				
	,, ,,	,, 31	,,	W, E	7 0	12 9	5 9				
	,, ,,	Apr. 4	S	W, E	6·9	12 7	5 8				
	,, ,,	,, 5	,,	E, W	7 0	12 7	5 7	...	5·7	0 3	0·09
2	894 Gr. 72	Apr. 2	N	E, W	2 3 59·1	71 30 8 3	7·4				
	,, ,,	,, 3	S	W, E	57·3	8 3	5 6	6·5	...	0 6	0·36
3	895 Gr. 72	Mar 30	N	W, E	5 18 26 3	68 15 38 7	5 0				
	,, ,,	,, 31	,,	E, W	28 9	38 6	7 5				
	,, ,,	Apr. 4	S	E, W	30·0	38 3	8 3				
	,, ,,	,, 5	,,	W, E	30 0	38 2	8 2	7·3	...	0·2	0·04
4	901 Gr. 72	Mar. 30	N	E, W	1 44 36 2	71 49 32·0	8 2				
	,, ,,	,, 31	,,	W, E	35·2	31 9	7·1				
	,, ,,	Apr. 2	,,	W, E	35·8	31·8	7 6				
	,, ,,	,, 3	S	E, W	35 9	31 7	7·6				
	,, ,,	,, 4	,,	W, E	35 8	31 6	7 4				
	,, ,,	,, 5	,,	E, W	36·3	31 6	7 9	7·6	...	0·5	0·25
5	918 Gr. 72	Mar. 30	N	W, E	7 1 30·8	66 32 36 7	7·5				
	,, ,,	,, 31	,,	E, W	29 9	36 6	6 5				
	,, ,,	Apr. 4	S	E, W	30 6	36·2	6 8				
	,, ,,	,, 5	,,	W, E	31 3	36 1	7 4	7·1	...	0·0	0·00
6	919 Gr. 72	Apr. 2	N	E, W	4 38 31·5	78 12 37 6	6·1				
	,, ,,	,, 3	S	W, E	31·2	37 5	6 3	...	6·2	0·2	0·04
7	923 Gr. 72	Mar. 30	N	E, W	0 30 8·4	73 3 57·0	5 4				
	,, ,,	,, 31	,,	W, E	8·7	57·0	5·7				
	,, ,,	Apr. 4	S	W, E	7·3	56 7	4·0				
	,, ,,	,, 5	,,	E, W	8 4	56 6	5 0	5·0	...	2·1	4·41
8	927 Gr. 72	Apr. 2	N	W, E	4 21 56·0	69 12 9·8	5·8				
	,, ,,	,, 3	S	E, W	56·8	9 7	6 5	6 2	...	0·9	0·81
9	930 Gr. 72	Mar. 30	N	W, E	6 2 10·5	79 36 16·3	5 8				
	,, ,,	,, 31	,,	E, W	9 9	16 2	6·3				
	,, ,,	Apr. 4	S	E, W	10 7	16 1	5·4				
	,, ,,	,, 5	,,	W, E	10·4	16 0	5·6	...	5·8	0·2	0·04
10	939 Gr. 72	Mar. 30	N	E, W	7 51 10·9	65 42 56 0	6·9				
	,, ,,	,, 31	,,	W, E	10·9	55·9	6 8				
	,, ,,	Apr. 2	,,	E, W	11·7	55·7	7·4				
	,, ,,	,, 3	S	W, E	12·2	55·6	7·8				
	,, ,,	,, 4	,,	W, E	12·1	55·5	7 6				
	,, ,,	,, 5	,,	E, W	12·1	55 4	7·5	7·3	...	0·2	0·04

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

160. Dhulipalla—*Co-latitude* 73° 34′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
11	950 Gr. 72	Mar. 30	N	W, E	7 51 25·5	81 25 30·4	4·9				
	„ „	„ 31	„	E, W	23·9	30·3	6·4				
	„ „	Apr. 2	„	W, E	24·3	30·3	6·0				
	„ „	„ 3	S	E, W	24·3	30·2	5·9				
	„ „	„ 4	„	E, W	24·5	30·2	5·7				
	„ „	„ 5	„	W, E	24·8	30·2	5·4	...	5·7	0·3	0·09
12	955 Gr. 72	Mar. 30	N	E, W	0 52 15·7	72 41 50·5	6·2				
	„ „	„ 31	„	W, E	16·4	50·4	6·8				
	„ „	Apr. 4	S	W, E	16·1	50·1	6·2				
	„ „	„ 5	„	E, W	16·6	50·1	6·7	6·5	...	0·6	0·36
13	958 Gr. 72	Apr. 2	N	E, W	3 55 24·8	77 29 30·6	5·8				
	„ „	„ 3	S	W, E	25·0	30·5	5·5	...	5·7	0·3	0·09
14	967 Gr. 72	Apr. 2	N	W, E	1 51 35·5	71 42 31·0	6·5				
	„ „	„ 3	S	E, W	35·9	30·9	6·8	6·7	...	0·4	0·16
15	970 Gr. 72	Mar. 30	N	W, E	2 9 4·5	75 43 10·8	6·3				
	„ „	„ 31	„	E, W	3·9	10·8	6·9				
	„ „	Apr. 4	S	E, W	4·1	10·5	6·4				
	„ „	„ 5	„	W, E	4·3	10·4	6·1	...	6·4	0·4	0·16
16	980 Gr. 72	Mar. 30	N	E, W	0 53 52·2	74 27 58·0	5·8				
	„ „	„ 31	„	W, E	51·7	57·9	6·2				
	„ „	Apr. 2	„	E, W	51·7	57·8	6·1				
	„ „	„ 3	S	W, E	52·1	57·7	5·6				
	„ „	„ 4	„	W, E	52·6	57·6	5·0				
	„ „	„ 5	„	E, W	52·0	57·6	5·6	...	5·7	0·3	0·09
17	989 Gr. 72	Mar. 30	N	W, E	1 31 20·5	75 5 27·6	7·1				
	„ „	„ 31	„	E, W	19·9	27·5	7·6				
	„ „	Apr. 2	„	W, E	20·3	27·3	7·0				
	„ „	„ 3	S	E, W	19·4	27·3	7·9				
	„ „	„ 4	„	E, W	19·5	27·2	7·7				
	„ „	„ 5	„	W, E	21·0	27·1	6·1	...	7·2	1·2	1·44
18	996 Gr. 72	Apr. 2	N	E, W	1 43 34·0	75 17 40·1	6·1				
	„ „	„ 3	S	W, E	33·3	40·0	6·7	...	6·4	0·4	0·16
19	997 Gr. 72	Mar. 30	N	E, W	6 33 20·4	80 7 26·8	6·4				
	„ „	„ 31	„	W, E	19·5	26·8	7·3				
	„ „	Apr. 4	S	W, E	20·3	26·6	6·3				
	„ „	„ 5	„	E, W	20·1	26·5	6·4	...	6·6	0·6	0·36
20	1012 Gr. 72	Mar. 30	N	W, E	7 20 12·9	66 13 54·1	7·0				
	„ „	„ 31	„	E, W	12·9	54·0	6·9				
	„ „	Apr. 2	„	W, E	14·4	53·8	8·2				
	„ „	„ 3	S	E, W	14·7	53·7	8·4				
	„ „	„ 4	„	E, W	14·3	53·6	7·9				
	„ „	„ 5	„	W, E	15·2	53·5	8·7	7·9	...	0·8	0·64
21	1015 Gr. 72	Apr. 2	N	E, W	5 18 2·0	78 52 8·4	6·4				
	„ „	„ 3	S	W, E	2·4	8·3	5·9	...	6·2	0·2	0·04
22	1016 Gr. 72	Mar. 30	N	E, W	12 7 40·1	61 26 26·4	6·5				
	„ „	„ 31	„	W, E	41·4	26·3	7·7				
	„ „	Apr. 4	S	W, E	41·9	25·8	7·7				
	„ „	„ 5	„	E, W	41·8	25·6	7·4	7·3	...	0·2	0·04

160. Dhulipalla—*Co-latitude* 73° 34′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
23	1027 Gr. 72	Mar. 30	N	W, E	12 13 13·7	85 47 18·7	5·0				
	" "	" 31	"	E, W	12·7	18·7	6·0				
	" "	Apr. 4	S	E, W	13·7	18·6	4·9				
	" "	" 5	"	W, E	12·4	18·6	6·2	...	5·5	0·5	0·25
24	1036 Gr. 72	Mar. 30	N	E, W	8 29 51·8	82 3 57·0	5·2				
	" "	" 31	"	W, E	50·3	56·9	6·6				
	" "	Apr. 4	S	W, E	50·2	56·8	6·6				
	" "	" 5	"	E, W	51·1	56·8	5·7	...	6·0	0·0	0·00
25	1039 Gr. 72	Mar. 30	N	W, E	8 49 37·3	64 44 30·2	7·5				
	" "	" 31	"	E, W	38·2	30·1	8·3				
	" "	Apr. 4	S	E, W	38·2	29·6	7·8				
	" "	" 5	"	W, E	40·0	29·4	9·4	8·3	...	1·2	1·44
26	1047 Gr. 72	Apr. 2	N	W, E	7 45 54·9	81 20 1·1	6·2				
	" "	" 3	S	E, W	54·7	1·0	6·3	...	6·3	0·3	0·09
27	1048 Gr. 72	Mar. 30	N	E, W	0 23 48·6	73 57 53·8	5·2				
	" "	" 31	"	W, E	47·6	53·8	6·2				
	" "	Apr. 4	S	W, E	48·4	53·4	5·0				
	" "	" 5	"	E, W	47·4	53·3	5·9	...	5·6	0·4	0·16
28	1060 Gr. 72	Apr. 2	N	E, W	5 17 32·9	78 51 39·1	6·2				
	" "	" 3	S	W, E	33·8	39·0	5·2	...	5·7	0·3	0·09
29	1061 Gr. 72	Mar. 30	N	W, E	0 38 1·1	72 56 5·5	6·6				
	" "	" 31	"	E, W	2·1	5·5	7·6				
	" "	Apr. 4	S	E, W	2·5	5·1	7·6				
	" "	" 5	"	W, E	2·8	5·0	7·8	7·4	...	0·3	0·09
30	1066 Gr. 72	Mar. 30	N	E, W	2 35 17·4	70 58 48·9	6·3				
	" "	" 31	"	W, E	19·0	48·8	7·8				
	" "	Apr. 2	"	W, E	18·2	48·6	6·8				
	" "	" 3	S	E, W	18·3	48·5	6·8				
	" "	" 4	"	W, E	18·5	48·4	6·9				
	" "	" 5	"	E, W	18·6	48·3	6·9	6·9	...	0·2	0·04
31	1074 Gr. 72	Mar. 30	N	W, E	11 57 45·1	61 36 22·7	7·8				
	" "	" 31	"	E, W	45·1	22·6	7·7				
	" "	Apr. 4	S	E, W	47·8	22·0	9·8				
	" "	" 5	"	W, E	46·0	21·9	7·9	8·3	...	1·2	1·44
32	1083 Gr. 72	Mar. 30	N	E, W	11 4 18·8	84 38 23·5	4·7				
	" "	Apr. 4	S	W, E	18·7	23·4	4·7				
	" "	" 5	"	E, W	18·1	23·4	5·3	...	4·9	1·1	1·21
33	1086 Gr. 72	Apr. 2	N	E, W	9 16 54·4	82 51 1·3	6·9				
	" "	" 3	S	W, E	55·4	1·2	5·8	...	6·4	0·4	0·16

160. Dhulipalla—*Co-latitude* 73° 34′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	$v\,v$
		1889			° ′ ″	° ′ ″	″	″	″		
34	1090 Gr. 72	Mar. 30	N	W, E	1 14 26·9	74 48 31·8	4·9				
	" "	" 31	"	E, W	25·7	31·7	6·0				
	" "	Apr. 4	S	E, W	25·3	31·4	6·1				
	" "	" 5	"	W, E	25·4	31·3	5·9	...	5·7	0·3	0·09
35	1106 Gr. 72	Mar. 30	N	E, W	9 11 61·5	82 46 6·4	4·9				
	" "	Apr. 4	S	W, E	60·9	6·2	5·3				
	" "	" 5	"	E, W	59·9	6·2	6·3	...	5·5	0·5	0·25
36	1107 Gr. 72	Apr. 2	N	W, E	6 16 48·6	67 17 18·6	7·2				
	" "	" 3	S	E, W	49·1	18·5	7·6	7·4	...	0·3	0·09
37	1110 Gr. 72	Mar. 30	N	W, E	7 5 2·7	80 39 7·5	4·8				
	" "	Apr. 2	"	E, W	1·5	7·4	5·9				
	" "	" 3	S	W, E	2·1	7·3	5·2				
	" "	" 4	"	E, W	1·6	7·3	5·7				
	" "	" 5	"	W, E	1·0	7·2	6·2	...	5·6	0·4	0·16
38	1113 Gr. 72	Apr. 2	N	W, E	10 0 32·5	83 34 38·8	6·3				
	" "	" 3	S	E, W	33·2	38·7	5·5	...	5·9	0·1	0·01
39	1120 Gr. 72	Mar. 30	N	E, W	10 3 22·0	63 30 44·9	6·9				
	" "	Apr. 4	S	W, E	24·3	44·2	8·5				
	" "	" 5	"	E, W	23·5	44·0	7·5	7·6	...	0·5	0·25
40	1129 Gr. 72	Mar. 30	N	W, E	8 7 47·2	65 26 19·7	6·9				
	" "	Apr. 2	"	E, W	48·3	19·3	7·6				
	" "	" 3	S	W, E	48·9	19·1	8·0				
	" "	" 4	"	E, W	47·7	19·0	6·7				
	" "	" 5	"	W, E	48·8	18·9	7·7	7·4	...	0·3	0·09
41	1137 Gr. 72	Mar. 30	N	E, W	1 58 24·3	71 35 43·3	7·6				
	" "	Apr. 4	S	W, E	25·2	42·8	8·0				
	" "	" 5	"	E, W	25·3	42·7	8·0	7·9	...	0·8	0·64
42	1140 Gr. 72	Apr. 2	N	W, E	10 1 47·1	63 32 20·2	7·3				
	" "	" 3	S	E, W	47·1	20·0	7·1	7·2	...	0·1	0·01
43	1164 Gr. 72	Mar. 30	N	W, E	1 16 5·2	72 18 2·0	7·2				
	" "	" 31	"	E, W	6·1	1·9	8·0				
	" "	Apr. 2	"	E, W	5·7	1·7	7·4				
	" "	" 3	S	W, E	5·8	1·6	7·4				
	" "	" 4	"	E, W	5·9	1·5	7·4				
	" "	" 5	"	W, E	5·6	1·4	7·0	7·4	...	0·3	0·09
44	1171 Gr. 72	Mar. 30	N	E, W	5 35 8·9	79 9 15·8	6·9				
	" "	" 31	"	W, E	9·0	15·7	6·7				
	" "	Apr. 2	"	W, E	9·1	15·6	6·5				
	" "	" 3	S	E, W	9·7	15·6	5·9				
	" "	" 4	"	W, E	8·8	15·5	6·7				
	" "	" 5	"	E, W	8·7	15·4	6·7	...	6·6	0·6	0·36

160. Dhulipalla—*Co-latitude* 73° 34′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance			N.P.D.			Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			°	′	″	°	′	″	″	″	″		
45	1176 Gr. 72	Mar. 30	N	W, E	3	52	5·8	77	26	12 0	6 2				
	" "	" 31	"	E, W			4·8			11·9	7 1				
	" "	Apr. 2	"	E, W			5 7			11 8	6·1				
	" "	" 3	S	W, E			4·7			11 7	7 0				
	" "	" 4	"	E, W			5 4			11·7	6·3				
	" "	" 5	"	W, E			5·5			11·6	6 1	...	6:5	0 5	0·25
46	1188 Gr. 72	Mar. 30	N	E, W	5	24	55·4	68	9	11·3	6·7				
	" "	" 31	"	W, E			56·1			11·2	7 3				
	" "	Apr 2	"	W, E			57·1			10 9	8 0				
	" "	" 3	S	E W			56 5			10·8	7·3				
	" "	" 4	"	W, E			56 6			10·7	7 3				
	" "	" 5	"	E, W			57 5			10·6	8 1	7·5	...	0·4	0·16
47	1198 Gr. 72	Apr. 2	N	E, W	1	34	30·1	71	59	36·6	6·7				
	" "	" 3	S	W, E			29 9			36 5	6 4	6·6	...	0·5	0·25
48	1203 Gr. 72	Mar. 30	N	W, E	4	52	39·6	78	26	44 4	4 8				
	" "	" 31	"	E, W			38 6			44·4	5 8				
	" "	Apr. 4	S	E, W			39·1			44·1	5 0				
	" "	" 5	"	W, E			38 8			44 0	5 2	..	5·2	0·8	0·64
49	1208 Gr. 72	Mar 30	N	E, W	5	18	58·1	68	15	9·1	7·2				
	" "	" 31	"	W, E			57 6			9·0	6 6				
	" "	Apr. 2	"	W, E			58·9			8 8	7 7				
	" "	" 3	S	E, W			58 6			8 6	7 2				
	" "	" 4	"	W, E			58 7			8 5	7 2				
	" "	" 5	"	E, W			57 9			8·4	6 3	7·0	...	0·1	0·01
50	1233 Gr. 72	Mar. 30	N	W, E	2	3	42·5	75	37	47 4	4·9				
	" "	" 31	"	E, W			41 6			47 3	5 7				
	" "	Apr. 2	"	E, W			40 9			47 1	6 2				
	" "	" 3	S	W, E			41 1			47 0	5 9				
	" "	" 4	"	E, W			42·0			47 0	5 [illegible]				
	" "	" 5	"	W, E			41·2			46 9	5 7	...	5·6	0·4	0·16
51	1252 Gr. 72	Apr. 2	N	W E	4	5	3·2	69	29	3·7	6 9				
	" "	" 3	S	E, W			2·5			3 6	6·1	6·5	...	0 6	0·36
52	1265 Gr. 72	Apr. 2	N	E, W	0	5	4·6	73	39	10·6	6 0				
	" "	" 3	S	W, E			4·3			10·5	6·2	..	6·1	0·1	0·01
53	1275 Gr. 72	Apr. 2	N	W, E	2	31	16·2	71	2	51·2	7·4				
	" "	" 3	S	E, W			15·2			51·1	6 3	6·9	...	0·2	0 04
54	1297 Gr. 72	Apr. 2	N	E, W	2	57	11·0	76	31	17 6	6·6				
	" "	" 3	S	W, E			10·8			17·5	6·7	...	6·7	0·7	0·49
55	1312 Gr. 72	Apr. 2	N	W, E	0	22	56·6	73	11	9·2	5·8				
	" "	" 3	S	E, W			56·1			9·1	5·2	5·5	...	1·6	2·56

160. Dhulipalla—*Co-latitude* 73° 34′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
56	1316 Gr. 72	Apr. 2	N	E, W	3 17 34·0	70 16 32·2	6·2				
	" "	" 3	S	W, E	34·2	32·1	6·3	6·3	...	0·8	0·64
57	1327 Gr. 72	Apr. 2	N	W, E	2 13 43·7	75 47 50·0	6·3				
	" "	" 3	S	E, W	44·0	49·9	5·9	...	6·1	0·1	0·01
								Σ vv by N. Stars = 15·31			
								Σ vv by S. Stars = 6·99			

Summary.

No. of North Stars 28 No. of South Stars 29

No. of observations 210

	°	′	″	″
Co-latitude by North Stars	73	34	7·05	± 0·096
" " South "	73	34	5·98	± 0·062
Mean Co-latitude	73	34	6·52	± 0·057
Correction for Height above Sea-level		+	0·01	

Final Co-latitude 73° 34′ 6″·53

		°	′	″	″
Astronomical Latitude (A)	=	16	25	53·47	± 0·057
Geodetic Latitude (G)	=	16	25	56·75	
Deflection of plumb-line (A−G)	=		−	3·28	

161. Didawa—*Co-latitude* 65° 8′ +

Latitude ... 24° 51′ — *Instrument*—Zenith Telescope

Longitude ... 71 21 — *Mean Height of Barometer* 29·76 in.

Height ... 212 feet — *Mean Temperature* 71°·8

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	1369 Newc. & 3506 Gr. 80	Nov. 17	2 52	E, W	65 10 59·27	− 2 16·90	42·37	42·37	0·7	0·30	0·0630
2	1389 & 1399 Newcomb ,, ,, ,,	Nov. 17 ,, 18	5 13	W, E E, W	65 23 39·58 39·65	− 14 56·86 56·88	42·72 42·77	42·75	1·0	0·08	0·0064
3	1416 & 1424 Newcomb ,, ,, ,,	Nov. 17 ,, 18	15 17	W, E E, W	65 18 1·38 1·41	− 9 18·58 18·42	42·80 42·99	42·90	1·0	0·23	0·0529
4	1431 & 1443 Newcomb ,, ,, ,,	Nov. 17 ,, 18	24 22	E, W W, E	65 30 17·82 17·85	− 21 35·86 35·85	41·96 42·00	41·98	1·0	0·69	0·4761
5	3725 Gr. 80 & 1474 Newc. ,, ,, ,, ,,	Nov. 17 ,, 18	12 47	W, E E, W	65 30 51·93 51·96	− 22 8·75 8·88	43·18 43·08	43·13	1·0	0·46	0·2116
6	3759 Gr. 80 & 1488 Newc. ,, ,, ,, ,,	Nov. 17 ,, 18	25 9	E, W W, E	65 22 19·37 19·38	− 13 38·13 38·27	41·24 41·11	41·18	1·0	1·49	2·2201
7	1495 & 1499 Newcomb ,, ,, ,,	Nov. 17 ,, 18	14 7	W, E E, W	65 34 14·66 14·67	− 25 32·52 31·91	42·14 42·76	42·45	1·0	0·22	0·0484
8	1501 Newc. & 3846 Gr. 80 ,, ,, ,, ,,	Nov. 17 ,, 18	4 44	E, W W, E	65 1 29·10 29·10	+ 7 14·31 13·65	43·41 42·75	43·08	1·0	0·41	0·1681
9	1522 Newc. & 3882 Gr. 80 ,, ,, ,, ,,	Nov. 17 ,, 18	21 17	W, E E, W	65 25 33·99 34·00	− 16 51·16 51·92	42·83 42·08	42·46	1·0	0·21	0·0441
10	3891 Gr. 80 & 1546 Newc.	Nov. 17	1 34	E, W	65 14 24·48	− 5 40·72	43·76	43·76	0·5	1·09	0·5941
11	3891 Gr. 80 & 1549 Newc.	Nov. 17	1 44	E, W	65 24 35·51	− 15 52·18	43·33	43·33	0·5	0·66	0·2178
12	1553 & 1572 Newcomb ,, ,, ,,	Nov. 17 ,, 18	18 59	W, E E, W	65 11 7·48 7·47	− 2 23·88 24·52	43·60 42·95	43·28	0·7	0·61	0·2605
13	1569 & 1572 Newcomb ,, ,, ,,	Nov. 17 ,, 18	19 21	W, E E, W	65 33 29·63 29·62	− 24 45·95 46·98	43·68 42·64	43·16	0·7	0·49	0·1681
14	4059 & 42 Gr. 80 ,, ,, ,,	Nov. 17 ,, 18	11 42	W, E E, W	65 27 19·28 19·24	− 18 36·61 36·38	42·67 42·86	42·77	0·7	0·10	0·0070
15	42 & 55 Gr. 80 ,, ,, ,,	Nov. 17 ,, 18	11 14	E, W W, E	64 59 40·96 40·91	+ 9 1·60 2·61	42·56 43·52	43·04	0·7	0·37	0·0958

161. Didawa—*Co-latitude* 65° 8′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
16	23 Newc. & 71 Gr. 80 " " " "	Nov. 17 " 18	29 15	W, E E, W	65 15 39·46 39·42	− 6 56·50 56·89	42·96 42·53	42·75	1·0	0·08	0·0064
17	36 Newc. & 113 Gr. 80	Nov. 18	5 39	E, W	65 19 4·94	− 10 22·13	42·81	42·81	0·7	0·14	0·0137
18	136 & 160 Gr. 80 " " "	Nov. 16 " 23	6 19	E, W W, E	65 2 4·78 4·43	+ 6 38·29 38·24	43·07 42·67	42·87	0·7	0·20	0·0280
19	136 & 181 Gr. 80	Nov. 16	6 25	E, W	64 55 44·47	+ 12 57·81	42·28	42·28	0·5	0·39	0·0761
20	185 Gr. 80 & 79 Newc.	Nov. 16	21 49	W, E	65 5 36·45	+ 3 6·21	42·66	42·66	0·7	0·01	0·0001
21	97 & 108 Newcomb " " "	Nov. 16 " 20	16 8	E, W W, E	65 12 44·49 44·25	− 4 1·59 1·83	42·90 42·42	42·66	1·0	0·01	0·0001
22	118 & 121 Newcomb " " " " " "	Nov. 16 " 23 " 24	4 24	W, E W, E E, W	65 17 13·29 12·90 12·85	− 8 30·95 30·32 30·69	42·34 42·58 42·16	42·31	1·2	0·36	0·1555
23	296 & 317 Gr. 80 " " "	Nov. 16 " 20	7 44	E, W W, E	64 55 37·01 36·74	+ 13 5·68 5·67	42·69 42·41	42·55	1·0	0·12	0·0144
24	347 Gr. 80 & 155 Newc. " " " "	Nov. 16 " 20	7 49	E, W W, E	64 54 55·39 55·12	+ 13 47·25 47·43	42·64 42·55	42·60	1·0	0·07	0·0049
25	161 & 171 Newcomb	Nov. 16	2 53	E, W	65 35 18·59	− 26 36·18	42·41	42·41	0·7	0·26	0·0473
26	414 Gr. 80 & 185 Newc. " " " "	Nov. 16 " 20	3 57	W, E E, W	65 6 29·16 28·91	+ 2 13·99 13·34	43·15 42·25	42·70	1·0	0·03	0·0009
27	471 Gr. 80 & 203 Newc. " " " "	Nov. 16 " 20	4 1	E, W W, E	65 18 37·43 37·20	− 9 54·57 54·20	42·86 43·00	42·93	0·7	0·26	0·0473
28	471 Gr. 80 & 209 Newc. " " " "	Nov. 16 " 20	3 58	E, W W, E	65 15 14·86 14·63	− 6 32·06 32·14	42·80 42·49	42·65	0·7	0·02	0·0003
29	549 Gr. 80 & 229 Newc. " " " "	Nov. 16 " 20	0 26	W, E E, W	65 25 41·63 41·42	− 16 58·52 59·48	43·11 41·94	42·53	1·0	0·14	0·0196
30	256 & 258 Newcomb " " "	Nov. 19 " 20	3 28	W, E E, W	64 43 36·79 36·73	+ 25 5·97 5·56	42·76 42·29	42·53	1·0	0·14	0·0196
31	664 & 695 Gr. 80	Nov. 21	9 23	E, W	65 33 26·33	− 24 42·72	43·61	43·61	0·5	0·94	0·4418
32	274 Newc. & 695 Gr. 80	Nov. 21	9 16	E, W	65 26 22·24	− 17 39·25	42·99	42·99	0·5	0·32	0·0512
33	740 & 776 Gr. 80 " " "	Nov. 21 " 22	12 30	W, E E, W	65 11 14·22 14·19	− 2 31·43 31·75	42·79 42·44	42·62	0·7	0·05	0·0018
34	749 & 776 Gr. 80 " " "	Nov. 21 " 22	12 39	W, E E, W	65 20 30·57 30·54	− 11 47·71 47·68	42·86 42·86	42·86	0·7	0·19	0·0253
35	305 & 313 Newcomb " " "	Nov. 21 " 22	19 7	E, W W, E	65 26 38·08 38·08	− 17 55·20 55·55	42·88 42·53	42·71	1·0	0·04	0·0016

161. Didawa—*Co-latitude* 65° 8′ + ·

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	″	″	″			
36	327 Newc. & 869 Gr. 80	Nov. 22	13 35	W, E	65 12 7·00	− 3 24·78	42·22	42·22	0·7	0·45	0·1418
37	343 Newc. & 902 Gr. 80 " " " "	Nov. 21 " 22	3 20	E, W W, E	64 48 45·28 45·28	+ 19 57·37 50·96	42·65 42·24	42·45	1·0	0·22	0·0484
38	387 & 394 Newcomb " " "	Nov. 21 " 22	20 23	W, E E, W	65 27 1·02 1·03	− 18 17·85 19·06	43·17 41·97	42·57	1·0	0·10	0·0100
39	1059 & 1099 Gr. 80	Nov. 22	5 41	E, W	65 7 45·46	+ 0 56·84	42·30	42·30	0·7	0·37	0·0958
40	419 Newc. & 1138 Gr. 80 " " " "	Nov. 21 " 22	4 24	E, W W, E	65 19 46·12 46·17	− 11 3·54 4·11	42·58 42·06	42·32	1·0	0·35	0·1225
41	1145 & 1181 Gr. 80 " " "	Nov. 21 " 22	3 13	W, E E, W	64 55 7·23 7·27	+ 13 35·45 34·22	42·68 41·49	42·09	1·0	0·58	0·3364
42	471 & 476 Newcomb " " "	Nov. 21 " 22	2 55	E, W W, E	64 55 20·31 20·37	+ 13 22·61 21·56	42·92 41·93	42·43	0·7	0·[illegible]	0·0403
43	476 Newc. & 1281 Gr. 80 " " " "	Nov. 21 " 22	3 11	W, E E, W	65 10 50·81 50·87	− 2 8·26 8·84	42·55 42·03	42·29	0·7	0·38	0·1011
44	481 Newc. & 1311 Gr. 80	Nov. 22	7 2	W, E	65 3 40·81	+ 5 0·73	41·54	41·54	0·5	1·13	0·6385
45	484 Newc. & 1311 Gr. 80 " " " "	Nov. 21 " 22	7 6	E, W W, E	64 59 57·05 57·12	+ 8 45·00 44·61	42·05 41·73	41·89	0·7	0·78	0·4259
46	495 & 515 Newcomb " " "	Nov. 21 " 22	0 31	W, E E, W	64 51 9·75 9·84	+ 17 33·41 32·91	43·16 42·75	42·96	0·7	0·29	0·0589
47	495 Newc. & 1367 Gr. 80 " " " "	Nov. 21 " 22	0 22	W, E E, W	65 0 13·51 13·61	+ 8 30·26 28·64	43·77 42·25	43·01	0·7	0·34	0·0809
48	517 & 521 Newcomb " " "	Nov. 21 " 22	3 6	E, W W, E	65 1 54·95 55·04	+ 6 48·21 47·88	43·16 42·92	43·04	1·0	0·37	0·1369
49	1418 & 1425 Gr. 80	Nov. 21	0 12	W, E	65 20 9·94	− 11 26·63	43·31	43·31	0·7	0·64	0·2867
50	544 & 558 Newcomb	Nov. 22	4 11	E, W	65 3 10·22	+ 5 32·12	42·34	42·34	0·5	0·33	0·0545
51	544 & 565 Newcomb	Nov. 22	3 58	E, W	65 15 33·57	− 6 51·42	42·15	42·15	0·5	0·52	0·1352
52	578 & 583 Newcomb	Nov. 22	13 53	W, E	65 2 43·54	+ 5 59·15	42·69	42·69	0·7	0·02	0·0003
53	1435 & 1453 Newcomb " " "	Nov. 23 " 24	0 19	W, E E, W	64 50 5·21 5·27	+ 18 37·01 37·63	42·22 42·90	42·56	1·0	0·11	0·0121
54	1464 & 1474 Newcomb " " "	Nov. 23 " 24	13 46	E, W W, E	64 31 49·08 49·62	+ 36 52·65 54·35	41·73 43·97	42·85	1·0	0·18	0·0324
55	1478 & 1488 Newcomb " " "	Nov. 23 " 24	24 27	W, E E, W	64 40 16·92 16·94	+ 28 26·06 26·60	42·98 43·54	43·26	1·0	0·59	0·3481

161. Didawa—*Co-latitude* 65° 8′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1900	° ′		° ′ ″	′ ″	″	″			
56	1504 & 1523 Newcomb	Nov. 23	2 15	E, W	64 42 0·78	+ 26 42·19	42·97				
	,, ,, ,,	,, 24		W, E	0·81	41·92	42·73	42·85	1·0	0·18	0·0324
57	1529 & 1552 Newcomb	Nov. 23	24 1	W, E	65 15 39·10	− 6 56·61	42·49				
	,, ,, ,,	,, 24		E, W	39·12	55·64	43·48	42·99	1·0	0·32	0·1024
58	1561 & 1583 Newcomb	Nov. 23	6 7	E, W	65 19 15·77	− 10 32·78	42·99				
	,, ,, ,,	,, 24		W, E	15·78	33·16	42·62	42·81	1·0	0·14	0·0196
59	10 & 14 Newcomb	Nov. 23	10 48	W, E	64 33 40·61	+ 35 2·94	43·55				
	,, ,, ,,	,, 24		E, W	40·60	2·91	43·51	43·53	1·0	0·86	0·7396
60	19 & 42 Newcomb	Nov. 23	23 11	E, W	65 25 46·33	− 17 3·51	42·82				
	,, ,, ,,	,, 24		W, E	46·30	3·86	42·44	42·63	1·0	0·04	0·0016
61	64 & 71 Newcomb	Nov. 24	10 21	E, W	65 14 31·18	− 5 48·36	42·82	42·82	0·7	0·15	0·0158
62	82 & 93 Newcomb	Nov. 23	19 42	E, W	64 40 30·59	+ 28 12·45	43·04				
	,, ,, ,,	,, 24		W, E	30·55	12·17	42·72	42·88	0·7	0·21	0·0309
63	88 & 93 Newcomb	Nov. 23	19 38	E, W	64 43 56·31	+ 24 45·93	42·24				
	,, ,, ,,	,, 24		W, E	56·27	46·15	42·42	42·33	0·7	0·34	0·0809
64	131 & 138 Newcomb	Nov. 24	16 44	W, E	64 52 44·46	+ 15 58·21	42·67	42·67	0·7	0·00	0·0000
								Σ P = 52·4		Σ Pvv = 9·7198	

Summary.

No. of pairs 64

No. of observations 111

Mean difference between observations taken E, W and those taken W, E = − 0″·05

Observed Co-latitude (weighted mean) 65° 8′. 42″·67 ± 0″·036

Correction for Height above Sea-level + 0″·01

Final Co-latitude 65° 8′ 42″·68

		°	′	″	″
Astronomical Latitude (A)	=	24	51	17·32	± 0·036
Geodetic Latitude (G)	=	24	51	19·36	
Deflection of plumb-line (A − G)	=		−	2·04	

162. Diwai—*Co-latitude* 70° 10′ +

Latitude	... 19° 50′	*Maximum recorded Height of Barometer*	= 29·214 in.
Longitude	... 79 35	*Minimum* ,, ,, ,,	= 29·082
Height	... 967 feet	*Maximum* ,, *Reading of Thermometer*	= 74°·8
Instrument—Zenith Sector No. 2		*Minimum* ,, ,, ,,	= 64 ·0

Observer—J. Eccles, M.A.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1888-89			° ′ ″	° ′ ″	″	″	″		
1	176 Gr. 72	Dec 31	N	E, W	0 26 25·5	69 44 7·9	33·4	33·4	..	0·3	0·09
2	198 Gr. 72	Dec. 30	N	E, W	0 50 55·1	71 1 28·9	33·8				
	,, ,,	,, 31	,,	W, E	54·8	29·0	34·2	.	34·0	1·5	2·25
3	210 Gr. 72	Dec. 30	N	W, E	0 26 16·1	70 36 48·8	32·7				
	,, ,,	,, 31	,,	E, W	15·8	48·8	33·0	..	32·9	0·4	0·16
4	225 Gr. 72	Dec. 30	N	E, W	2 36 45·4	72 47 18·8	33·4				
	,, ,,	,, 31	,,	W, E	45·7	18·9	33·2	...	33·3	0·8	0·64
5	240 Gr. 72	Dec. 30	N	W, E	1 39 21·7	68 31 10·6	32·3				
	,, ,,	,, 31	,,	E, W	22·9	10·0	33·5	32·9	...	0·8	0·64
6	252 Gr. 72	Dec. 30	N	E, W	4 59 2·0	75 9 36·0	34·0				
	,, ,,	,, 31	,,	W, E	1·8	36·0	34·2	...	34·1	1·6	2·56
7	264 Gr. 72	Dec. 30	N	W, E	5 12 3·9	75 22 37·7	33·8				
	,, ,,	,, 31	,,	E, W	6·3	37·7	31·4	...	32·6	0·1	0·01
8	268 Gr. 72	Jan. 1	N	E, W	1 56 37·3	72 7 10·4	33·1				
	,, ,,	,, 2	S	W, E	37·8	10·4	32·6	...	32·9	0·4	0·16
9	270 Gr. 72	Jan. 3	S	E, W	2 14 44·8	72 25 15·1	30·3				
	,, ,,	,, 4	,,	W, E	42·7	15·2	32·5	...	31·4	1·1	1·21
10	274 Gr. 72	Dec. 30	N	E, W	1 4 17·3	69 6 17·3	34·6				
	,, ,,	,, 31	,,	W, E	16·6	17·3	33·9	34·3	...	0·6	0·36
11	292 Gr. 72	Dec. 31	N	E, W	0 31 7·9	70 41 40·2	32·3				
	,, ,,	Jan. 3	S	W, E	8·3	40·3	32·0				
	,, ,,	,, 4	,,	E, W	8·0	40·4	32·4	...	32·2	0·3	0·09
12	297 Gr. 72	Jan. 1	N	W, E	0 48 28·1	69 22 5·8	33·9				
	,, ,,	,, 2	S	E, W	27·4	5·8	33·2	33·6	...	0·1	0·01
13	313 Gr. 72	Jan. 1	N	E, W	4 30 21·2	65 40 13·3	34·5				
	,, ,,	,, 2	S	W, E	21·0	13·3	34·3	34·4	...	0·7	0·49
14	317 Gr. 72	Jan. 3	S	E, W	11 11 17·7	81 21 51·1	33·4				
	,, ,,	,, 4	,,	W, E	18·8	51·2	32·4	...	32·9	0·4	0·16
15	321 Gr. 72	Dec. 31	N	E, W	2 35 46·1	67 34 48·1	34·2	34·2	...	0·5	0·25

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

162. Diwai—*Co-latitude* 70° 10′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1888-89			° ′ ″	° ′ ″	″	″	″		
16	325 Gr. 72	Jan. 1	N	W, E	7 16 12·0	77 26 44·9	32·9				
	" "	" 2	S	E, W	12·2	45·0	32·8	...	32·9	0·4	0·16
17	329 Gr. 72	Jan. 3	S	W, E	4 16 0·4	65 54 34·1	34·5				
	" "	" 4	"	E, W	0·8	34·1	34·9	34·7	...	1·0	1·00
18	335 Gr. 72	Jan. 1	N	E, W	5 8 44·1	65 1 51·3	35·4				
	" "	" 2	S	W, E	42·9	51·3	34·2	34·8	...	1·1	1·21
19	338 Gr. 72	Dec. 30	N	W, E	0 28 51·9	70 39 24·8	32·9				
	" "	" 31	"	E, W	51·2	24·8	33·6	...	33·3	0·8	0·64
20	343 Gr. 72	Jan. 3	S	E, W	0 45 9·4	69 25 25·5	34·9				
	" "	" 4	"	W, E	9·0	25·6	34·6	34·8	...	1·1	1·21
21	349 Gr. 72	Jan. 1	N	W, E	3 56 12·2	66 14 22·2	34·4				
	" "	" 2	S	E, W	11·2	22·2	33·4	33·9	...	0·2	0·04
22	351 Gr. 72	Dec. 30	N	E, W	3 53 19·3	66 17 15·0	34·3				
	" "	" 31	"	W, E	18·9	15·0	33·9				
	" "	Jan. 3	S	W, E	18·9	15·0	33·9				
	" "	" 4	"	E, W	19·0	15·0	34·0	34·0	...	0·3	0·09
23	355 Gr. 72	Jan. 1	N	E, W	11 43 45·0	58 26 49·5	34·5				
	" "	" 2	S	W, E	45·3	49·4	34·7	34·6	...	0·9	0·81
24	362 Gr. 72	Dec. 30	N	W, E	3 1 39·6	67 8 53·4	33·0				
	" "	" 31	"	E, W	39·4	53·4	32·8				
	" "	Jan. 3	S	E, W	39·8	53·4	33·2				
	" "	" 4	"	W, E	39·5	53·4	32·9	33·0	...	0·7	0·49
25	367 Gr. 72	Jan. 2	S	E, W	7 38 59·4	77 49 32·0	32·6	...	32·6	0·1	0·01
26	370 Gr. 72	Jan. 3	S	W, E	3 58 30·3	66 12 3·8	34·1				
	" "	" 4	"	E, W	30·3	3·8	34·1	34·1	...	0·4	0·16
27	373 Gr. 72	Dec. 30	N	E, W	1 57 11·6	68 13 23·3	34·9				
	" "	" 31	"	W, E	11·0	23·3	34·3	34·6	...	0·9	0·81
28	377 Gr. 72	Jan. 1	N	E, W	8 52 33·7	61 18 0·1	33·8				
	" "	" 2	S	W, E	34·0	0·1	34·1	34·0	...	0·3	0·09
29	381 Gr. 72	Dec. 30	N	W, E	6 21 56·8	63 48 36·1	32·9				
	" "	" 31	"	E, W	57·3	36·1	33·4	33·2	...	0·5	0·25
30	388 Gr. 72	Jan. 1	N	W, E	4 42 11·9	74 52 45·2	33·3				
	" "	" 2	S	E, W	12·5	45·2	32·7				
	" "	" 3	"	E, W	12·7	45·2	32·5				
	" "	" 4	"	W, E	12·7	45·2	32·5	...	32·8	0·3	0·09
31	399 Gr. 72	Dec. 30	N	E, W	4 28 0·2	74 38 32·2	33·0				
	" "	" 31	"	W, E	0·1	32·3	32·2	...	32·1	0·4	0·16

162. Diwai—*Co-latitude* 70° 10′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1888-89			° ′ ″	° ′ ″	″	″	″		
32	419 Gr. 72	Dec. 30	N	W, E	0 53 30·4	71 4 3·3	32·9				
	” ”	” 31	”	E, W	30·6	3·4	32·8				
	” ”	Jan. 1	”	E, W	31·5	3·4	31·9				
	” ”	” 2	S	W, E	31·6	3·4	31·8				
	” ”	” 3	”	W, E	31·5	3·4	31·9				
	” ”	” 4	”	E, W	30·8	3·4	32·6	...	32·3	0·2	0·04
33	429 Gr. 72	Dec. 30	N	E, W	3 32 24·6	73 42 56·6	32·0				
	” ”	” 31	”	W, E	24·4	56·7	32·3				
	” ”	Jan. 1	”	W, E	25·0	56·7	31·7				
	” ”	” 2	S	E, W	25·1	56·7	31·6				
	” ”	” 3	”	E, W	24·9	56·7	31·8				
	” ”	” 4	”	W, E	25·0	56·8	31·8	...	31·9	0·6	0·36
34	441 Gr. 72	Dec. 30	N	W, E	2 55 4·8	67 15 27·9	32·7				
	” ”	” 31	”	E, W	6·1	27·9	34·0				
	” ”	Jan. 1	”	E, W	6·7	27·9	34·6				
	” ”	” 2	S	W, E	6·5	27·9	34·4				
	” ”	” 3	”	W, E	6·6	27·9	34·5				
	” ”	” 4	”	E, W	6·4	27·9	34·3	34·1	...	0·4	0·16
35	449 Gr. 72	Dec. 30	N	E, W	1 10 30·1	71 21 4·0	33·9				
	” ”	” 31	”	W, E	30·2	4·0	33·8				
	” ”	Jan 1	”	W, E	30·7	4·0	33·3				
	” ”	” 2	S	E, W	30·9	4·1	33·2				
	” ”	” 3	”	E, W	31·6	4·1	32·5				
	” ”	” 4	”	W, E	31·5	4·1	32·6	...	33·2	0·7	0·49
36	460 Gr. 72	Dec. 30	N	W, E	5 3 12·0	65 7 22·1	34·1				
	” ”	” 31	”	E, W	11·4	22·0	33·4				
	” ”	Jan. 3	S	W, E	12·3	22·0	34·3				
	” ”	” 4	”	E, W	11·6	22·0	33·6	33·9	...	0·2	0·04
37	468 Gr. 72	Jan. 1	N	E, W	1 36 20·8	68 34 14·2	35·0				
	” ”	” 2	S	W, E	19·9	14·2	34·1	34·6	...	0·9	0·81
38	472 Gr. 72	Dec 31	N	W, E	1 19 48·4	71 30 20·8	32·4				
	” ”	Jan. 3	S	E, W	48·6	20·8	32·2				
	” ”	” 4	”	W, E	48·8	20·8	32·0	...	32·2	0·3	0·09
39	500 Gr. 72	Dec. 30	N	W, E	2 32 45·8	72 43 17·9	32·1				
	” ”	” 31	”	E, W	44·8	17·9	33·1				
	” ”	Jan. 1	”	W, E	46·7	17·9	31·2				
	” ”	” 2	S	E, W	46·8	17·9	31·1				
	” ”	” 4	”	E, W	45·9	18·0	32·1	...	31·9	0·6	0·36
40	523 Gr. 72	Dec. 30	N	E, W	1 21 54·4	71 32 26·7	32·3				
	” ”	” 31	”	W, E	53·7	26·7	33·0				
	” ”	Jan. 3	S	E, W	55·7	26·8	31·1				
	” ”	” 4	”	W, E	54·9	26·8	31·9	...	32·1	0·4	0·16
41	530 Gr. 72	Jan. 1	N	E, W	1 14 55·8	68 55 38·2	34·0				
	” ”	” 2	S	W, E	55·6	38·2	33·8	33·9	...	0·2	0·04

162. Diwai—*Co-latitude* 70° 10′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean by North Star	Seconds of Co-latitude: Mean by South Star	v	v v
		1888-89			° ′ ″	° ′ ″	″	″	″		
42	551 Gr. 72	Dec. 30	N	W, E	4 42 14·9	65 28 17·3	32·2				
	" "	" 31	"	E, W	15·1	17·3	32·4				
	" "	Jan. 1	"	W, E	15·0	17·3	33·2				
	" "	" 2	S	E, W	16·1	17·3	33·4				
	" "	" 3	"	W, E	15·7	17·2	32·9				
	" "	" 4	"	E, W	15·9	17·2	33·1	32·9	...	0·8	0·64
43	566 Gr. 72	Jan. 1	N	E, W	12 26 24·7	82 36 56·9	32·2				
	" "	" 2	S	W, E	24·0	57·0	33·0				
	" "	" 3	"	E, W	24·3	57·0	32·7				
	" "	" 4	"	W, E	25·2	57·1	31·9	...	32·5	0·0	0·00
44	569 Gr. 72	Dec. 30	N	E, W	6 6 50·8	64 3 42·7	33·5				
	" "	" 31	"	W, E	50·7	42·7	33·4	33·5	...	0·2	0·04
45	577 Gr. 72	Jan. 1	N	W, E	0 8 2·1	70 18 34·8	32·7				
	" "	" 2	S	E, W	1·5	34·8	33·3				
	" "	" 3	"	W, E	1·5	34·8	33·3				
	" "	" 4	"	E, W	1·9	34·8	32·9	...	33·1	0·6	0·36
46	579 Gr. 72	Dec. 30	N	W, E	3 26 35·5	66 43 57·7	33·2	33·2	...	0·5	0·25
47	589 Gr. 72	Jan. 3	S	E, W	3 18 19·6	66 52 14·2	33·8				
	" "	" 4	"	W, E	19·8	14·2	34·0	33·9	...	0·2	0·04
48	590 Gr. 72	Jan. 2	S	W, E	4 37 6·8	65 33 27·1	33·9	33·9	...	0·2	0·04
49	593 Gr. 72	Dec. 30	N	E, W	3 6 27·2	67 4 6·8	34·0				
	" "	" 31	"	W, E	26·5	6·8	33·3	33·7	...	0·0	0·00
50	600 Gr. 72	Jan. 3	S	W, E	2 42 46·2	67 27 46·7	32·9				
	" "	" 4	"	E, W	46·9	46·7	33·6	33·3	...	0·4	0·16
51	610 Gr. 72	Dec. 30	N	W, E	2 44 40·6	67 25 53·4	34·0				
	" "	" 31	"	E, W	39·7	53·4	33·1				
	" "	Jan. 1	"	W, E	39·9	53·4	33·3				
	" "	" 2	S	E, W	40·9	53·4	34·3	33·7	...	0·0	0·00
52	618 Gr. 72	Jan. 3	S	E, W	1 1 52·3	69 8 39·3	31·6				
	" "	" 4	"	W, E	53·5	39·3	32·8	32·2	...	1·5	2·25
53	623 Gr. 72	Dec. 30	N	E, W	0 27 23·2	69 43 10·3	33·5				
	" "	" 31	"	W, E	22·6	10·3	32·9	33·2	...	0·5	0·25
54	628 Gr. 72	Jan. 1	N	E, W	12 42 27·9	57 28 3·9	31·8				
	" "	" 2	S	W, E	27·8	3·9	31·7	31·8	...	1·9	3·61

162. Diwai—*Co-latitude* 70° 10′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance			N P D.			Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1888 89			°	′	″	°	′	″	″	″	″		
55	645 Gr. 72	Dec. 30	N	W, E	3	19	55·6	73	30	28·4	32·8				
	,, ,,	,, 31	,,	E, W			57·3			28·5	31·2				
	,, ,,	Jan. 2	S	E, W			56·8			28·6	31·8				
	,, ,,	,, 3	,,	W, E			57·3			28·7	31·4				
	,, ,,	,, 4	,,	E, W			57·2			28·7	31·5	...	31·7	0·8	0·64
56	676 Gr. 72	Jan. 1	N	E, W	6	24	2·5	63	46	30·8	33·3				
	,, ,,	,, 2	S	W, E			2·9			30·7	33·6				
	,, ,,	,, 3	,,	E, W			2·9			30·7	33·6				
	,, ,,	,, 4	,,	W, E			4·9			30·7	35·6	34·0	...	0·3	0·09
57	682 Gr. 72	Dec 30	N	E, W	4	32	53·6	65	37	42·5	36·1				
	,, ,,	,, 31	,,	W, E			51·1			42·5	33·6	34·9	...	1·2	1·44
58	690 Gr. 72	Dec. 30	N	W, E	3	43	5·6	73	53	37·8	32·2				
	,, ,,	,, 31	,,	E, W			6·1			37·8	31·7				
	,, ,,	Jan 1	,,	W, E			7·0			37·9	30·9				
	,, ,,	,, 2	S	E, W			6·3			37·9	31·6				
	,, ,,	,, 3	,,	W, E			6·0			38·0	32·0				
	,, ,,	,, 4	,,	E, W			6·0			38·0	32·0	...	31·7	0·8	0·64
59	706 Gr. 72	Jan. 1	N	E, W	3	5	8·7	73	15	40·9	32·2				
	,, ,,	,, 2	S	W, E			8·7			41·0	32·3				
	,, ,,	,, 3	,,	E, W			8·9			41·0	32·1				
	,, ,,	,, 4	,,	W, E			8·7			41·1	32·4	..	32·3	0·2	0·04
60	727 Gr 72	Jan. 3	S	W, E	1	50	46·2	68	19	46·2	32·4				
	,, ,,	,, 4	,,	E, W			46·4			46·2	32·6	32·5	..	1·2	1·44
61	728 Gr. 72	Jan. 1	N	W, E	11	18	47·1	81	29	19·3	32·2				
	,, ,,	,, 2	S	E, W			46·4			19·4	33·0	...	32·6	0·1	0·01
62	737 Gr 72	Jan. 1	N	E, W	3	45	39·8	73	56	11·3	31·5				
	,, ,,	,, 2	S	W, E			38·8			11·4	32·6	...	32·1	0·4	0·16
63	742 Gr. 72	Jan. 4	S	W, E	7	18	58·6	62	51	34·8	33·4	33·4	...	0·3	0·09
64	758 Gr 72	Jan. 3	S	W, E	6	13	20·4	63	57	13·1	33·5				
	,, ,,	,, 4	,,	E, W			20·9			13·1	34·0	33·8	...	0·1	0·01
65	759 Gr. 72	Jan. 1	N	W, E	4	50	16·7	65	20	16·2	32·9				
	,, ,,	,, 2	S	E, W			17·3			16·2	33·5	33·2	...	0·5	0·25
66	777 Gr. 72	Jan. 1	N	E, W	3	44	23·7	73	54	54·4	31·7				
	,, ,,	,, 2	S	W, E			21·4			54·4	33·0				
	,, ,,	,, 3	,,	E, W			22·3			54·5	32·[illegible]				
	,, ,,	,, 4	,,	W, E			22·7			54·5	31·8	...	32·2	0·3	0·09
67	792 Gr. 72	Jan. 1	N	W, E	2	4	40·8	68	5	51·9	32·7				
	,, ,,	,, 2	S	E, W			40·9			51·9	32·8	32·8	...	0·9	0·81
68	795 Gr. 72	Jan. 3	S	W, E	6	1	4·7	64	9	28·0	32·7				
	,, ,,	,, 4	,,	E, W			5·3			28·0	33·3	33·0	...	0·7	0·49
69	807 Gr 72	Jan. 1	N	E, W	10	17	53·4	80	28	26·0	32·6				
	,, ,,	,, 2	S	W, E			53·8			26·1	32·3				
	,, ,,	,, 3	,,	E, W			53·7			26·2	32·5				
	,, ,,	,, 4	,,	W, E			53·6			26·3	32·7	...	32·5	0·0	0·00

162. Diwai—*Co-latitude* 70° 10′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
70	812 Gr. 72	Jan. 1	N	W, E	1 8 15·3	71 18 47·4	32·1				
	„ „	„ 2	S	E, W	15·6	47·5	31·9				
	„ „	„ 3	„	W, E	15·6	47·5	31·9				
	„ „	„ 4	„	E, W	15·4	47·6	32·2	...	32·0	0·5	0·25
71	833 Gr. 72	Jan. 1	N	E, W	4 37 45·4	65 32 47·8	33·2				
	„ „	„ 2	S	W, E	46·7	47·8	34·5	33·9	...	0·2	0·04
72	837 Gr. 72	Jan. 3	S	E, W	0 59 32·6	69 11 0·9	33·5				
	„ „	„ 4	„	W, E	31·9	0·9	32·8	33·2	...	0·5	0·25
73	850 Gr. 72	Jan. 1	N	W, E	0 34 25·0	69 36 8·1	33·1				
	„ „	„ 2	S	E, W	25·4	8·1	33·5	33·3	...	0·4	0·16
74	852 Gr. 72	Jan. 3	S	W, E	0 17 11·0	69 53 21·8	32·8	32·8	...	0·9	0·81
								Σ vv by N. Stars = 22·21			
								Σ vv by S. Stars = 11·99			

Summary.

No. of North Stars 44 No. of South Stars 30

No. of observations 204

	°	′	″	″
Co-latitude by North Stars	70	10	33·66	± 0·073
„ „ South Stars	70	10	32·54	± 0·079
Mean Co-latitude	70	10	33·10	± 0·054
Correction for Height above Sea-level			+ 0·03	

Final Co-latitude 70° 10′ 33″·13

		°	′	″	″
Astronomical Latitude (A)	=	19	49	26·87	± 0·054
Geodetic Latitude (G)	=	19	49	32·57	
Deflection of plumb-line (A − G)	=			− 5·70	

163. Gudali—*Co-latitude* 75° 58′ +

Latitude	... 14° 1′	*Instrument*—Zenith Telescope	
Longitude	... 80 4	*Mean Height of Barometer*	in. 29 80
Height	... 292 feet	*Mean Temperature*	72°·4

Observer—Lieut. G. P. Lenox Conyngham, R E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
1	1232 & 1240 Gr. 80	Jan 16	14 12	E, W	76 6 46·56	− 7 57 49	49 1				
	„ „ „	„ 18		W, E	46 64	58 49	48 2				
	„ „ „	„ 22		E, W	46 78	57 23	49 6				
	„ „ „	„ 23		W, E	46·82	58 18	48 6	48·8	1 3	0·5	0·33
2	1250 & 1272 Gr. 80	Jan. 16	2 26	W, E	75 41 25·28	+ 17 23·77	49·1				
	„ „ „	„ 18		E, W	25 35	22 67	48 0				
	„ „ „	„ 22		W, E	25 50	23 47	49 0				
	„ „ „	„ 23		E, W	25 54	24·09	49 6	48·9	0·9	0 4	0·14
3	1272 & 1297 Gr. 80	Jan. 16	2 6	E, W	76 1 42·25	− 2 53·03	49·2				
	„ „ „	„ 18		W, E	42·33	51 90	50 4				
	„ „ „	„ 22		E, W	42 49	54·23	48 3				
	„ „ „	„ 23		W, E	42·53	53·27	49·3	49 3	0·9	0 0	0·00
4	1313 & 1342 Gr. 80	Jan. 20	8 33	E, W	75 56 26 98	+ 2 23·97	51 0				
	„ „ „	„ 22		W, E	27 07	23·20	50·3				
	„ „ „	„ 23		E, W	27·12	21 96	49·1	50·1	1·2	0·8	0·77
5	1359 & 1363 Gr. 80	Jan. 16	11 36	E, W	75 53 49·40	+ 4 59·66	49·1				
	„ „ „	„ 20		W, E	49 58	59 51	49·1				
	„ „ „	„ 22		E, W	49·68	59 15	48 8				
	„ „ „	„ 23		W, E	49·73	59 72	49 5	49·1	1·3	0·2	0·05
6	1370 & 1390 Gr. 80	Jan. 16	11 36	W, E	75 45 51·51	+ 12 57·67	49·2				
	„ „ „	„ 20		E W	51 71	57·91	49 6				
	„ „ „	„ 22		W, E	51·80	56 45	48·3				
	„ „ „	„ 23		E, W	51·85	56 89	48 7	48 9	1·3	0·4	0·21
7	1402 & 1411 Gr. 80	Jan. 16	4 35	W, E	75 53 54 87	+ 4 54·13	49·0				
	„ „ „	„ 18		E, W	54 98	55·44	50 4				
	„ „ „	„ 22		W, E	55·19	54·74	49·9				
	„ „ „	„ 23		E, W	55·25	54·40	49·7	49·8	1·3	0·5	0·33
8	1434 & 1449 Gr. 80	Jan. 16	4 13	W, E	75 45 7·35	+ 13 43·56	50·9				
	„ „ „	„ 20		E, W	7·58	43 64	51·2				
	„ „ „	„ 22		E, W	7·70	42·89	50·6				
	„ „ „	„ 23		W, E	7·75	42·62	50·4	50·8	1·3	1·5	2·93
9	1451 & 1465 Gr. 80	Jan. 16	7 54	E, W	76 1 41·32	− 2 52·39	48·9				
	„ „ „	„ 20		W, E	41·57	52·88	48·7				
	„ „ „	„ 22		W, E	41·69	52·71	49·0	48·9	1·2	0·4	0·19

163. Gudali—*Co-latitude* 75° 58′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
10	1476 & 1482 Gr. 80	Jan. 16	1 37	W, E	75 52 4·96	+ 6 45·03	50·0				
	,, ,, ,,	,, 20		E, W	5·22	45·26	50·5				
	,, ,, ,,	,, 22		E, W	5·34	44·69	50·0	50·1	1·2	0·8	0·77
11	1494 & 1498 Gr. 80	Jan. 16	1 51	E, W	76 6 31·77	− 7 42·36	49·4				
	,, ,, ,,	,, 18		W, E	31·90	41·82	50·1				
	,, ,, ,,	,, 23		E, W	32·24	42·99	49·3	49·6	0·8	0·3	0·07
12	1498 & 1504 Gr. 80	Jan. 16	1 44	W, E	75 59 24·75	− 0 35·36	49·4				
	,, ,, ,,	,, 18		E, W	24·89	34·69	50·2				
	,, ,, ,,	,, 23		W, E	25·22	35·81	49·4	49·7	0·8	0·4	0·13
13	1517 & 1524 Gr. 80	Jan. 16	8 29	E, W	75 59 35·45	− 0 46·27	49·2				
	,, ,, ,,	,, 18		W, E	35·59	47·18	48·4				
	,, ,, ,,	,, 22		W, E	35·87	47·14	48·7				
	,, ,, ,,	,, 23		E, W	35·94	47·22	48·7	48·8	1·3	0·5	0·33
14	1540 & 1554 Gr. 80	Jan. 16	11 26	W, E	75 47 20·24	+ 11 29·15	49·4				
	,, ,, ,,	,, 22		E, W	20·68	27·38	48·1	48·7	1·0	0·6	0·36
15	1559 & 1577 Gr. 80	Jan. 16	22 32	E, W	75 39 9·41	+ 19 39·54	49·0				
	,, ,, ,,	,, 18		W, E	9·56	41·26	50·8				
	,, ,, ,,	,, 22		W, E	9·86	39·34	49·2	49·7	1·2	0·4	0·19
16	1583 & 1596 Gr. 80	Jan. 16	3 16	W, E	76 20 35·36	− 21 45·72	49·6				
	,, ,, ,,	,, 18		E, W	35·53	46·99	48·5				
	,, ,, ,,	,, 22		E, W	35·86	46·40	49·5				
	,, ,, ,,	,, 23		W, E	35·95	47·10	48·9	49·1	1·3	0·2	0·05
17	1606 & 1622 Gr. 80	Jan. 16	10 40	E, W	76 22 51·66	− 24 2·31	49·4				
	,, ,, ,,	,, 18		W, E	51·84	3·17	48·7				
	,, ,, ,,	,, 22		W, E	52·19	3·32	48·9				
	,, ,, ,,	,, 23		E, W	52·27	3·38	48·9	49·0	1·3	0·3	0·12
18	1636 Gr. 80 & 959 Gr. 72	Jan. 16	5 15	E, W	76 10 59·87	− 12 12·95	46·9				
	,, ,, ,, ,,	,, 18		W, E	60·05	11·99	48·1				
	,, ,, ,, ,,	,, 22		E, W	60·43	13·05	47·4				
	,, ,, ,, ,,	,, 23		W, E	60·52	12·17	48·3	47·6	1·3	1·7	3·76
19	1674 & 1685 Gr. 80	Jan. 16	6 39	W, E	76 15 23·00	− 16 32·42	50·6				
	,, ,, ,,	,, 18		E, W	23·20	32·84	50·4				
	,, ,, ,,	,, 22		W, E	23·60	33·37	50·2				
	,, ,, ,,	,, 23		E, W	23·71	33·34	50·4	50·4	1·3	1·1	1·57
20	1727 & 1746 Gr. 80	Jan. 16	11 8	W, E	75 48 15·69	+ 10 33·94	49·6				
	,, ,, ,,	,, 18		E, W	15·91	33·41	49·3				
	,, ,, ,,	,, 22		W, E	16·35	32·56	48·9				
	,, ,, ,,	,, 23		E, W	16·46	32·93	49·4	49·3	1·3	0·0	0·00

163. Gudali—*Co-latitude* 75° 58′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
21	1762 & 1769 Gr. 80	Jan 16	6 26	E, W	75 39 20.50	+ 19 29.67	50.2				
	„ „ „	„ 18		W, E	20.73	29.99	50.7				
	„ „ „	„ 22		E, W	21.19	27.39	48.6				
	„ „ „	„ 23		W, E	21.30	27.78	49.1	49.7	1.3	0.4	0.21
22	382 Gr 64 & 475 Gr 80	Jan. 21	5 26	W, E	76 6 25.40	− 7 36.26	49.1				
	„ „ „ „	„ 24		E, W	25.52	35.78	49.7				
	„ „ „ „	„ 25		W, E	25.56	36.64	48.9	49.2	1.2	0.1	0.01
23	511 & 517 Gr. 80	Jan. 20	10 32	W, E	76 11 24.94	− 12 34.62	50.3				
	„ „ „	„ 21		E, W	24.97	34.82	50.2				
	„ „ „	„ 24		W, E	25.08	35.39	49.7				
	„ „ „	„ 25		E, W	25.11	34.95	50.1	50.0	1.3	0.7	0.64
24	546 & 565 Gr. 80	Jan. 20	5 11	E, W	75 49 21.27	+ 9 28.44	49.7				
	„ „ „	„ 21		W, E	21.31	27.83	49.1				
	„ „ „	„ 24		E, W	21.40	29.11	50.5				
	„ „ „	„ 25		W, E	21.43	28.33	49.8	49.8	1.3	0.5	0.33
25	589 & 602 Gr. 80	Jan. 20	3 6	W, E	76 5 44.12	− 6 53.90	50.2				
	„ „ „	„ 21		E, W	44.15	54.78	49.4				
	„ „ „	„ 24		W, E	44.24	54.78	49.5				
	„ „ „	„ 25		E, W	44.27	54.36	49.9	49.7	1.3	0.4	0.21
26	628 & 630 Gr. 80	Jan. 20	8 3	E, W	76 15 54.36	− 17 4.92	49.5				
	„ „ „	„ 21		W, E	54.39	5.46	48.9				
	„ „ „	„ 24		E, W	54.48	5.56	48.9				
	„ „ „	„ 25		W, E	54.50	4.67	49.8	49.3	1.3	0.0	0.00
27	661 & 677 Gr. 80	Jan. 20	7 2	W, E	75 31 36.30	+ 27 13.39	49.7				
	„ „ „	„ 21		E, W	36.32	13.41	49.7				
	„ „ „	„ 24		E, W	36.40	12.58	49.0				
	„ „ „	„ 25		W, E	36.42	12.68	49.1	49.4	1.3	0.1	0.01
28	696 & 712 Gr. 80	Jan. 20	4 52	E, W	75 55 39.56	+ 3 9.81	49.4				
	„ „ „	„ 21		W, E	39.58	10.87	50.5				
	„ „ „	„ 24		W, E	39.66	9.84	49.5				
	„ „ „	„ 25		E, W	39.68	9.78	49.5	49.7	1.3	0.4	0.21
29	734 & 740 Gr 80	Jan. 20	2 0	E, W	75 42 34.03	+ 16 15.37	49.4				
	„ „ „	„ 21		W, E	34.06	15.73	49.8				
	„ „ „	„ 24		W, E	34.13	15.52	49.7				
	„ „ „	„ 25		E, W	34.15	14.70	48.8	49.4	0.9	0.1	0.01
30	740 & 742 Gr. 80	Jan. 20	1 43	W, E	76 0 13.04	− 1 23.44	49.6				
	„ „ „	„ 21		E, W	13.06	22.84	50.2				
	„ „ „	„ 24		E, W	13.13	23.59	49.5				
	„ „ „	„ 25		W, E	13.16	22.80	50.4	49.9	0.9	0.6	0.32
31	742 & 749 Gr. 80	Jan. 20	1 52	E, W	76 9 28.54	− 10 39.06	49.5				
	„ „ „	„ 21		W, E	28.57	38.81	49.8				
	„ „ „	„ 24		W, E	28.64	38.59	50.0				
	„ „ „	„ 25		E, W	28.67	39.24	49.4	49.7	0.9	0.4	0.14

Gudali—*Co-latitude* 75° 58′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
32	754 & 789 Gr. 80	Jan. 20	8 40	W, E	75 55 1·75	+ 3 47·15	48·9				
	" " "	" 21		E, W	1·77	47·75	49·5				
	" " "	" 24		E, W	1·84	47·88	49·7				
	" " "	" 25		W, E	1·86	47·06	48·9	49·2	1·3	0·1	0·01
33	809 & 818 Gr. 80	Jan. 20	24 4	W, E	76 20 57·76	− 22 7·43	50·3				
	" " "	" 21		E, W	57·78	8·50	49·3				
	" " "	" 24		E, W	57·84	7·90	49·9				
	" " "	" 25		W, E	57·86	6·98	50·9	50·1	1·3	0·8	0·83
34	837 & 861 Gr. 80	Jan. 20	18 41	E, W	76 7 13·47	− 8 23·90	49·6				
	" " "	" 21		W, E	13·50	24·92	48·6				
	" " "	" 24		W, E	13·52	24·17	49·4				
	" " "	" 25		E, W	13·56	24·41	49·2	49·2	1·3	0·1	0·01
35	887 & 898 Gr. 80	Jan. 20	14 31	W, E	75 59 16·03	− 0 26·81	49·2				
	" " "	" 21		E, W	16·05	27·32	48·7				
	" " "	" 24		E, W	16·11	26·21	49·9				
	" " "	" 25		W, E	16·13	26·85	49·3	49·3	1·3	0·0	0·00
36	902 Gr. 80 & 517 Gr. 72	Jan. 20	8 0	E, W	76 8 45·56	− 9 57·15	48·4				
	" " " "	" 21		W, E	45·59	57·14	48·5				
	" " " "	" 24		W, E	45·65	56·53	49·1				
	" " " "	" 25		E, W	45·68	56·68	49·0	48·7	1·3	0·6	0·47
37	523 Gr. 72 & 928 Gr. 80	Jan. 20	4 32	W, E	76 3 40·28	− 4 51·54	48·7				
	" " " "	" 21		E, W	40·30	50·67	49·6				
	" " " "	" 24		E, W	40·37	51·84	48·5				
	" " " "	" 25		W, E	40·39	51·74	48·7	48·9	1·3	0·4	0·21
38	947 & 954 Gr. 80	Jan. 20	16 33	E, W	76 7 5·02	− 8 16·09	48·9				
	" " "	" 21		W, E	5·04	16·35	48·7				
	" " "	" 24		W, E	5·10	15·82	49·3	49·0	1·2	0·3	0·11
39	998 & 1001 Gr. 80	Jan. 20	6 26	W, E	76 10 44·81	− 11 54·85	50·0				
	" " "	" 21		E, W	44·83	56·00	48·8				
	" " "	" 24		W, E	44·90	55·06	49·8				
	" " "	" 25		E, W	44·92	55·87	49·1	49·4	1·3	0·1	0·01
40	1010 & 1016 Gr. 80	Jan. 20	12 4	E, W	76 7 2·05	− 8 12·86	49·2				
	" " "	" 21		W, E	2·07	12·46	49·6				
	" " "	" 24		E, W	2·14	11·18	51·0				
	" " "	" 25		W, E	2·17	12·38	49·8	49·9	1·3	0·6	0·47
41	1037 Gr. 80 & 604 Gr. 72	Jan. 20	1 6	W, E	76 19 1·27	− 20 11·98	49·3				
	" " " "	" 21		E, W	1·30	12·55	48·8				
	" " " "	" 24		W, E	1·37	11·53	49·8				
	" " " "	" 25		E, W	1·40	12·11	49·3	49·3	1·3	0·0	0·00
42	1065 & 1076 Gr. 80	Jan. 20	21 31	E, W	76 15 49·57	− 16 60·94	48·6				
	" " "	" 21		W, E	49·59	61·77	47·8				
	" " "	" 24		E, W	49·67	59·85	49·8				
	" " "	" 25		W, E	49·69	61·33	48·4	48·6	1·3	0·7	0·64

163. Gudali—*Co-latitude* 75° 58′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
43	1104 Gr. 80 & 637 Gr. 72	Jan. 20	6 18	W, E	76 1 52·18	− 3 2·77	49·4				
	” ” ” ”	” 21		E, W	52·20	3·49	48·7				
	” ” ” ”	” 24		W, E	52·28	3·09	49·2				
	” ” ” ”	” 25		E, W	52·31	4·01	48·3	48·9	1·3	0·4	0·21
44	116 Dy. 75 & 1175 Gr. 80	Jan. 20	11 21	E, W	76 6 54·03	− 8 4·85	49·2				
	” ” ” ”	” 21		W, E	54·06	4·61	49·5				
	” ” ” ”	” 24		E, W	54·14	5·21	48·9				
	” ” ” ”	” 25		W, E	54·17	5·90	48·3	49·0	1·3	0·3	0·12
45	663 Gr. 72 & 1187 Gr 80	Jan. 20	25 28	W, E	76 27 5·97	− 28 17·24	48·7				
	” ” ” ”	” 21		E, W	6·00	17·71	48·5				
	” ” ” ”	” 24		W, E	6·08	17·89	48·2				
	” ” ” ”	” 25		E, W	6·11	17·01	49·1	48·6	1·3	0·7	0·64
								Σ P = 54·6		Σ Pvv = 18·12	

Summary.

No. of pairs 45

No. of observations 170

Mean difference between observations taken E, W and those taken W, E = ∸ 0″·05

Observed Co-latitude (weighted mean) 75° 58′ 49″·34 ± 0″·059

Correction for Height above Sea-level + 0″·01

Final Co-latitude 75° 58′ 49″·35

	°	′	″	″
Astronomical Latitude (A)	= 14	1	10·65	± 0·059
Geodetic Latitude (G)	= 14	1	9·45	
Deflection of plumb-line (A−G)	=	+	1·20	

164. Gurmi—*Co-latitude* 63° 23′ +

Latitude ... 26° 36′
Longitude ... 78 33
Height ... 575 feet

Instrument—Zenith Telescope
Mean Height of Barometer 29·42 in.
Mean Temperature 61°·1

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1902	° ′		° ′ ″	′ ″	″	″			
1	1415 & 1430 Newcomb	Nov. 3	34 29	E, W	63 48 13·76	− 24 19·40	54·36				
	„ „ „	„ 4		W, E	13·74	19·07	54·67	54·52	1·0	0·51	0·2601
2	1438 & 1446 Newcomb	Nov. 3	29 23	W, E	63 13 53·89	+ 9 60·12	54·01				
	„ „ „	„ 4		E, W	53·87	59·89	53·76				
	„ „ „	„ 5		W, E	53·83	59·79	53·62	53·79	0·8	0·22	0·0387
3	1455 & 1458 Newcomb	Nov. 3	6 6	E, W	63 23 44·37	+ 0 10·24	54·61				
	„ „ „	„ 4		W, E	44·34	9·81	54·15	54·51	1·2	0·50	0·3000
	„ „ „	„ 6		E, W	44·28	10·85	55·13				
4	1459 & 1492 Newcomb	Nov. 3	31 14	E, W	63 29 55·26	− 6 1·44	53·82				
	„ „ „	„ 4		W, E	55·22	1·77	53·45	53·78	0·8	0·23	0·0423
	„ „ „	„ 5		E, W	55·20	0·83	54·37				
5	1485 & 1492 Newcomb	Nov. 2	31 20	W, E	63 24 3·82	− 0 10·16	53·66				
	„ „ „	„ 3		E, W	3·78	10·17	53·61				
	„ „ „	„ 4		W, E	3·73	10·23	53·50				
	„ „ „	„ 5		E, W	3·69	9·77	53·92	53·67	0·9	0·34	0·1040
6	1501 & 1504 Newcomb	Nov. 2	3 20	E, W	63 36 40·95	− 12 46·70	54·25				
	„ „ „	„ 3		W, E	40·90	46·78	54·12				
	„ „ „	„ 4		E, W	40·85	46·36	54·49				
	„ „ „	„ 5		W, E	40·81	46·55	54·26	54·28	1·3	0·27	0·0948
7	1517 & 1520 Newcomb	Nov. 2	15 18	W, E	63 29 19·74	− 5 25·11	54·63				
	„ „ „	„ 3		E, W	19·68	25·17	54·51				
	„ „ „	„ 4		W, E	19·62	24·94	54·68				
	„ „ „	„ 5		E, W	19·56	24·72	54·84	54·67	1·3	0·66	0·5663
8	1546 & 1561 Newcomb	Nov. 2	3 48	W, E	62 59 48·46	+ 24 4·74	53·20				
	„ „ „	„ 3		E, W	48·39	6·19	54·58				
	„ „ „	„ 4		W, E	48·31	5·02	53·33				
	„ „ „	„ 5		E, W	48·24	6·22	54·46	53·89	0·9	0·12	0·0130
9	1549 & 1561 Newcomb	Nov. 2	3 58	W, E	63 9 59·43	+ 13 54·25	53·68				
	„ „ „	„ 3		E, W	59·35	55·08	54·43				
	„ „ „	„ 4		W, E	59·28	54·47	53·75				
	„ „ „	„ 5		E, W	59·20	55·09	54·29	54·04	0·9	0·03	0·0008
10	1586 & 1590 Newcomb	Nov. 2	30 32	E, W	63 33 52·32	− 9 58·51	53·81				
	„ „ „	„ 3		W, E	52·24	58·88	53·36				
	„ „ „	„ 4		E, W	52·17	58·53	53·64				
	„ „ „	„ 5		W, E	52·09	58·29	53·80	53·65	1·3	0·36	0·1685
11	6 & 11 Newcomb	Nov. 2	18 38	W, E	63 5 23·75	+ 18 29·43	53·18				
	„ „ „	„ 3		E, W	23·67	29·97	53·64				
	„ „ „	„ 4		W, E	23·58	30·26	53·84				
	„ „ „	„ 6		E, W	23·41	30·33	53·74	53·60	0·9	0·41	0·1513

164. Gurmi—*Co-latitude* 63° 23′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
12	6 & 17 Newcomb	Nov. 2	18 57	W, E	63 24 19·39	− 0 25·60	53·79				
	„ „ „	„ 3		E, W	19·31	25·55	53·76				
	„ „ „	„ 4		W, E	19·22	24·09	54·23				
	„ „ „	„ 6		E, W	19·05	24·93	54·12	53·98	0·9	0·03	0·0008
13	22 & 31 Newcomb	Nov. 2	26 58	E, W	63 36 34·89	− 12 40·59	54·30				
	„ „ „	„ 3		W, E	34·80	40·79	54·01				
	„ „ „	„ 4		E, W	34·71	41·13	53·58				
	„ „ „	„ 5		W, E	34·62	40·61	54·01	53·98	1·3	0·03	0·0012
14	36 & 45 Newcomb	Nov. 2	3 18	E, W	62 57 46·53	+ 26 6·17	52·70				
	„ „ „	„ 3		W, E	46·43	7·01	53·44				
	„ „ „	„ 4		E, W	46·33	7·48	53·81				
	„ „ „	„ 5		W, E	46·23	7·86	54·09	53·51	1·3	0·50	0·3250
15	93 & 99 Newcomb	Nov. 2	21 15	W, E	63 6 30·19	+ 17 23·65	53·84				
	„ „ „	„ 3		E, W	30·09	23·04	53·13				
	„ „ „	„ 4		W, E	29·98	23·52	53·50				
	„ „ „	„ 5		E, W	29·89	23·33	53·22	53·42	0·9	0·59	0·3133
16	99 & 101 Newcomb	Nov. 2	21 34	E, W	63 25 55·53	− 2 1·12	54·41				
	„ „ „	„ 3		W, E	55·43	1·63	53·80				
	„ „ „	„ 4		E, W	55·33	1·56	53·77				
	„ „ „	„ 5		W, E	55·24	1·65	53·59	53·89	0·9	0·12	0·0130
17	115 & 120 Newcomb	Nov. 3	23 49	E, W	63 29 17·18	− 5 23·13	54·05				
	„ „ „	„ 4		W, E	17·08	22·37	54·[illegible]				
	„ „ „	„ 5		E, W	16·98	22·78	54·[illegible]	54·42	1·2	0·41	0·2017
18	141 & 143 Newcomb	Nov 2	6 59	E, W	63 34 25·89	− 10 31·75	54·14				
	„ „ „	„ 3		W, E	25·79	31·52	54·27				
	„ „ „	„ 4		E, W	25·69	31·04	54·65				
	„ „ „	„ 5		W, E	25·60	31·50	54·10	54·29	1·3	0·28	0·1019
19	160 & 170 Newcomb	Nov. 2	21 50	W, E	63 0 20·73	+ 23 32·80	53·53				
	„ „ „	„ 3		E, W	20·63	32·92	53·55				
	„ „ „	„ 4		W, E	20·54	33·18	53·72				
	„ „ „	„ 5		E, W	20·44	33·47	53·91	53·68	1·3	0·33	0·1416
20	189 & 196 Newcomb	Nov. 2	22 46	E, W	63 31 27·94	− 7 33·24	54·70				
	„ „ „	„ 3		W, E	27·86	33·59	54·27				
	„ „ „	„ 4		E, W	27·78	33·34	54·44				
	„ „ „	„ 5		W, E	27·69	33·33	54·36	54·44	1·3	0·43	0·2401
21	208 & 211 Newcomb	Nov. 2	23 15	W, E	63 44 6·85	− 20 11·98	54·87				
	„ „ „	„ 3		E, W	6·77	12·75	54·02				
	„ „ „	„ 4		W, E	6·69	12·66	54·03				
	„ „ „	„ 5		E, W	6·63	12·19	54·44	54·34	1·3	0·33	0·1416
22	221 & 225 Newcomb	Nov. 2	36 21	E, W	63 26 34·64	− 2 41·20	53·44				
	„ „ „	„ 3		W, E	34·58	41·38	53·20				
	„ „ „	„ 4		E, W	34·51	40·84	53·67				
	„ „ „	„ 5		W, E	34·45	40·53	53·92	53·56	1·3	0·45	0·2633
23	244 & 250 Newcomb	Nov. 2	4 54	W, E	63 17 41·02	+ 6 12·38	53·40				
	„ „ „	„ 3		E, W	40·95	13·23	54·18				
	„ „ „	„ 4		W, E	40·88	13·04	53·92				
	„ „ „	„ 5		E, W	40·83	13·73	54·56	54·02	1·3	0·01	0·0001

164. Gurmi—*Co-latitude* 63° 23′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
24	273 & 281 Newcomb	Nov. 2	7 41	E, W	63 21 8·66	+ 2 45·46	54·12				
	" " "	" 3		W, E	8·60	45·31	53·91				
	" " "	" 4		E, W	8·55	45·16	53·71				
	" " "	" 5		W, E	8·50	45·67	54·17	53·98	1·3	0·03	0·0012
25	289 & 298 Newcomb	Nov. 2	30 4	W, E	63 29 4·18	− 5 10·30	53·88				
	" " "	" 3		E, W	4·15	10·15	54·00				
	" " "	" 4		W, E	4·12	9·93	54·19				
	" " "	" 5		E, W	4·08	10·15	53·93	54·00	1·3	0·01	0·0001
								Σ P = 28·2		Σ Pvv = 3·4850	

Summary.

No. of pairs 25

No. of observations 94

Mean difference between observations taken E, W and those taken W, E = + 0″·15

Observed Co-latitude (weighted mean) 63° 23′ 54″·01 ± 0″·049

Correction for Height above Sea-level + 0″·02

Final Co-latitude 63° 23′ 54″·03

		°	′	″	″
Astronomical Latitude (A)	=	26	36	5·97	± 0·049
Geodetic Latitude (G)	=	26	36	3·63	
Deflection of plumb-line (A − G)	=		+	2·34	

165. Hathbena—*Co-latitude* 70° 8′ +

Latitude	... 19° 52′	*Instrument*—Zenith Telescope	
Longitude	... 82 4	*Mean Height of Barometer*	in 27·42
Height	... 2600 feet	*Mean Temperature*	71°·4

Observer—Lieut. E. A. Tandy, R. E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: By each Observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	475 & 488 Gr. 80	Jan. 29	0 40	E, W	69 59 13·07	+ 9 4·23	17·30	17·30	0·5	0·01	0·0001
2	475 & 508 Gr. 80	Jan. 29	0 44	E, W	69 55 50·27	+ 12 27·37	17·64	17·64	0·5	0·33	0·0545
3	1567 & 1590 Gr. 80 " " "	Jan. 29 Feb. 1	14 30	W, E E, W	70 24 20·73 20·79	− 16 4·46 3·48	16·27 17·31	16·79	1·0	0·52	0·2704
4	1603 & 1606 Gr. 80* " " "	Jan. 29 Feb. 1	4 53	E, W W, E	70 38 50·23 50·30	− 30 35·35 33·03	14·87 17·27	16·07	1·0	1·24	1·5376
5	1621 & 1632 Gr. 80 " " "	Jan. 29 Feb. 1	6 47	W, E E, W	70 18 16·02 16·10	− 9 58·49 58·78	17·57 17·32	17·43	1·0	0·12	0·0144
6	1636 & 1662 Gr. 80	Jan. 29	11 44	E, W	69 45 30·56	+ 22 40·24	16·80	16·80	0·5	0·51	0·1301
7	1685 & 1701 Gr. 80 " " "	Jan. 29 Feb. 1	12 56	E, W W, E	70 1 59·54 59·65	+ 6 18·13 18·52	17·67 18·17	17·92	1·0	0·62	0·3721
8	1708 & 1713 Gr. 80 " " " 1713 & 1729 Gr. 80 " " "	Jan. 29 Feb. 1 Jan. 29 Feb. 1	12 31 12 48	E, W W, E W, E E, W	70 1 21·11 21·23 70 18 24·19 24·31	+ 6 55·56 56·22 − 10 7·11 6·88	16·67 17·43 17·68 17·4[illegible]	17·15	1·5	0·16	0·0384
9	1731 & 1746 Gr. 80 " " "	Jan. 29 Feb. 1	5 17	E, W W, E	70 0 7·26 7·40	+ 8 10·64 8·16	17·00 15·56	16·73	1·0	0·58	0·3364
10	1748 & 1767 Gr. 80 " " "	Jan. 29 Feb. 1	18 46	W, E E, W	69 58 47·62 47·67	+ 9 29·49 29·67	17·11 17·34	17·23	1·0	0·08	0·0064
11	1769 & 1799 Gr. 80 " " "	Jan. 29 Feb 1	12 6	E, W W, E	70 1 14·57 14·74	+ 7 1·59 2·15	16·16 16·89	16·53	1·0	0·78	0·6084
12	792 & 808 Gr. 80 " " "	Jan. 30 " 31	5 25	E, W W, E	70 30 34·53 34·57	− 22 17·70 18·43	16·83 16·14	16·49	1·0	0·82	0·6724
13	816 & 886 Gr. 80	Jan. 30	20 44	E, W	69 47 33·71	+ 20 45·12	18·83	18·83	0·5	1·52	1·1552
14	872 & 944 Gr. 80 " " "	Jan. 30 " 31	20 39	E, W W, E	70 37 40·15 40·18	− 29 22·70 23·10	17·45 17·08	17·27	1·0	0·04	0·0016

165. Hathbena—*Co-latitude* 70° 8′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1900	° ′		° ′ ″	′ ″	″	″			
15	953 & 975 Gr. 80	Jan. 30	5 42	W, E	69 51 15·72	+ 17 2·46	18·18				
	" " "	" 31		E, W	15·73	3·00	18·73				
	953 & 992 Gr. 80	" 31	5 51	E, W	70 0 24·60	+ 7 53·50	18·10	18·34	1·5	1·03	1·5914
16	998 & 999 Gr. 80	Jan. 30	0 16	E, W	70 0 24·34	+ 7 53·28	17·62				
	" " "	" 31		W, E	24·36	53·24	17·60	17·61	1·0	0·30	0·0900
17	871 & 918 Gr. 80	Jan. 30	20 22	E, W	70 0 28·14	+ 7 50·54	18·68	18·68	0·5	1·37	0·9385
18	1022 & 1025 Gr. 80	Jan. 30	0 14	W, E	70 5 3·55	+ 3 14·61	18·16				
	" " "	" 31		E, W	3·57	13·36	16·93	17·55	1·0	0·24	0·0576
19	1043 & 1139 Gr. 80	Jan. 30	3 20	E, W	70 11 38·12	− 3 20·38	17·74				
	" " "	" 31		W, E	38·13	21·12	17·01				
	1052 & 1139 Gr. 80	" 30	3 14	E, W	70 17 35·66	− 9 17·99	17·67				
	" " "	" 31		W, E	35·67	18·51	17·16				
	1057 & 1139 Gr. 80	" 30	3 2	E, W	70 29 27·12	− 21 9·16	17·96				
	" " "	" 31		W, E	27·13	9·86	17·27				
	1082 & 1139 Gr. 80	" 30	3 3	E, W	70 28 34·86	− 20 16·85	18·01				
	" " "	" 31		W, E	34·88	17·46	17·42	17·53	2·5	0·22	0·1210
20	1150 & 1161 Gr. 80	Jan. 30	9 33	W, E	70 28 16·02	− 19 59·68	16·34				
	" " "	" 31		E, W	16·05	60·26	15·79	16·07	1·0	1·24	1·5376
21	1168 & 1186 Gr. 80	Jan. 31	6 15	W, E	70 44 58·00	− 36 40·36	17·64	17·64	0·5	0·33	0·0545
22	1185 & 1193 Gr. 80	Jan. 30	6 28	E, W	70 14 34·72	− 6 18·50	16·22				
	" " "	" 31		W, E	34·74	17·52	17·22				
	1168 & 1193 Gr. 80	" 30	6 37	E, W	70 23 37·05	− 15 20·27	16·78	16·74	1·5	0·57	0·4874
23	1250 & 1256 Gr. 80	Jan. 30	2 44	E, W	70 33 30·08	− 25 13·76	16·32				
	" " "	" 31		W, E	30·11	12·99	17·12				
	1250 & 1266 Gr. 80	" 30	3 13	E, W	70 4 22·13	+ 3 55·16	17·29				
	" " "	" 31		W, E	22·15	55·31	17·46	17·05	1·5	0·26	0·1014
24	1282 & 1284 Gr. 80	Jan. 30	11 45	W, E	69 45 53·75	+ 22 22·93	16·68				
	" " "	" 31		E, W	53·76	22·87	16·63				
	1282 & 1299 Gr. 80	" 30	11 49	W, E	69 42 9·81	+ 26 8·23	18·04				
	" " "	" 31		E, W	9·83	7·33	17·16	17·13	1·5	0·18	0·0486
25	1323 & 1350 Gr. 80	Jan. 30	4 17	W, E	69 39 17·62	+ 28 59·88	17·50				
	" " "	" 31		E, W	17·65	59·46	17·11	17·31	1·0	0·00	0·0000
26	1365 & 1373 Gr. 80	Jan. 30	2 23	E, W	70 2 9·08	+ 6 9·17	18·25				
	" " "	" 31		W, E	9·10	8·99	18·09	18·17	1·0	0·86	0·7396
27	1368 & 1378 Gr. 80	Jan. 30	3 6	E, W	70 10 36·54	− 2 18·18	18·36				
	" " "	" 31		W, E	36·56	19·34	17·22	17·79	1·0	0·48	0·2304

165. Hathbena—*Co-latitude* 70° 8′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
28	1383 & 1395 Gr. 80	Jan. 30	1 58	W, E	70 5 31·75	+ 2 44·48	16·23				
	″ ″ ″	″ 31		E, W	31·78	46·04	17·82				
	1383 & 1411 Gr. 80	″ 30	1 37	W, E	69 44 25·15	+ 23 51·39	16·54				
	″ ″ ″	″ 31		E, W	25·17	53·14	18·31				
	1383 & 1434 Gr. 80	″ 30	1 43	W, E	69 51 3·12	+ 17 13·47	16·59				
	″ ″ ″	″ 31		E, W	3·15	15·31	18·46	17·33	2·0	0·02	0·0008
29	1465 & 1470 Gr. 80	Jan. 30	1 40	W, E	69 49 42·04	+ 18 35·23	17·27				
	″ ″ ″	″ 31		E, W	42·07	35·99	18·06	17·67	1·0	0·36	0·1296
									Σ P = 31·0	Σ Pvv = 11·3297	

Summary.

No. of pairs 29

No. of observations 70

Mean difference between observations taken E, W and those taken W, E = + 0″·21

Observed Co-latitude (weighted mean) 70° 8′ 17″·31 ± 0″·078

Correction for Height above Sea-level + 0″·09

Final Co-latitude 70° 8′ 17″·40

		°	′	″	″
Astronomical Latitude (A)	=	19	51	42·60	± 0·078
Geodetic Latitude (G)	=	19	51	42·34	
Deflection of plumb-line (A – G)	=		+	0·26	

166. Jalpaiguri—*Co-latitude* 63° 28′ +

Latitude	... 26° 31′	*Instrument*—Zenith Telescope		
Longitude	... 88 47	*Mean Height of Barometer*	in. 29·64	
Height	... 280 feet	*Mean Temperature*	58°·9	

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	$P v v$
		1902	° ′		° ′ ″	′ ″	″	″			
1	93 & 99 Newcomb	Jan. 19	21 15	W, E	63 6 44·70	+ 22 3·70	48·40				
	" " "	" 20		E, W	44·77	3·66	48·43	48·42	0·7	0·13	0·0118
2	99 & 104 Newcomb	Jan. 19	21 35	E, W	63 26 9·93	+ 2 38·17	48·10				
	" " "	" 20		W, E	10·00	38·94	48·94				
	" " "	" 21		E, W	10·07	38·64	48·71	48·67	0·8	0·12	0·0115
3	115 & 120 Newcomb	Jan. 19	23 49	W, E	63 29 30·86	− 0 42·05	48·81				
	" " "	" 20		E, W	30·92	42·64	48·28				
	" " "	" 21		W, E	30·98	42·03	48·95	48·58	0·8	0·03	0·0007
4	115 & 130 Newcomb	Jan. 19	24 1	W, E	63 41 55·24	− 13 6·55	48·69				
	" " "	" 20		E, W	55·30	6·79	48·51				
	" " "	" 21		W, E	55·36	6·46	48·90	48·66	0·8	0·11	0·0097
5	189 & 196 Newcomb	Jan. 18	22 46	E, W	63 31 36·67	− 2 48·02	48·65				
	" " "	" 19		W, E	36·69	46·86	49·83				
	" " "	" 20		E, W	36·72	47·61	49·11				
	" " "	" 21		W, E	36·74	47·14	49·60	49·30	0·9	0·75	0·5063
6	196 & 208 Newcomb	Jan. 18	23 7	W, E	63 52 26·96	− 23 38·77	48·19				
	" " "	" 19		E, W	26·98	37·70	49·28				
	" " "	" 20		W, E	27·01	38·70	48·31				
	" " "	" 21		E, W	27·03	38·85	48·18	48·49	0·9	0·06	0·0032
7	218 & 234 Newcomb	Jan. 19	15 38	E, W	63 21 52·68	+ 6 56·77	49·45				
	" " "	" 20		W, E	52·70	56·05	48·75				
	" " "	" 21		E, W	52·71	55·82	48·53	48·87	1·2	0·32	0·1229
8	248 & 252 Newcomb	Jan. 18	13 45	W, E	64 1 46·27	− 32 58·51	47·76				
	" " "	" 19		E, W	46·28	57·93	48·35				
	" " "	" 20		W, E	46·28	58·36	47·92				
	" " "	" 21		E, W	46·29	58·40	47·89	47·98	1·4	0·57	0·4549
9	255 & 260 Newcomb	Jan. 18	20 52	W, E	63 24 56·14	+ 3 53·02	49·16				
	" " "	" 19		E, W	56·13	53·03	49·16				
	" " "	" 20		W, E	56·14	52·36	48·50				
	" " "	" 21		E, W	56·13	52·11	48·24	48·77	1·4	0·22	0·0678

166. Jalpaiguri—*Co-latitude* 63° 28′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
10	262 & 273 Newcomb	Jan. 18	7 30	E, W	63 9 35·09	+ 19 13 71	48 80				
	" " "	" 19		W, E	35 09	14 23	49 32				
	" " "	" 20		E, W	35 08	13 95	49 03				
	" " "	" 21		W, E	35·08	13 64	48 72	48·97	1 4	0·42	0·2470
11	329 & 342 Newcomb	Jan. 18	19 50	E, W	63 55 16 75	− 26 28 72	48·03				
	" " "	" 19		W, E	16 73	28 73	48 00				
	" " "	" 20		E, W	16 71	29·15	47 56				
	" " "	" 21		W, E	16 69	28 75	47 94	47·88	1 4	0 67	0·6285
12	348 & 362 Newcomb	Jan. 18	5 31	E, W	63 24 0·17	+ 4 48 84	49 01				
	" " "	" 19		W, E	0·15	49·32	49 47				
	" " "	" 20		E, W	0 13	48 35	48 48				
	" " "	" 21		W, E	0 10	49·23	49 33	49·07	1 4	0 52	0·3786
13	364 & 377 Newcomb	Jan. 18	29 11	E, W	63 29 15·62	− 0 27·41	48·21				
	" " "	" 19		W, E	15·59	27 66	47 93				
	" " "	" 20		E, W	15 55	26 85	48 70	48·20	0 8	0 35	0 0980
14	366 & 377 Newcomb	Jan. 18	28 51	E, W	63 9 23·76	+ 19 25 22	48 98				
	" " "	" 19		W, E	23·73	24 58	48 31				
	" " "	" 20		E, W	23·70	26 09	49 79				
	" " "	" 21		W, E	23·67	24 64	48 31	48 85	0 9	0·30	0·0810
15	382 & 387 Newcomb	Jan. 18	18 47	E, W	63 50 18 35	− 21 30·11	48 24				
	" " "	" 19		W, E	18 32	30 40	47 83				
	" " "	" 20		E, W	18 29	30 42	47 87				
	" " "	" 21		W, E	18 27	30 22	48 05	48·00	1 4	0·55	0·4235
16	1043 & 1058 Gr 80	Jan. 18	3 13	W, E	63 40 12 76	− 11 23 52	49·24				
	" " "	" 19		E, W	12 73	24 41	48 32				
	" " "	" 20		W, E	12 71	23·96	48 75				
	" " "	" 21		E, W	12 68	24 08	48 60	48·73	0 9	0·18	0·0292
17	1052 & 1058 Gr. 80	Jan 18	3 19	W, E	63 46 10·49	− 17 21·99	48 50				
	" " "	" 19		E, W	10·46	22 01	48 45				
	" " "	" 20		W, E	10 44	22 74	47 70				
	" " "	" 21		E, W	10 41	21·88	48 53	48·30	0 9	0 25	0·0563
18	413 & 415 Newcomb	Jan. 18	22 21	W, E	63 0 42·03	+ 28 6 68	48 71				
	" " "	" 19		E, W	41 99	6 38	48 37	48 54	1·0	0·01	0·0001
19	426 & 433 Newcomb	Jan 18	13 14	W, E	63 45 46·90	− 16 59·19	47 71				
	" " "	" 19		E, W	46 87	58·61	48 26				
	" " "	" 20		W, E	46 84	58 90	47 94				
	" " "	" 21		E, W	46 82	58 48	48 34	48 06	0 9	0 49	0·2161
20	426 & 445 Newcomb	Jan. 18	13 5	W, E	63 36 45·21	− 7 57·65	47·56				
	" " "	" 19		E, W	45 19	56 73	48 46				
	" " "	" 20		W, E	45 16	57 88	47 28				
	" " "	" 21		E, W	45·13	56 28	48 85	48·04	0·9	0·51	0·2341
21	471 & 481 Newcomb	Jan. 18	4 55	W, E	62 55 54·42	+ 32 54 45	48 87				
	" " "	" 19		E, W	54 39	54·37	48·76				
	" " "	" 20		W, E	54·36	54 08	48 44				
	" " "	" 21		E, W	54 33	54·40	48 73	48·70	1·4	0 15	0·0315
22	492 & 506 Newcomb	Jan. 18	21 11	E, W	63 21 21·67	+ 7 27·72	49·30				
	" " "	" 19		W, E	21 65	26 41	48 06				
	" " "	" 20		E, W	21·64	27 41	49·05				
	" " "	" 21		W, E	21·62	26·62	48 24	48 69	1·4	0·14	0·0274

166. Jalpaiguri—*Co-latitude* 63° 28′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
23	515 & 517 Newcomb	Jan. 18	1 13	W, E	63 8 18·23	+ 20 30·45	48·68				
	" " "	" 19		E, W	18·21	31·03	49·24				
	" " "	" 20		W, E	18·19	30·40	48·59				
	" " "	" 21		E, W	18·16	30·63	48·79	48·83	1·4	0·28	0·1098
								Σ P = 25·0		Σ Pvv = 3·7499	

Summary.

No. of pairs 23

No. of observations 83

Mean difference between observations taken E, W and those taken W, E = + 0″·12

Observed Co-latitude (weighted mean) 63° 28′ 48″·55 ± 0″·056

Correction for Height above Sea-level + 0″·01

Final Co-latitude 63° 28′ 48″·56

		°	′	″	″
Astronomical Latitude (A)	=	26	31	11·44	± 0·056
Geodetic Latitude (G)	=	26	31	17·39	
Deflection of plumb-line (A − G)	=			− 5·95	

167. Jambo—*Co-latitude* 62° 43′ +

Latitude	... 27° 16′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 72 34	*Mean Height of Barometer*	in 29·18
Height	... 772 feet	*Mean Temperature*	61°·0

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
1	3806 & 3808 Gr. 80	Nov. 26	16 43	E, W	63 0 14·12	− 16 46·01	28·11				
	" " "	" 27		W, E	14·16	45·81	28·35				
	" " "	" 28		E, W	14·19	46·50	27·69	28·05	1·2	0·02	0·0005
2	3813 & 3823 Gr. 80	Nov. 28	2 49	W, E	63 8 59·51	− 25 31·68	27·83	27·83	0·7	0·20	0·0280
3	3882 & 3875 Gr. 80	Nov. 26	18 30	W, E	62 40 43·31	+ 2 44·59	27·90				
	" " "	" 28		E, W	43·34	44·73	28·07	27·98	1·0	0·05	0·0025
4	3922 & 3919 Gr. 80	Nov. 26	4 12	W, E	62 48 30·09	− 5 1·12	28·07				
	" " "	" 27		E, W	30·10	0·68	29·42				
	" " "	" 28		W, E	30·11	4·12	25·99	28·13	0·8	0·10	0·0080
5	3902 & 3891 Gr. 80	Nov. 27	0 42	W, E	63 1 54·92	− 18 26·57	28·35				
	" " "	" 28		E, W	54·93	27·40	27·53	27·94	1·0	0·09	0·0081
6	3922 & 3931 Gr. 80	Nov. 26	4 12	W, E	62 58 41·38	− 15 14·09	27·29				
	" " "	" 27		E, W	41·39	13·00	28·39				
	" " "	" 28		W, E	41·40	12·68	28·72	28·13	0·8	0·10	0·0080
7	3974 & 3945 Gr. 80	Nov. 26	15 16	W, E	62 34 33·21	+ 8 55·27	28·48				
	" " "	" 27		E, W	33·20	55·73	28·93	28·70	1·0	0·67	0·4489
8	2233 Gr. 72 & 3996 Gr. 80	Nov. 27	30 52	W, E	62 29 34·78	+ 13 54·21	28·99				
	" " " "	" 28		E, W	34·76	53·04	27·80	28·39	0·7	0·36	0·0907
9	2233 & 2238 Gr. 72	Nov. 26	30 52	E, W	62 41 21·21	+ 2 7·08	28·29				
	" " "	" 27		W, E	21·19	5·21	26·40				
	" " "	" 28		E, W	21·17	4·95	26·12	26·94	0·8	1·09	0·9505
10	148 & 139 Gr. 80	Nov. 26	0 54	W, E	62 28 37·32	+ 14 50·26	27·58				
	" " "	" 27		E, W	37·27	51·60	28·87				
	" " "	" 28		W, E	37·22	50·82	28·04	28·16	1·2	0·13	0·0203
11	2263 Gr. 72 & 4047 Gr. 80	Nov. 27	0 57	W, E	62 31 30·70	+ 11 57·39	28·09				
	" " " "	" 28		E, W	30·68	57·17	27·85	27·97	1·0	0·06	0·0036
12	157 & 170 Gr. 80	Nov. 26	13 12	W, E	62 25 41·82	+ 17 46·25	28·07				
	" " "	" 27		E, W	41·76	47·86	29·62				
	" " "	" 28		W, E	41·72	45·88	27·60	28·43	1·2	0·40	0·1920
13	188 Gr. 80 & 110 Gr. 72	Nov. 26	7 59	E, W	62 55 40·45	− 12 13·42	27·03				
	" " " "	" 27		W, E	40·41	12·32	28·09				
	" " " "	" 28		E, W	40·36	12·78	27·58	27·57	1·2	0·46	0·2539

167. Jambo—*Co-latitude* 62° 43′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
14	241 & 199 Gr. 80	Nov. 27	20 35	W, E	62 24 20·54	+ 19 6·31	26·85				
	" " "	" 28		E, W	20·48	7·65	28·13	27·49	0·7	0·54	0·2041
15	247 & 199 Gr. 80	Nov. 27	20 32	W, E	62 27 3·11	+ 16 24·44	27·55				
	" " "	" 28		E, W	3·04	25·45	28·49	28·02	0·7	0·01	0·0001
16	241 & 200 Gr. 80	Nov. 27	20 35	W, E	62 24 15·22	+ 19 12·97	28·19				
	" " "	" 28		E, W	15·16	12·78	27·94	28·06	0·7	0·03	0·0006
17	247 & 200 Gr. 80	Nov. 27	20 32	W, E	62 26 57·78	+ 16 31·09	28·87				
	" " "	" 28		E, W	57·72	30·58	28·30	28·58	0·7	0·55	0·2118
18	256 & 251 Gr. 80	Nov. 27	13 8	E, W	63 6 34·74	− 23 7·14	27·60	27·60	0·7	0·43	0·1294
19	291 & 296 Gr. 80	Nov. 27	9 44	E, W	62 58 27·70	− 14 60·62	27·08				
	" " "	" 28		W, E	27·64	58·82	28·82	27·95	0·7	0·08	0·0045
20	294 & 296 Gr. 80	Nov. 27	9 43	E, W	62 59 14·82	− 15 47·32	27·50				
	" " "	" 28		W, E	14·76	45·68	29·08	28·29	0·7	0·26	0·0473
21	317 & 325 Gr. 80	Nov. 26	5 19	E, W	62 32 42·27	+ 10 45·61	27·88				
	" " "	" 27		W, E	42·21	46·66	28·87				
	" " "	" 28		E, W	42·14	46·30	28·44	28·40	1·2	0·37	0·1643
22	329 & 350 Gr. 80	Nov. 26	7 33	W, E	63 3 16·83	− 19 49·21	27·62				
	" " "	" 27		E, W	16·77	48·80	27·97				
	" " "	" 28		W, E	16·70	48·79	27·91	27·83	1·2	0·20	0·0480
23	376 & 373 Gr. 80	Nov. 26	8 8	W, E	62 28 19·03	+ 15 10·37	29·40				
	" " "	" 27		E, W	18·95	8·71	27·66				
	" " "	" 28		W, E	18·88	8·96	27·84	28·30	1·2	0·27	0·0875
24	241 Gr. 80 & 132 G. 72	Nov. 27	20 44	W, E	62 32 21·92	+ 11 5·71	27·63				
	" " " "	" 28		E, W	21·86	5·46	27·32	27·47	0·7	0·56	0·2195
25	247 Gr. 80 & 132 Gr. 72	Nov. 27	20 41	W, E	62 35 4·48	+ 8 23·84	28·32				
	" " " "	" 28		E, W	4·42	23·24	27·66	27·99	0·7	0·04	0·0011
									ΣP = 22·5		ΣPvv = 3·1332

Summary.

No. of pairs 25
No. of observations 58

Mean difference between observations taken E, W and those taken W, E = − 0″·16

Observed Co-latitude (weighted mean) 62° 43′ 28″·03 ± 0″·051

Correction for Height above Sea-level + 0″·03

Final Co-latitude 62° 43′ 28″·06

		°	′	″	
Astronomical Latitude (A)	=	27	16	31·94	± 0·051
Geodetic Latitude (G)	=	27	16	28·88	
Deflection of plumb-line (A − G)	=		+	3·06	

168. Kalianpur 6th visit*—*Co-latitude* 65° 52′ +

Latitude ... 24° 7′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 77 42 *Mean Height of Barometer* 28·29 in.

Height ... 1765 feet *Mean Temperature* 57°·3

Observer—Captain G P. Lenox Conyngham, R E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	256 & 268 Gr. 80	Jan 9	15 43	W, E	65 38 19·96	+ 14 29·15	49·11				
	" " "	" 10		E, W	19·95	28·99	48·94	49·03	0·9	0·43	0·1664
2	285 & 288 Gr. 80	Jan. 9	5 9	E, W	66 3 9·31	− 10 17·62	51·69				
	" " "	" 10		W, E	9·35	19·01	50·34	51·01	1·0	1·55	2·4025
3	331 & 334 Gr. 80	Jan. 9	5 25	W, E	65 34 11·00	+ 18 39·68	50·68				
	" " "	" 10		E, W	11·02	38·30	49·32	50·00	0·7	0·54	0·2041
4	350 & 368 Gr. 80	Jan. 9	4 54	E, W	65 40 13·19	+ 12 37·14	50·33				
	" " "	" 10		W, E	13·21	36·62	49·83	50·08	0·6	0·62	0·2306
5	368 & 373 Gr 80	Jan. 9	4 55	W, E	65 41 2·07	+ 11 48·50	50·57				
	" " "	" 10		E, W	2·09	47·31	49·40	49·99	0·6	0·53	0·1685
6	394 & 396 Gr. 80	Jan. 9	2 34	E, W	65 55 14·93	− 2 23·65	51·28				
	" " "	" 10		W, E	14·94	24·15	50·79	51·03	1·0	1·57	2·4649
7	403 & 414 Gr. 80	Jan. 9	4 38	W, E	65 47 32·68	+ 5 15·82	48·50				
	" " "	" 10		E, W	32·70	15·55	48·25	48·38	0·8	1·08	0·9331
8	418 & 434 Gr 80	Jan 9	7 15	E, W	65 42 39·77	+ 10 8·90	48·67				
	" " "	" 10		W, E	39·79	9·26	49·05	48·86	0·8	0·60	0·2880
9	455 & 468 Gr. 80	Jan. 9	20 24	W, E	65 54 46·78	− 1 57·94	48·84				
	" " "	" 10		E, W	46·79	58·89	47·90	48·37	1·0	1·09	1·1881
10	471 & 475 Gr. 80	Jan. 9	4 41	E, W	65 58 44·61	− 5 55·18	49·43				
	" " "	" 10		W, E	44·63	54·51	50·12	49·77	1·0	0·31	0·0961
11	483 & 513 Gr. 80	Jan. 9	25 33	W, E	66 2 0·04	− 9 9·49	50·55				
	" " "	" 10		E, W	0·04	9·26	50·78	50·67	0·7	1·21	1·0249
12	513 & 500 Gr. 80	Jan. 9	25 24	E, W	65 53 43·75	− 0 53·37	50·38				
	" " "	" 10		W, E	43·75	54·15	49·60	49·99	0·7	0·53	0·1966
13	948 & 977 Gr. 80	Jan. 9	6 23	E, W	65 56 14·38	− 3 25·72	48·66				
	" " "	" 18		W, E	14·29	24·53	49·76	49·21	1·0	0·25	0·0625
14	994 & 998 Gr. 80	Jan. 9	3 40	W, E	66 4 36·09	− 11 47·24	48·85				
	" " "	" 18		E, W	35·99	47·20	48·79	48·82	1·0	0·64	0·4096
15	1010 & 1021 Gr. 80	Jan. 9	1 46	E, W	65 49 47·68	+ 3 0·64	48·32				
	" " "	" 18		W, E	47·58	1·70	49·28	48·80	1·0	0·66	0·4356

* **For the first five visits to this station see No. 42, Volume XI of the *Account of the Operations &c.***

168. Kalianpur 6th visit—*Co-latitude* 65° 52′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
16	1104 & 1127 Gr. 80	Jan. 9	3 55	E, W	65 48 41·74	+ 4 7·70	49·44	49·13	1·0	0·33	0·1089
	,, ,, ,,	,, 14		W, E	41·69	7·14	48·83				
17	1181 & 1193 Gr. 80	Jan. 9	2 10	W, E	65 57 13·21	− 4 23·84	49·37	48·54	1·0	0·92	0·8464
	,, ,, ,,	,, 14		E, W	13·18	25·47	47·71				
·18	1206 & 1240 Gr. 80	Jan. 9	3 41	W, E	65 36 18·64	+ 16 31·03	49·67	49·67	0·5	0·21	0·0221
19	1261 & 1372 Gr. 80	Jan. 9	12 33	E, W	65 35 32·21	+ 17 16·72	48·93	50·28	0·8	0·82	0·5379
	,, ,, ,,	,, 14		W, E	32·22	19·41	51·63				
20	1284 & 1297 Gr. 80	Jan. 9	7 59	W, E	65 59 12·34	− 6 22·66	49·68	49·61	1·0	0·15	0·0225
	,, ,, ,,	,, 14		E, W	12·36	22·82	49·54				
21	553 & 562 Gr. 80	Jan. 11	1 4	W, E	66 3 26·70	− 10 37·19	49·51	49·71	1·0	0·25	0·0625
	,, ,, ,,	,, 12		E, W	26·71	36·81	49·90				
22	577 & 584 Gr. 80	Jan. 11	0 11	E, W	66 1 32·75	− 8 43·48	49·27	49·42	0·7	0·04	0·0011
	,, ,, ,,	,, 12		W, E	32·75	43·18	49·57				
23	590 & 577 Gr. 80	Jan. 11	0 12	W, E	66 3 0·13	− 10 10·76	49·37	49·76	0·7	0·30	0·0630
	,, ,, ,,	,, 12		E, W	0·13	9·97	50·16				
24	613 & 620 Gr. 80	Jan. 11	11 39	W, E	66 8 41·81	− 15 51·78	50·03	49·90	1·0	0·44	0·1936
	,, ,, ,,	,, 12		E, W	41·81	52·04	49·77				
25	630 & 648 Gr. 80	Jan. 11	2 13	E, W	65 59 10·14	− 6 19·75	50·39	50·79	0·7	1·33	1·2382
	,, ,, ,,	,, 12		W, E	10·15	18·96	51·19				
26	648 & 633 Gr. 80	Jan. 11	2 15	W, E	66 1 15·50	− 8 26·17	49·33	50·51	0·7	1·05	0·7718
	,, ,, ,,	,, 12		E, W	15·50	23·82	51·68				
27	686 & 704 Gr. 80	Jan. 11	1 24	W, E	66 0 37·29	− 7 47·53	49·76	50·42	0·7	0·96	0·6451
	,, ,, ,,	,, 12		E, W	37·29	46·21	51·08				
28	707 & 686 Gr. 80	Jan. 11	1 19	E, W	65 55 5·49	− 2 16·77	48·72	49·15	0·7	0·31	0·0673
	,, ,, ,,	,, 12		W, E	5·49	15·91	49·58				
29	721 & 789 Gr. 80	Jan. 11	18 43	E, W	65 51 28·69	+ 1 18·81	47·50	48·10	1·0	1·36	1·8496
	,, ,, ,,	,, 12		W, E	28·69	20·02	48·71				
30	800 & 846 Gr. 80	Jan. 11	8 46	W, E	65 45 40·36	+ 7 9·38	49·74	48·98	0·8	0·48	0·1843
	,, ,, ,,	,, 12		E, W	40·06	8·15	48·21				
31	869 & 888 Gr. 80	Jan. 11	13 2	W, E	65 44 22·64	+ 8 27·93	50·57	49·79	0·8	0·33	0·0871
	,, ,, ,,	,, 12		E, W	22·63	26·38	49·01				
32	1342 & 1363 Gr. 80	Jan. 11	1 33	E, W	65 52 12·92	+ 0 36·56	49·48	49·83	1·0	0·37	0·1369
	,, ,, ,,	,, 12		W, E	12·93	37·25	50·18				
33	1373 & 1390 Gr. 80	Jan. 11	1 44	W, E	65 55 5·75	− 2 15·27	50·48	50·23	0·7	0·77	0·4150
	,, ,, ,,	,, 12		E, W	5·76	15·77	49·99				
34	1390 & 1378 Gr. 80	Jan. 11	1 27	E, W	65 38 0·00	+ 14 50·03	50·03	49·82	0·6	0·36	0·0778
	,, ,, ,,	,, 12		W, E	0·01	49·60	49·61				

168. Kalianpur 6th visit—*Co-latitude* 65° 52′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1899	° ′		° ′ ″	′ ″	″	″			
35	1414 & 1459 Gr. 80 " " "	Jan. 11 " 12	3 56	W, E W, E	65 42 26·30 26·33	+ 10 21 96 22·34	48·26 48·67	48 47	1·0	0·99	0·9801
36	1470 & 1474 Gr. 80 " " "	Jan. 11 " 12	5 18	E, W W, E	66 10 30·83 30·86	− 17 41·30 41·26	49·53 49 60	49 57	1·0	0·11	0·0121
37	1483 & 1498 Gr. 80 " " "	Jan. 11 " 12	8 35	W, E E, W	65 43 17·60 17·64	+ 9 33·13 30·99	50 73 48 63	49·68	0·7	0·22	0·0339
38	1498 & 1507 Gr 80 " " "	Jan. 11 " 12	8 28	E, W W, E	65 49 28·05 28·08	+ 3 21·29 21·32	49·34 49·40	49·37	0·7	0·09	0·0057
39	1520 & 1547 Gr. 80 " " "	Jan. 11 " 12	5 58	W, E E, W	65 54 22·62 22·66	− 1 35·39 33·14	47·23 49 52	48·37	1·0	1·09	1·1881
40	1572 & 1577 Gr. 80 " " "	Jan 11 " 12	12 33	E, W W, E	65 42 24·63 24·67	+ 10 22 92 24·24	47·55 48·91	48·23	0·7	1·23	1·0590
41	1580 & 1572 Gr. 80 " " "	Jan. 11 " 12	12 16	W, E E, W	65 59 46·95 47·00	− 6 57 95 57·91	49·00 49·09	49 05	0·7	0·41	0·1177
42	1595 & 1617 Gr. 80 " " "	Jan. 11 " 12	2 22	W, E E, W	65 59 33·04 33·11	− 6 44·80 43·78	48 24 49·33	48·78	0·7	0·68	0·3237
43	1617 & 1621 Gr. 80 " " "	Jan. 11 " 12	2 25	E, W W, E	65 56 14·97 15·03	− 3 25 85 25·45	49·12 49·58	49·35	0·7	0·11	0·0085
44	1632 & 1646 Gr. 80 " " "	Jan. 11 " 12	11 25	W, E E, W	65 40 19 65 19·72	+ 12 30 38 28·78	50·03 48·50	49·27	1·0	0·19	0·0361
								Σ P = 36·4		Σ Pvv = 21·3675	

Summary.

No. of pairs 44

No. of observations 87

Mean difference between observations taken E, W and those taken W, E = − 0″·28

Observed Co-latitude (weighted mean) 65° 52′ 49″·46 ± 0″·079

Correction for Height above Sea-level + 0″·07

Final Co-latitude 65° 52′ 49″·53

Astronomical Latitude = 24° 7′ 10″·47 ± 0″·079

This value was corrected for variation of latitude and printed on p. (34) as 24° 7′ 10″·59.

For other five values of the Astronomical Latitude see pp. (33) and (34).

169. Kamkhera—*Co-latitude* 66° 0′ +

Latitude	... 24° 0′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 77 46	*Mean Height of Barometer*	in. 28·09
Height	... 1780 feet	*Mean Temperature*	68°·0

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	Pvv
		1899	° ′		° ′ ″	′ ″	″	″			
1	1363 & 1373 Gr. 80	Feb. 25	1 40	E, W	65 59 24·81	+ 0 52·31	17·12				
	„ „ „	„ 26		W, E	24·82	51·89	16·71	16·92	0·7	0·12	0·0101
2	1373 & 1390 Gr. 80	Feb. 25	1 44	W, E	65 55 4·90	+ 5 12·49	17·39				
	„ „ „	„ 26		E, W	4·86	11·88	16·74	17·07	0·7	0·03	0·0006
3	1383 & 1390 Gr. 80	Feb. 25	1 58	W, E	66 9 27·20	− 9 9·35	17·85				
	„ „ „	„ 26		E, W	27·16	10·05	17·11	17·48	0·7	0·44	0·1355
4	1383 & 1363 Gr. 80	Feb. 25	1 54	W, E	66 13 47·16	− 13 29·53	17·63				
	„ „ „	„ 26		E, W	47·12	30·04	17·08	17·35	0·7	0·31	0·0673
5	1395 & 1397 Gr. 80	Feb. 25	6 1	E, W	66 2 45·69	− 2 30·39	15·30				
	„ „ „	„ 26		W, E	45·65	28·72	16·93	16·11	1·0	0·93	0·8649
6	1405 & 1436 Gr. 80	Feb. 25	3 23	W, E	65 50 15·53	+ 10 0·46	15·99				
	„ „ „	„ 26		E, W	15·49	2·23	17·72	16·86	0·7	0·18	0·0227
7	1436 & 1416 Gr. 80	Feb. 25	3 15	E, W	65 58 40·36	+ 1 35·87	16·23				
	„ „ „	„ 26		W, E	40·31	38·95	19·26	17·74	0·7	0·70	0·3430
8	1459 & 1405 Gr. 80	Feb. 25	3 36	E, W	66 2 52·08	− 2 34·18	17·90				
	„ „ „	„ 26		W, E	52·03	33·98	18·05	17·98	0·7	0·94	0·6185
9	1470 & 1474 Gr. 80	Feb. 25	5 18	E, W	66 10 30·22	− 10 12·57	17·65				
	„ „ „	„ 26		W, E	30·17	14·26	15·91	16·78	1·0	0·26	0·0676
10	1482 & 1483 Gr. 80	Feb. 25	8 34	W, E	65 42 49·47	+ 17 27·54	17·01				
	„ „ „	„ 26		E, W	49·41	27·62	17·03	17·02	0·7	0·02	0·0003
11	1483 & 1498 Gr. 80	Feb. 25	8 34	E, W	65 43 16·96	+ 16 59·94	16·90				
	„ „ „	„ 26		W, E	16·90	58·61	15·51	16·20	0·7	0·84	0·4939
12	1498 & 1507 Gr. 80	Feb. 25	8 28	W, E	65 49 27·44	+ 10 48·67	16·11				
	„ „ „	„ 26		E, W	27·39	49·35	16·74	16·42	0·7	0·62	0·2691
13	1507 & 1482 Gr. 80	Feb. 25	8 28	E, W	65 48 59·95	+ 11 16·26	16·21				
	„ „ „	„ 26		W, E	59·90	18·37	18·27	17·24	0·7	0·20	0·0280
14	1520 & 1547 Gr. 80	Feb. 25	5 58	W, E	65 54 22·13	+ 5 53·57	15·70				
	„ „ „	„ 26		E, W	22·09	55·25	17·34	16·52	1·0	0·52	0·2704
15	1793 & 1799 Gr. 80	Feb. 25	8 4	E, W	65 57 55·74	+ 2 23·25	18·99				
	„ „ „	„ 26		W, E	55·69	19·84	15·53	17·26	1·0	0·22	0·0484

169. Kamkhera—*Co-latitude* 66° 0′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
16	1817 & 1843 Gr. 80	Feb. 25	20 19	W, E	66 7 50·35	− 7 35·00	15·35				
	" " "	" 26		E, W	50·32	32·15	18·17	16·76	0·7	0·28	0·0549
17	1843 & 1819 Gr. 80	Feb. 25	20 23	E, W	66 12 22·31	− 12 6·35	15·96				
	" " "	" 26		W, E	22·27	3·86	18·41	17·19	0·7	0·15	0·0158
18	1846 & 1867 Gr. 80	Feb. 25	21 40	E, W	66 0 16·86	− 0 0·18	16·68				
	" " "	" 26		W, E	16·83	1·16	15·67	16·18	1·0	0·86	0·7396
19	1879 & 1885 Gr. 80	Feb. 25	19 42	W, E	66 5 37·24	− 5 21·24	16·00				
	" " "	" 26		E, W	37·20	19·17	18·03	17·02	1·0	0·02	0·0004
20	869 & 888 Gr. 80	Feb. 26	13 2	E, W	65 44 22·48	+ 15 53·05	15·53				
	" " "	" 27		W, E	22·49	54·76	17·25	16·39	1·0	0·65	0·4225
21	948 & 977 Gr. 80	Feb. 26	6 22	E, W	65 56 14·07	+ 4 1·17	15·24				
	" " "	" 27		W, E	14·07	2·44	16·51	15·88	1·0	1·16	1·1356
22	994 & 998 Gr. 80	Feb. 26	3 40	W, E	66 4 35·67	− 4 18·42	17·25				
	" " "	" 27		E, W	35·67	18·54	17·13	17·19	0·7	0·15	0·0158
23	999 & 994 Gr 80	Feb 26	3 56	E, W	66 20 25·26	− 20 7·72	17·54				
	" " "	" 27		W, E	25·26	7·38	17·88	17·71	0·7	0·67	0·3142
24	1010 & 1021 Gr 80	Feb 26	1 47	E, W	65 49 47·17	+ 10 29·75	16·92				
	" " "	" 27		W, E	47·16	29·25	16·41	16·66	0·7	0·38	0·1011
25	1057 & 1010 Gr. 80	Feb. 26	1 43	W, E	65 45 39·12	+ 14 37·98	17·10				
	" " "	" 27		E, W	39·11	36·44	15·55	16·33	0·7	0·71	0·3529
26	1104 & 1127 Gr. 80	Feb 26	3 55	W, E	65 48 40·96	+ 11 36·64	17·60				
	" " "	" 27		E, W	40·94	34·54	15·48	16·54	0·7	0·50	0·1750
27	1144 & 1104 Gr. 80	Feb. 26	4 2	E, W	65 41 8·79	+ 19 9·44	18·23				
	" " "	" 27		W, E	8·78	6·42	15·20	16·71	0·7	0·33	0·0762
28	1181 & 1193 Gr 80	Feb. 27	2 10	W, E	65 57 12·33	+ 3 4·86	17·19				
	" " "	" 28		E, W	12·30	3·83	16·13	16·66	1·0	0·38	0·1444
29	1206 & 1223 Gr. 80	Feb. 27	3 10	W, E	66 7 49·00	− 7 31·44	17·56				
	" " "	" 28		E, W	48·98	29·92	19·06	18·31	1·0	1·27	1·6129
30	1256 & 1265 Gr 80	Feb. 27	1 33	E, W	66 17 39·96	− 17 21·97	17·99				
	" " "	" 28		W, E	39·93	23·13	16·80	17·40	1·0	0·36	0·1296
31	1284 & 1297 Gr. 80	Feb. 27	7 58	W, E	65 59 11·40	+ 1 5·01	16·41				
	" " "	" 28		E, W	11·37	5·67	17·04	16·72	0·7	0·32	0·0717
32	1297 & 1298 Gr. 80	Feb. 27	8 2	E, W	65 55 27·31	+ 4 48·67	15·98				
	" " "	" 28		W, E	27·27	48·78	16·05	16·02	0·7	1·02	0·7283
33	1572 & 1577 Gr. 80	Feb. 27	12 33	W, E	65 42 24·25	+ 17 54·00	18·25				
	" " "	" 28		E, W	24·20	53·73	17·93	18·09	0·7	1·05	0·7718

169. Kamkhera—*Co-latitude* 66° 0′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
34	1580 & 1572 Gr. 80	Feb. 27	12 16	E, W	65 59 46·68	+ 0 31·14	17·82				
	„ „ „	„ 28		W, E	46·63	32·97	19·60	18·71	0·7	1·67	1·9522
35	1595 & 1617 Gr. 80	Feb. 27	2 22	W, E	65 59 32·80	+ 0 44·58	17·38				
	„ „ „	„ 28		E, W	32·75	44·48	17·23	17·30	0·7	0·26	0·0473
36	1617 & 1621 Gr. 80	Feb. 27	2 25	E, W	65 56 14·78	+ 4 2·66	17·44				
	„ „ „	„ 28		W, E	14·73	2·38	17·11	17·28	0·7	0·24	0·0403
37	1629 & 1647 Gr. 80	Feb. 27	17 18	W, E	66 11 0·55	− 10 43·12	17·43				
	„ „ „	„ 28		E, W	0·50	42·57	17·93	17·68	1·0	0·64	0·4096
38	1666 & 1668 Gr. 80	Feb. 27	0 14	E, W	66 14 14·84	− 13 57·89	16·95				
	„ „ „	„ 28		W, E	14·78	58·94	15·84	16·40	1·0	0·64	0·4096
39	1701 & 1703 Gr. 80	Feb. 27	9 8	E, W	66 13 39·41	− 13 21·95	17·46				
	„ „ „	„ 28		W, E	39·35	20·37	18·98	18·22	1·0	1·18	1·3924
40	1714 & 1728 Gr. 80	Feb. 27	7 17	W, E	66 4 14·58	− 3 58·03	16·55				
	„ „ „	„ 28		E, W	14·53	58·21	16·32	16·43	1·0	0·61	0·3721
41	1730 & 1733 Gr. 80	Feb. 27	4 33	E, W	66 2 20·74	− 2 3·25	17·49				
	„ „ „	„ 28		W, E	20·70	3·12	17·58	17·54	1·0	0·50	0·2500
42	1751 & 1759 Gr. 80	Feb. 27	17 10	W, E	66 11 52·50	− 11 34·94	17·56				
	„ „ „	„ 28		E, W	52·46	35·96	16·50	17·03	1·0	0·01	0·0001
								ΣP =	34·5	ΣPvv =	14·9766

Summary.

No. of pairs 42
No. of observations 84

Mean difference between observations taken E, W and those taken W, E = + 0″·02

Observed Co-latitude (weighted mean) 66° 0′ 17″·04 ± 0″·069

Correction for Height above Sea-level + 0″·07

Final Co-latitude 66° 0′ 17″·11

		°	′	″	″
Astronomical Latitude (A)	=	23	59	42·89	± 0·069
Geodetic Latitude (G)	=	23	59	44·93	
Deflection of plumb-line (A−G)	=		−	2·04	

170. Kanheri—*Co-latitude* 71° 30′ +

Latitude	... 18° 30′	*Instrument*—Zenith Telescope	
Longitude	... 75 46	*Mean Height of Barometer*	in. 27·42
Height	... 2610 feet	*Mean Temperature*	66°·0

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	603 & 628 Gr. 80	Feb. 6	12 56	W, E	71 22 10·48	+ 8 27·44	37·9	37·9	0·7	0·2	0·03
2	633 & 664 Gr. 80	Feb. 6	3 18	E, W	71 34 19·54	− 3 41·49	38·0	38·0	0·5	0·1	0·01
3	664 & 677 Gr. 80	Feb. 6	3 12	W, E	71 40 28·86	− 9 49·89	39·0	39·0	0·5	0·9	0·41
4	677 & 680 Gr 80 " " "	Feb. 6 " 9	3 5	E, W W, E	71 33 23·30 23·35	− 2 45·01 45·71	38·3 37·6	37·9	0·7	0·2	0·03
5	692 & 698 Gr 80 " " "	Feb. 6 " 9	0 46	W, E E, W	71 57 17·55 17·61	− 26 40·31 39·57	37·2 38·0	37·6	0·7	0·5	0·18
6	698 & 703 Gr. 80 " " "	Feb. 6 " 9	0 34	E, W W, E	71 45 32·60 32·66	− 14 53·99 54·80	38·6 37·9	38·2	0·7	0·1	0·01
7	704 Gr. 80 & 556 Gr. 64	Feb. 9	4 3	E, W	71 28 37·98	+ 1 59·11	37·1	37·1	0·7	1·0	0·70
8	727 & 754 Gr. 80 " " "	Feb. 6 " 9	4 4	W, E E, W	71 18 46·66 46·70	+ 11 51·66 51·03	38·3 37·7	38·0	0·7	0·1	0·01
9	754 & 792 Gr. 80 " " "	Feb. 6 " 9	4 21	E, W W, E	71 35 11·44 11·47	− 4 32·92 33·68	38·5 37·8	38·1	0·7	0·0	0·00
10	803 Gr. 80 & 622 Gr. 64 " " " "	Feb. 6 " 9	5 13	W, E E, W	71 26 6·49 6·52	+ 4 32·40 31·55	38·9 38·1	38·5	1·0	0·4	0·16
11	823 Gr. 80 & 639 Gr. 64 " " " "	Feb. 6 " 9	3 6	E, W W, E	71 39 8·90 8·93	− 8 30·52 30·13	38·4 38·8	38·6	1·0	0·5	0·25
12	856 & 874 Gr. 80 " " "	Feb. 6 " 9	15 27	W, E E, W	71 48 52·01 52·02	− 18 13·48 13·53	38·5 38·5	38·5	0·7	0·4	0·11
13	874 Gr. 80 & 678 Gr. 64 " " " "	Feb. 6 " 9	15 8	E, W W, E	71 27 37·83 37·85	+ 2 59·26 60·35	37·1 38·2	37·6	0·7	0·5	0·18
14	902 Gr. 80 & 513 Gr. 72 " " " "	Feb. 6 " 9	3 2	W, E E, W	71 11 2·16 2·17	+ 19 36·26 34·48	38·4 36·6	37·5	1·0	0·6	0·36
15	517 Gr. 72 & 915 Gr. 80 " " " "	Feb. 6 " 9	13 8	E, W W, E	71 0 31·65 31·65	+ 30 4·90 5·84	36·5 37·5	37·0	1·0	1·1	1·21

170. Kanheri—*Co-latitude* 71° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
16	943 & 946 Gr. 80	Feb. 6	2 4	E, W	70 58 22·51	+ 32 15·04	37·5				
	" " "	" 9		W, E	22·51	15·50	38·0	37·7	0·7	0·4	0·11
17	946 & 962 Gr. 80	Feb. 6	2 18	W, E	71 13 14·79	+ 17 21·38	36·2				
	" " "	" 9		E, W	14·78	23·88	38·7	37·4	0·7	0·7	0·34
18	977 & 999 Gr. 80	Feb. 6	1 2	E, W	71 17 23·43	+ 13 16·04	39·5				
	" " "	" 9		W, E	23·42	15·51	38·9	39·2	1·0	1·1	1·21
19	572 Gr. 72 & 1033 Gr. 80	Feb. 6	5 26	W, E	71 46 32·46	− 15 52·57	39·9				
	" " " "	" 9		E, W	32·45	53·72	38·7	39·3	1·0	1·2	1·44
20	1037 & 1043 Gr. 80	Feb. 6	4 11	E, W	71 2 33·24	+ 28 4·48	37·7				
	" " "	" 9		W, E	33·23	4·47	37·7	37·7	0·7	0·4	0·11
21	1043 & 1053 Gr. 80	Feb. 6	4 27	W, E	71 19 1·04	+ 11 36·01	37·0				
	" " "	" 9		E, W	1·03	38·42	39·4	38·2	0·7	0·1	0·01
22	1053 & 1057 Gr. 80	Feb. 6	4 9	E, W	71 36 48·17	− 6 10·94	37·2				
	" " "	" 9		W, E	48·16	9·54	38·6	37·9	0·7	0·2	0·03
23	604 Gr. 72 & 1070 Gr. 80	Feb. 6	5 22	W, E	72 2 51·98	− 32 14·18	37·8				
	" " " "	" 9		E, W	51·97	14·33	37·6	37·7	1·0	0·4	0·16
24	1104 & 1130 Gr. 80	Feb. 6	1 42	E, W	71 25 1·77	+ 5 35·96	37·7	37·7	0·7	0·4	0·11
25	1161 & 1173 Gr. 80	Feb. 6	10 28	E, W	71 22 58·55	+ 7 38·77	37·3				
	" " "	" 9		W, E	58·54	39·67	38·2	37·7	1·0	0·4	0·16
26	1175 Gr. 80 & 664 Gr. 72	Feb. 6	15 47	W, E	71 41 20·49	− 10 41·83	38·7				
	" " " "	" 9		E, W	20·47	43·31	37·2	37·9	1·0	0·2	0·04
27	1184 & 1197 Gr. 80	Feb. 6	5 32	W, E	71 9 29·28	+ 21 8·49	37·8				
	" " "	" 9		E, W	29·25	7·26	36·5	37·1	1·0	1·0	1·00
28	1206 & 1218 Gr. 80	Feb. 6	2 19	E, W	71 35 4·72	− 4 26·31	38·4				
	" " "	" 9		W, E	4·70	25·86	38·8	38·6	1·0	0·5	0·25
29	1250 Gr. 80 & 716 Gr. 72	Feb. 3	1 58	E, W	71 18 34·12	+ 12 3·08	37·2				
	" " " "	" 5		W, E	34·11	3·39	37·5	37·3	1·0	0·8	0·64
30	1265 & 1272 Gr. 80	Feb. 3	6 41	W, E	71 25 53·70	+ 4 44·98	38·7				
	" " "	" 5		E, W	53·69	43·89	37·6	38·1	1·0	0·0	0·00
31	1282 & 1287 Gr. 80	Feb. 3	9 55	E, W	71 34 38·17	− 3 60·69	37·5				
	" " "	" 5		W, E	38·16	58·42	39·7	38·6	1·0	0·5	0·25
32	937 Gr. 64 & 1309 Gr. 80	Feb. 3	16 21	W, E	71 30 48·43	− 0 10·94	37·5				
	" " " "	" 5		E, W	48·42	10·02	38·4	37·9	1·0	0·2	0·04
33	1311 & 1327 Gr. 80	Feb. 3	0 26	E, W	71 39 16·68	− 8 38·37	38·3				
	" " "	" 5		W, E	16·67	38·93	37·7	38·0	1·0	0·1	0·01
34	1349 & 1368 Gr. 80	Feb. 3	1 43	W, E	71 32 28·56	− 1 50·06	38·5				
	" " "	" 5		E, W	28·56	50·16	38·4	38·4	1·0	0·3	0·09

170. Kanheri—*Co-latitude* 71° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = p	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
35	1378 Gr. 80 & 801 Gr. 72 " " "	Feb. 3 " 5	4 19	E, W W, E	71 22 2·21 2·21	+ 8 35·30 35·54	37·5 37·7	37·6	1·0	0·5	0·25
36	1402 & 1405 Gr. 80 " " "	Feb. 3 " 5	9 2	W, E E, W	71 27 35·66 35·65	+ 3 2·50 2·77	38·2 38·4	38·3	1·0	0·2	0·04
37	1411 Gr. 80 " "	Feb. 3 " 5	0 11	E, W W, E	71 19 26·56 26·56	+ 11 12·51 12·16	39·1 38·7	38·9	1·0	0·8	0·64
38	1413 & 1442 Gr. 80 " " "	Feb. 3 " 5	1 17	W, E E, W	71 19 17·58 17·58	+ 11 21·98 21·14	39·6 38·7	39·1	1·0	1·0	1·00
39	1450 & 1453 Gr. 80 " " "	Feb. 3 " 5	14 44	E, W W, E	71 33 13·22 13·23	− 2 34·72 35·03	38·5 38·2	38·3	1·0	0·2	0·04
40	1470 Gr. 80 " "	Feb. 3 " 5	0 3	W, E E, W	71 27 9·00 9·01	+ 3 30·75 29·74	39·7 38·7	39·2	1·0	1·1	1·21
41	1480 & 1489 Gr. 80 " " "	Feb. 3 " 5	12 23	E, W W, E	71 23 28·23 28·25	+ 7 9·86 10·02	38·1 38·3	38·2	0·7	0·1	0·01
42	1489 & 1493 Gr. 80 " " "	Feb. 3 " 5	12 19	W, E E, W	71 19 52·41 52·43	+ 10 45·27 45·56	37·7 38·0	37·8	0·7	0·3	0·06
43	1504 & 1511 Gr. 80 " " "	Feb. 3 " 5	6 19	E, W W, E	71 25 37·40 37·41	+ 5 0·23 1·22	37·6 38·6	38·1	1·0	0·0	0·00
44	1529 & 1533 Gr. 80	Feb. 5	3 30	E, W	71 4 16·15	+ 26 21·54	37·7	37·7	0·5	0·4	0·08
45	1533 & 1536 Gr. 80	Feb. 5	3 9	W, E	71 25 28·82	+ 5 9·14	38·0	38·0	0·5	0·1	0·01
46	1536 & 1541 Gr. 80 " " "	Feb. 3 " 5	3 10	W, E E, W	71 26 44·45 44·48	+ 3 53·05 53·86	37·5 38·3	37·9	0·7	0·2	0·03
47	1554 & 1572 Gr. 80	Feb. 5	6 56	W, E	71 17 36·48	+ 13 1·54	38·0	38·0	0·5	0·1	0·01
48	1572 & 1585 Gr. 80 " " "	Feb. 3 " 5	6 42	W, E E, W	71 32 17·18 17·22	− 1 38·49 39·16	38·7 38·1	38·4	0·7	0·3	0·06
49	1603 & 1617 Gr. 80	Feb. 3	3 35	E, W	71 54 22·05	− 23 44·78	37·3	37·3	0·7	0·8	0·45
50	1621 & 1628 Gr. 80 " " "	Feb. 3 " 5	8 33	W, E E, W	72 1 30·68 30·73	− 30 53·05 51·92	37·6 38·8	38·2	1·0	0·1	0·01
51	1646 Gr. 80 & 957 Gr. 72 " " " "	Feb. 3 " 5	17 49	E, W W, E	72 2 30·28 30·36	− 31 52·96 52·68	37·3 37·7	37·5	1·0	0·6	0·36
52	1705 & 1717 Gr. 80	Feb. 7	9 7	E, W	71 1 52·37	+ 28 46·02	38·4	38·4	0·7	0·3	0·06
53	1727 & 1743 Gr. 80	Feb. 7	15 53	W, E	71 4 48·69	+ 25 48·87	37·6	37·6	0·7	0·5	0·18
54	1762 & 1793 Gr. 80	Feb. 7	2 22	E, W	71 37 3·41	− 6 25·98	37·4	37·4	0·7	0·7	0·34

170. Kanheri—*Co-latitude* 71° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
55	1798 & 1802 Gr. 80	Feb. 7	15 33	W, E	71 51 47·61	− 21 9·23	38·4	38·4	0·7	0·3	0·06
56	1816 & 1827 Gr. 80	Feb. 7	0 59	E, W	71 58 48·75	− 28 9·33	39·4	39·4	0·7	1·3	1·18
57	1831 & 1850 Gr. 80	Feb. 7	3 30	W, E	71 32 53·97	− 2 15·86	38·1	38·1	0·7	0·0	0·00
58	1862 & 1874 Gr. 80	Feb. 7	2 17	E, W	71 28 28·31	+ 2 9·57	37·9	37·9	0·7	0·2	0·03
59	1965 & 1970 Gr. 80	Feb. 7	0 39	E, W	71 40 49·26	− 10 11·69	37·6	37·6	0·7	0·5	0·18
60	1514 Gr. 64 & 2003 Gr. 80	Feb. 7	9 56	W, E	71 48 23·01	− 17 44·78	38·2	38·2	0·7	0·1	0·01
61	2020 & 2027 Gr. 80	Feb. 7	20 51	E, W	71 57 5·28	− 26 26·73	38·5	38·5	0·7	0·4	0·11
								Σ P = 49·5		ΣP vv = 16·06	

Summary.

No. of pairs 61

No. of observations 103

Mean difference between observations taken E, W and those taken W, E = + 0″·20

Observed Co-latitude (weighted mean) 71° 30′ 38″·08 ± 0″·050

Correction for Height above Sea-level + 0″·08

Final Co-latitude 71° 30′ 38″·16

		°	′	″	″
Astronomical Latitude (A)	=	18	29	21·84	± 0·050
Geodetic Latitude (G)	=	18	29	30·75	
Deflection of plumb-line (A − G)	=		−	8·91	

171. Karia—*Co-latitude* 70° 47′ +

Latitude	... 19° 12′	***Instrument***—Zenith Telescope	
Longitude	... 82 10	***Mean Height of Barometer***	in. 27·97
Height	... 2014 feet	***Mean Temperature***	68°·6

Observer—Lieut. E. A Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	*v*	P *v v*
		1900	° ′		° ′ ″	′ ″	″	″			
1	331 & 350 Gr. 80	Jan. 14	0 12	E, W	70 45 50·11	+ 2 7·36	57·47	57·47	0·5	0·21	0·0220
2	539 & 562 Gr. 80	Jan. 15	6 12	W, E	71 11 54·01	− 23 56·90	57 11				
	" " "	" 16		E, W	54·02	56 38	57 64	57·38	1 0	0·12	0·0144
3	563 & 574 Gr. 80	Jan. 15	28 47	E, W	71 18 56·23	− 30 58·81	57·42				
	" " "	" 16		W, E	56·24	59 18	57·06	57·24	1·0	0·02	0·0004
4	602 & 630 Gr 80	Jan. 15	2 24	W, E	70 34 47·03	+ 13 10·20	57 23				
	" " "	" 16		E, W	47 04	10 53	57 57				
	602 & 633 Gr. 80	" 15	2 21	W, E	36 52 52	11 4·56	57·08				
	" " "	" 16		E, W	52 54	4 91	57·45	57·34	1·5	0·08	0·0096
5	657 & 663 Gr. 80	Jan. 15	29 20	E, W	71 10 25·00	− 22 27·85	57 15				
	" " "	" 16		W, E	25 02	28·00	57·02	57·09	1 0	0·17	0·0289
6	700 & 713 Gr. 80	Jan. 15	3 10	W, E	71 5 48·02	− 17 50·43	57·59				
	" " "	" 17		E, W	48·05	50·24	57·81	57·70	1·0	0·44	0·1936
7	701 & 717 Gr. 80	Jan. 15	3 17	W, E	71 18 13·38	− 30 16·61	56 77				
	" " "	" 17		E, W	13 42	16·50	56·92	56·85	1·0	0·41	0·1681
8	704 & 719 Gr. 80	Jan. 15	3 34	W, E	70 58 7·26	− 10 9 02	58·24				
	" " "	" 17		E, W	7·30	9·75	57·55	57·90	1·0	0·64	0·4096
9	707 & 734 Gr. 80	Jan. 17	3 14	E, W	70 27 34·20	+ 20 22·20	56·40	56·40	0·5	0·86	0·3698
10	739 & 754 Gr. 80	Jan. 17	3 28	W, E	70 42 1·11	+ 5 55·68	56·79				
	742 & 754 Gr. 80	Jan. 17	3 32	W, E	45 24·96	2 32·54	57·50	57·15	1·0	0·11	0·0121
11	792 & 808 Gr. 80	Jan. 15	5 25	W, E	70 30 34·29	+ 17 22·85	57·14				
	" " "	" 17		E, W	34·32	23·19	57·51				
	803 & 808 Gr. 80	" 15	5 47	W, E	52 24·10	− 4 26·86	57·24				
	" " "	" 17		E, W	24·13	26·76	57·37	57·32	1·5	0·06	0·0054

171. Karia—*Co-latitude* 70° 47′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
12	851 & 886 Gr. 80	Jan. 15	19 27	W, E	71 4 29·23	− 16 32·18	57·05				
	,, ,, ,,	,, 17		E, W	29·27	31·77	57·50				
	851 & 887 Gr. 80	,, 15	19 26	W, E	3 26·74	15 30·16	56·58				
	,, ,, ,,	,, 17		E, W	26·78	29·45	57·33	57·12	1·5	0·14	0·0294
13	892 & 902 Gr. 80	Jan. 15	2 17	E, W	70 25 44·61	+ 22 12·94	57·55				
	,, ,, ,,	,, 17		W, E	44·64	12·41	57·05	57·30	1·0	0·04	0·0016
14	944 & 984 Gr. 80	Jan. 15	20 12	E, W	71 4 25·15	− 16 28·74	56·41				
	,, ,, ,,	,, 17		W, E	25·17	28·58	56·59	56·50	1·0	0·76	0·5776
15	1014 & 1016 Gr. 80	Jan. 15	17 42	E, W	70 29 3·64	+ 18 54·35	57·99				
	,, ,, ,,	,, 17		W, E	3·67	53·84	57·51	57·75	1·0	0·49	0·2401
16	1026 & 1053 Gr. 80	Jan. 15	4 31	W, E	71 15 2·86	− 27 6·01	56·85				
	,, ,, ,,	,, 17		E, W	2·90	5·85	57·05	56·95	1·0	0·31	0·0961
17	1127 & 1150 Gr. 80	Jan. 15	9 4	W, E	70 57 25·09	− 9 28·60	56·49				
	,, ,, ,,	,, 17		E, W	25·13	27·97	57·16				
	1138 & 1150 Gr. 80	,, 15	9 33	W, E	28 19·51	+ 19 37·15	56·66				
	,, ,, ,,	,, 17		E, W	19·54	37·53	57·07				
	1144 & 1150 Gr. 80	,, 15	9 11	W, E	49 53·16	− 1 55·75	57·41				
	,, ,, ,,	,, 17		E, W	53·19	55·98	57·21				
	1145 & 1150 Gr. 80	,, 15	9 9	W, E	51 45·62	3 47·87	57·75				
	,, ,, ,,	,, 17		E, W	45·66	49·13	56·53	57·03	2·5	0·23	0·1322
18	1159 & 1168 Gr. 80	Jan. 15	6 7	E, W	70 53 4·32	− 5 7·52	56·80				
	,, ,, ,,	,, 17		W, E	4·37	7·24	57·13	56·97	1·0	0·29	0·0841
19	1185 & 1186 Gr. 80	Jan. 15	6 6	W, E	70 35 55·47	+ 12 1·29	56·76				
	,, ,, ,,	,, 17		E, W	55·52	2·75	58·27	57·52	1·0	0·26	0·0676
20	1218 & 1256 Gr. 80	Jan. 15	3 3	E, W	70 52 24·39	− 4 27·45	56·94				
	,, ,, ,,	,, 17		W, E	24·43	26·48	57·95				
	1233 & 1256 Gr. 80	,, 15		E, W	45 15·53	+ 2 40·01	56·44				
	,, ,, ,,	,, 17	2 55	W, E	15·59	41·65	57·24	57·14	1·5	0·12	0·0216
21	1256 & 1297 Gr. 80	Jan. 17	3 33	E, W	70 24 45·14	+ 23 13·05	58·19				
	,, ,, ,,	,, 18		W, E	45·16	12·55	57·71	57·95	1·0	0·69	0·4761
22	1350 & 1383 Gr. 80	Jan. 17	2 55	W, E	71 2 16·75	− 14 19·08	57·67				
	1368 & 1383 Gr. 80	,, 17	2 34	W, E	70 42 4·49	+ 5 53·40	57·89	57·78	1·0	0·52	0·2704
23	1299 & 1313 Gr. 80	Jan. 17	13 19	W, E	71 12 27·35	− 24 30·95	56·40	56·40	1·0	0·86	0·7396
24	1397 & 1402 Gr. 80	Jan. 17	10 14	E, W	70 16 39·81	+ 31 17·71	57·52				
	,, ,, ,,	,, 18		W, E	39·85	17·69	57·54	57·53	1·0	0·27	0·0729

171. Karia—*Co-latitude* 70° 47′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
25	1411 & 1436 Gr. 80	Jan. 17	1 4	W, E	70 17 9·46	+ 30 48·47	57·93				
	" " "	" 18		E, W	9 49	49·26	58 75				
	1434 & 1436 Gr. 80	" 17	1 11	W, E	23 47 41	24 10·77	58·18	58·29	1·5	1·03	1·5913
26	1461 & 1470 Gr. 80	Jan. 17	0 42	E, W	70 47 35·18	+ 0 20·95	56·13	56·13	0·5	1·13	0·6384
27	1477 & 1490 Gr. 80	Jan. 17	12 5	W, E	71 7 52·87	− 19 56·37	56·50				
	" " "	" 18		E, W	52·93	56·17	56 76				
	1490 & 1493 Gr. 80	" 17	12 19	E, W	21 40·24	33 43 74	56·50				
	" " "	" 18		W, E	40·29	43 41	56 88	56·66	1·5	0·60	0·5400
28	1434 & 1461 Gr. 80	Jan. 18	0 44	E, W	70 50 16·15	− 2 18·71	57·44	57·44	0·5	0·18	0·0162
29	1654 & 1662 Gr. 80	Jan. 13	12 39	E, W	70 41 29·12	+ 6 28·74	57 86				
	" " "	" 19		W, E	29·60	25·48	55 08	56·47	1·0	0·79	0·6241
30	1678 & 1686 Gr. 80	Jan. 13	16 35	E, W	70 38 26·12	+ 9 31·77	57 89	57 89	0·5	0 63	0 1984
31	1691 & 1717 Gr. 80	Jan. 13	8 53	W, E	70 50 42·14	− 2 44·02	58 12				
	" " "	" 19		E, W	42·69	46·48	56 21				
	1705 & 1717 Gr. 80	" 13	9 7	W, E	71 4 13·78	16 15·62	58 16				
	" " "	" 19		E, W	14·34	18·13	56·21	57·18	1·5	0·08	0·0096
32	1728 & 1729 Gr. 80	Jan. 13	12 9	E, W	70 56 59·20	− 9 2·02	57·18				
	" " "	" 19		W, E	59·78	2·36	57 42	57·30	1·0	0 04	0·0016
33	1767 & 1789 Gr. 80	Jan. 13	19 9	E, W	70 22 37·93	+ 25 19·75	57·68				
	" " "	" 19		W, E	38·52	18·78	57 30	57·49	1·0	0·23	0·0529
34	1799 & 1807 Gr. 80	Jan. 13	12 46	W, E	70 40 11·66	+ 7 44·06	55·72				
	" " "	" 19		E, W	12 21	44·52	56·73	56·23	1·0	1·03	1·0609
35	1865 & 1884 Gr. 80	Jan. 13	3 46	W, E	71 6 48·50	− 18 52·36	56·14				
	" " "	" 19		E, W	49·28	50·71	58·57				
	1874 & 1884 Gr. 80	" 13	3 14	W, E	70 34 38 77	+ 13 17 89	56·66				
	" " "	" 19		E, W	39·55	18 41	57 96				
	1884 & 1908 Gr. 80	" 13	3 36	E, W	57 4·38	− 9 7·14	57 24				
	" " "	" 19		W, E	5·18	7·45	57·73	57·40	2·0	0·14	0·0392
36	1919 & 1939 Gr. 80	Jan. 13	19 53	W, E	70 20 0·78	+ 27 56·64	57·42				
	" " "	" 19		E, W	1·60	56·15	57·75	57·59	1·0	0·33	0·1089
37	1925 & 1939 Gr. 80	Jan. 13	19 51	W, E	70 16 24·15	+ 31 32·98	57·13				
	" " "	" 19		E, W	24·98	32·63	57 61	57·37	1·0	0·11	0·0121
38	1941 & 1985 Gr. 80	Jan. 13	8 18	E, W	70 55 17·55	− 7 19·43	58·12				
	" " "	" 19		W, E	18·43	19·52	58·91	58·52	1·0	1·26	1·5876

171. Karia—*Co-latitude* 70° 47′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
39	1992 & 2003 Gr. 80	Jan. 13	9 0	W, E	70 54 24·61	− 6 27·50	57·11				
	" " "	" 19		E, W	25·53	27·45	58·08	57·60	1·0	0·34	0·1156
40	2048 & 2106 Gr. 80	Jan. 13	19 33	E, W	70 31 53·66	+ 16 3·71	57·37				
	" " "	" 19		W, E	54·59	1·74	56·33	56·85	1·0	0·41	0·1681
41	2124 & 2144 Gr. 80	Jan. 13	1 15	W, E	70 47 46·42	+ 0 11·44	57·86				
	" " "	" 19		E, W	47·49	9·87	57·36	57·61	1·0	0·35	0·1225
42	219 & 264 Gr. 80	Jan. 13	0 34	W, E	70 46 48·12	+ 1 8·65	56·77				
	264 & 286 Gr. 80	" 13	0 30	E, W	42 15·57	5 41·01	56·58				
	286 & 290 Gr. 80	" 14	0 46	E, W	26 9·27	21 47·37	56·64				
	220 & 290 Gr. 80	" 13	0 48	W, E	28 34·83	19 21·48	56·31	56·58	1·5	0·68	0·6936
43	1436 & 1470 Gr. 80	Jan. 18	1 8	W, E	70 21 6·54	+ 26 51·73	58·27	58·27	0·5	1·01	0·5100
								Σ P = 46·5		Σ Pvv = 12·1342	

Summary.

No. of pairs 43

No. of observations 104

Mean difference between observations taken E,W and those taken W, E = + 0″·10

Observed Co-latitude (weighted mean) 70° 47′ 57″·26 ± 0″·053

Correction for Height above Sea-level + 0″·07

Final Co-latitude 70° 47′ 57″·33

		°	′	″	
Astronomical Latitude (A)	=	19	12	2·67	± 0·053
Geodetic Latitude (G)	=	19	12	5·98	
Deflection of plumb-line (A − G)	=		−	3·31	

172. Karothol—*Co-latitude* 65° 6′ +

Latitude ... 24° 54′ *Instrument*—Zenith Telescope

Longitude ... 67 56 *Mean Height of Barometer* 29·95 in.

Height ... 260 feet *Mean Temperature* 51°·1

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
1	343 Newc. & 902 Gr. 80 " " " "	Mar. 4 " 5	3 21	W, E E, W	64 48 44·43 44·43	+ 17 30·73 30·53	15·16 14·96	15·06	1·0	0·15	0·0225
2	348 Newc. & 943 Gr. 80 " " " "	Mar. 4 " 5	7 34	E, W W, E	65 27 6·21 6·20	− 20 50·53 50·19	15·68 16·01	15·85	0·7	0·64	0·2867
3	348 & 371 Newcomb " " "	Mar. 4 " 5	7 13	E, W W, E	65 5 42·85 42·85	+ 0 32·82 32·65	15·67 15·50	15·59	0·7	0·38	0·1011
4	374 & 391 Newcomb " " "	Mar. 4 " 5	14 44	W, E E, W	65 37 3·50 3·49	− 30 48·04 47·73	15·46 15·76	15·61	1·0	0·40	0·1600
5	1025 & 1058 Gr. 80 " " "	Mar. 4 " 5	4 42	E, W W, E	65 9 48·82 48·81	− 3 33·60 34·39	15·22 14·42	14·82	0·7	0·39	0·1065
6	1058 Gr. 80 & 419 Newc " " " "	Mar. 4 " 5	4 38	W, E E, W	65 5 47·84 47·82	+ 0 27·29 27·29	15·13 15·11	15·12	0·7	0·09	0·0057
7	426 & 430 Newcomb " " "	Mar. 4 " 5	14 45	E, W W, E	65 16 7·66 7·64	− 9 52·08 52·25	15·58 15·39	15·49	1·0	0·28	0·0784
8	440 & 458 Newcomb " " "	Mar. 4 " 5	9 0	E, W W, E	64 55 1·49 1·45	+ 11 14·02 13·43	15·51 14·88	15·20	0·7	0·01	0·0001
9	440 & 464 Newcomb " " "	Mar. 4 " 5	8 53	E, W W, E	64 47 52·76 52·72	+ 18 22·16 22·22	14·92 14·94	14·93	0·7	0·28	0·0549
10	468 & 479 Newcomb " " "	Mar. 4 " 5	16 18	W, E E, W	65 13 41·35 41·31	− 7 26·02 25·94	15·33 15·37	15·35	0·7	0·14	0·0137
11	475 & 479 Newcomb " " "	Mar. 4 " 5	16 12	W, E E, W	65 19 34·02 33·97	− 13 19·14 18·85	14·88 15·12	15·00	0·7	0·21	0·0309
12	484 Newc. & 1811 Gr. 80 " " " "	Mar. 4 " 5	7 6	E, W W, E	64 59 57·65 57·59	+ 6 16·63 17·22	14·28 14·81	14·55	1·0	0·66	0·4356

172. Karothol—*Co-latitude* 65° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
13	498 & 511 Newcomb " " "	Mar. 1 " 4	8 49	W, E E, W	65 8 45·47 45·45	− 2 30·36 29·87	15·11 15·58	15·35	1·0	0·14	0·0196
14	517 & 521 Newcomb " " "	Mar. 1 " 3	3 6	E, W W, E	65 1 56·51 56·41	+ 4 19·11 18·66	15·62 15·07	15·35	0·7	0·14	0·0137
15	521 & 531 Newcomb " " "	Mar. 1 " 3	2 50	W, E E, W	65 17 57·53 57·43	− 11 41·96 41·55	15·57 15·88	15·73	0·7	0·52	0·1893
16	544 & 558 Newcomb " " "	Mar. 1 " 3	4 10	E, W W, E	65 3 12·80 12·69	+ 3 2·52 2·48	15·32 15·17	15·25	0·7	0·04	0·0011
17	544 & 565 Newcomb " " "	Mar. 1 " 3	3 58	E, W W, E	65 15 36·42 36·30	− 9 21·36 20·95	15·06 15·35	15·21	0·7	0·00	0·0000
18	578 & 583 Newcomb " " "	Mar. 1 " 3	13 54	E, W W, E	65 2 47·14 47·01	+ 3 28·38 27·76	15·52 14·77	15·15	1·0	0·06	0·0036
19	1541 Gr. 80 & 595 Newc. " " " "	Mar. 1 " 3	9 44	E, W W, E	64 55 19·71 19·58	+ 10 55·32 54·89	15·03 14·47	14·75	1·0	0·46	0·2116
20	1555 & 1571 Gr. 80 " " "	Mar. 1 " 3	1 37	W, E E, W	64 59 50·86 50·73	+ 6 24·64 24·31	15·50 15·04	15·27	1·0	0·06	0·0036
21	1585 Gr. 80 & 623 Newc. " " " "	Mar. 1 " 3	0 27	E, W W, E	65 19 53·74 53·61	− 13 38·31 37·98	15·43 15·63	15·53	1·0	0·32	0·1024
22	634 & 638 Newcomb " " "	Mar. 1 " 3	16 31	W, E E, W	64 58 51·82 51·69	+ 7 23·24 23·16	15·06 14·85	14·96	1·0	0·25	0·0625
23	641 Newc. & 1662 Gr. 80 " " " "	Mar. 1 " 3	7 22	E, W W, E	65 24 7·03 6·89	− 17 51·88 51·90	15·15 14·99	15·07	1·0	0·14	0·0196
24	657 & 673 Newcomb " " "	Mar. 1 " 3	17 16	W, E E, W	65 16 26·80 26·68	− 10 11·74 11·32	15·06 15·36	15·21	1·0	0·00	0·0000
25	683 & 694 Newcomb " " "	Mar. 1 " 3	0 48	E, W W, E	65 30 45·33 45·19	− 24 29·84 30·95	15·49 14·24	14·87	1·0	0·34	0·1156
26	699 & 708 Newcomb " " "	Mar. 6 " 7	20 27	E, W W, E	65 24 44·71 44·63	− 18 28·45 29·40	16·26 15·23	15·75	1·0	0·54	0·2916
27	713 & 718 Newcomb " " "	Mar. 6 " 7	8 50	W, E E, W	65 12 8·40 8·31	− 5 52·96 53·29	15·44 15·02	15·23	1·0	0·02	0·0004

172. Karothol—*Co-latitude* 65° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1901	° ′		° ′ ″	′ ″	″	″			
28	720 & 728 Newcomb " " "	Mar. 6 " 7	18 35	E, W W, E	64 51 38·41 38·33	+ 14 37·02 37·18	15·43 15·51	15·47	1·0	0·26	0·0676
29	740 & 745 Newcomb	Mar. 6	23 1	W, E	64 40 46·09	+ 25 28·82	14·91	14·91	0·7	0·30	0·0630
30	758 & 768 Newcomb " " "	Mar. 6 " 7	15 58	E, W W, E	64 45 29·51 29·42	+ 20 45·75 45·86	15·26 15·28	15·27	1·0	0·06	0·0036
31	783 & 787 Newcomb " " "	Mar. 6 " 7	3 41	W, E E, W	64 52 25·67 25·59	+ 13 48·80 49·55	14·47 15·14	14·81	1·0	0·40	0·1600
32	798 & 807 Newcomb " " "	Mar. 6 " 7	16 36	E, W W, E	65 11 17·75 17·66	− 5 2·47 2·18	15·28 15·48	15·38	1·0	0·17	0·0289
33	818 & 821 Newcomb " " "	Mar. 6 " 7	13 41	W, E E, W	64 49 59·42 59·34	+ 16 15·66 16·96	15·08 16·30	15·69	0·7	0·48	0·1613
34	821 & 828 Newcomb " " "	Mar. 6 " 7	13 46	E, W W, E	64 44 49·99 49·92	+ 21 24·95 26·67	14·94 16·59	15·77	0·7	0·56	0·2195
35	2060 Gr. 80 & 840 Newc. " " " "	Mar. 6 " 7	15 22	W, E E, W	64 41 58·24 58·17	+ 24 17·71 16·60	15·95 14·77	15·36	1·0	0·15	0·0225
36	852 & 866 Newcomb " " "	Mar. 6 " 7	24 57	E, W W, E	65 8 46·62 46·57	− 2 31·73 31·28	14·89 15·29	15·09	1·0	0·12	0·0144
37	2173 & 2176 Gr. 80	Mar. 12	2 54	E, W	64 55 37·19	+ 10 38·35	15·54	15·54	0·5	0·33	0·0545
38	2176 Gr. 80 & 880 Newc.	Mar. 12	2 51	W, E	64 58 59·99	+ 7 15·10	15·09	15·09	0·5	0·12	0·0072
39	895 Newc. & 2228 Gr. 80 " " " " " " " "	Mar. 9 " 11 " 12	26 41	W, E W, E E, W	64 51 38·10 38·00 37·94	+ 14 36·93 37·78 37·10	15·03 15·78 15·04	15·23	1·2	0·02	0·0005
40	905 & 910 Newcomb " " " " " "	Mar. 9 " 11 " 12	5 34	E, W E, W W, E	64 45 58·39 58·27 58·22	+ 20 16·75 16·37 16·68	15·14 14·64 14·90	14·90	0·8	0·31	0·0769
41	905 & 915 Newcomb " " " " " "	Mar. 9 " 11 " 12	5 15	E, W E, W W, E	65 4 53·66 53·55 53·49	+ 1 21·26 21·32 21·74	14·02 14·87 15·23	15·07	0·8	0·14	0·0157
42	932 & 956 Newcomb " " "	Mar. 11 " 12	22 52	W, E E, W	64 49 47·07 47·02	+ 16 27·63 27·76	14·70 14·78	14·74	1·0	0·47	0·2209
43	966 & 977 Newcomb " " "	Mar. 11 " 12	8 57	E, W W, E	65 16 28·84 28·80	− 10 13·18 13·72	15·66 15·08	15·37	1·0	0·16	0·0256
44	980 & 995 Newcomb " " "	Mar. 11 " 12	4 44	W, E E, W	65 17 12·06 12·01	− 10 56·77 56·94	15·29 15·07	15·18	1·0	0·03	0·0009
45	997 & 1007 Newcomb " " "	Mar. 11 " 12	18 0	E, W W, E	65 16 17·74 17·71	− 10 2·41 2·52	15·33 15·19	15·26	1·0	0·05	0·0025

172. Karothol—*Co-latitude* 65° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1901	° ′		° ′ ″	′ ″	″	″			
46	2487 Gr. 80 & 1026 Newc.	Mar. 11	20 15	W, E	65 3 17·36	+ 2 57·85	15·21				
	" " " "	" 12		E, W	17·34	57·76	15·10	15·16	1·0	0·05	0·0025
47	2534 Gr. 80 & 1039 Newc.	Mar. 11	5 1	E, W	65 36 50·18	− 30 34·90	15·28				
	" " " "	" 12		W, E	50·15	34·92	15·23	15·26	1·0	0·05	0·0025
48	1054 & 1076 Newcomb	Mar. 11	17 21	W, E	65 14 40·97	− 8 26·49	14·48				
	" " "	" 12		E, W	40·95	25·63	15·32	14·90	0·7	0·31	0·0673
49	1062 & 1076 Newcomb	Mar. 11	17 37	W, E	64 58 26·28	+ 7 48·52	14·80				
	" " "	" 12		E, W	26·27	48·92	15·19	15·00	0·7	0·21	0·0309
50	1084 & 1091 Newcomb	Mar. 11	15 34	E, W	64 54 59·41	+ 11 15·27	14·68				
	" " "	" 12		W, E	59·40	15·88	15·28	14·98	1·0	0·23	0·0529
								Σ P = 43·7		Σ Pvv = 3·6323	

Summary.

No. of pairs 50

No. of observations 100

Mean difference between observations taken E, W and those taken W, E = + 0″·08

Observed Co-latitude (weighted mean) 65° 6′ 15″·21 ± 0″·028

Correction for Height above Sea-level + 0″·01

Final Co-latitude 65° 6′ 15″·22

	°	′	″	
Astronomical Latitude (A)	= 24	53	44·78	± 0·028
Geodetic Latitude (G)	= 24	53	46·69	
Deflection of plumb-line (A−G)	=	−	1·91	

173. Kaulia—*Co-latitude* 62° 11′ +

titude ... 27° 49′ *Height* ... 7051 feet

Longitude ... 85 17 *Instrument*—T. S. 6-inch Theodolite

Observer—Captain H. Wood, R.E.

Star		Date		Seconds of Co-latitude
		1903		″
Polaris	...	Oct.	24	30·4
α Gruis	...	,,	,,	38·7
Polaris	...	,,	26	34·7
γ Gruis	...	,,	,,	36·2
Polaris	...	,,	27	33·1
α Piscis Aust.	...	,,	,,	32·4

Summary.

No. of observations 21

		°	′	″
Observed Co-latitude		62	11	34·2
Correction for Height above Sea-level			+	0·3
Final Co-latitude		**62°**	**11′**	**34″·5**

		°	′	″
Astronomical Latitude (A)	=	27	48	25·5
Geodetic Latitude (G)	=	27	48	58·6
Deflection of plumb-line (A − G)	=		−	33·1

174. Khankharia—*Co-latitude* 65° 22′ +

Latitude	... 24° 37′	*Instrument*—Zenith Telescope		
Longitude	... 71 56	*Mean Height of Barometer*	in. 29·57	
Height	... 362 feet	*Mean Temperature*	72°·0	

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	68 & 75 Gr. 80	Nov. 3	4 44	E, W	65 31 8·72	− 8 6·58	62·14				
	" " "	" 4		W, E	8·65	7·96	60·69	61·42	0·7	0·40	0·1120
2	75 & 92 Gr. 80	Nov. 3	4 31	W, E	65 44 6·01	− 21 2·11	63·90				
	" " "	" 4		E, W	5·93	3·39	62·54	63·22	0·7	1·40	1·3720
3	112 Gr. 80 & 55 Newc.	Nov. 3	13 16	E, W	65 17 55·62	+ 5 5·36	60·98				
	" " "	" 4		W, E	55·52	5·44	60·96	60·97	1·0	0·85	0·7225
4	64 & 71 Newcomb	Nov. 3	10 21	W, E	65 14 32·52	+ 8 28·09	60·61				
	" " "	" 4		E, W	32·43	29·25	61·68	61·15	1·0	0·67	0·4489
5	97 & 108 Newcomb	Nov. 3	16 8	W, E	65 12 45·45	+ 10 14·84	60·29				
	" " "	" 4		E, W	45·36	15·77	61·13	60·71	1·0	1·11	1·2321
6	118 & 121 Newcomb	Nov. 3	4 23	E, W	65 17 14·27	+ 5 47·52	61·79				
	" " "	" 4		W, E	14·17	46·90	61·07	61·43	1·0	0·39	0·1521
7	73 & 81 Newcomb	Nov. 4	3 51	W, E	65 37 57·46	− 14 53·84	63·62	63·62	0·7	1·80	2·2680
8	350 & 368 Gr. 80	Nov. 4	4 54	W, E	65 39 45·89	− 16 41·69	64·20				
	" " "	" 5		E, W	45·80	42·81	62·99	63·60	1·0	1·78	3·1684
9	161 & 171 Newcomb	Nov. 5	2 53	W, E	65 35 19·33	− 12 15·45	63·88				
	" " "	" 7		E, W	19·18	17·72	61·46	62·67	1·0	0·85	0·7225
10	414 Gr. 80 & 185 Newc.	Nov. 5	3 57	E, W	65 6 29·89	+ 16 29·21	59·10				
	" " " "	" 7		W, E	29·84	31·49	61·33	60·22	1·0	1·60	2·5600
11	195 & 213 Newcomb	Nov. 5	15 57	W, E	65 22 17·15	+ 0 44·90	62·05	62·05	0·7	0·23	0·0370
12	229 & 236 Newcomb	Nov. 5	0 37	W, E	65 35 36·65	− 12 34·41	62·24				
	" " "	" 7		W, E	36·55	36·04	60·51				
	" " "	" 8		E, W	36·49	34·52	61·97	61·68	0·8	0·14	0·0157

174. Khankharia—*Co-latitude* 65° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
13	229 & 238 Newcomb " " " " " "	Nov. 5 " 7 " 8	0 37	W, E W, E E, W	65 35 42·21 42·11 42·05	− 12 39·53 41·91 40·06	62·68 60·20 61·99	61·72	0·8	0·10	0·0080
14	273 & 287 Newcomb	Nov. 5	9 51	W, E	65 31 4·37	− 8 2·32	62·05	62·05	0·7	0·23	0·0370
15	305 & 313 Newcomb	Nov. 5	19 8	E, W	65 26 38·35	− 3 36·69	61·66	61·66	0·7	0·16	0·0179
16	355 & 374 Newcomb	Nov. 5	14 51	E, W	65 43 47·45	− 20 44·10	63·35	63·35	0·7	1·53	1·6386
17	471 & 488 Gr. 80	Nov. 8	4 1	W, E	65 18 37·92	+ 4 24·43	62·35	62·35	0·5	0·53	0·1405
18	471 & 508 Gr. 80	Nov. 8	3 57	W, E	65 15 15·34	+ 7 47·49	62·83	62·83	0·5	1·01	0·5101
19	630 & 637 Gr. 80 " " "	Nov. 7 " 8	2 46	W, E E, W	65 25 38·85 38·81	− 2 35·64 37·28	63·21 61·53	62·37	1·0	0·55	0·3025
20	677 & 681 Gr. 80	Nov. 7	2 47	W, E	65 40 32·23	− 17 30·46	61·77	61·77	0·7	0·05	0·0018
21	695 & 717 Gr. 80 " " "	Nov. 7 " 8	9 10	E, W W, E	65 25 23·25 23·20	− 2 21·55 22·30	61·70 60·90	61·30	1·0	0·52	0·2704
22	740 & 776 Gr. 80	Nov. 8	12 30	E, W	65 11 14·55	+ 11 46·31	60·86	60·86	0·5	0·96	0·4608
23	749 & 776 Gr. 80	Nov. 8	12 40	E, W	65 20 30·88	+ 2 30·86	61·74	61·74	0·5	0·08	0·0032
24	808 & 836 Gr. 80 " " "	Nov. 7 " 8	0 23	E, W W, E	65 29 4·07 4·05	− 6 2·33 2·44	61·74 61·61	61·68	1·0	0·14	0·0196
25	851 & 869 Gr. 80 " " "	Nov. 7 " 8	13 34	W, E E, W	65 12 7·15 7·14	+ 10 54·47 53·59	61·62 60·73	61·18	1·0	0·64	0·4096
26	915 & 943 Gr. 80 " " "	Nov. 7 " 8	7 34	E, W W, E	65 27 6·75 6·74	− 4 4·74 4·67	62·01 62·07	62·04	0·7	0·22	0·0339
27	915 & 962 Gr. 80 " " "	Nov. 7 " 8	7 49	E, W W, E	65 42 0·33 0·32	− 18 58·24 58·24	62·09 62·08	62·09	0·7	0·27	0·0510
28	1010 & 1026 Gr. 80 " " "	Nov. 7 " 8	1 20	E, W W, E	65 23 45·53 45·55	− 0 44·13 44·14	61·40 61·41	61·41	0·7	0·41	0·1177

174. Khankharia—*Co-latitude* 65° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1900	° ′		° ′ ″	′ ″	″	″			
29	1010 & 1043 Gr. 80 " " "	Nov. 7 " 8	1 24	E, W W, E	65 27 56·29 56·31	− 4 54·28 54·48	62·01 61·83	61·92	0·7	0·10	0·0070
30	1058 & 1104 Gr. 80 " " "	Nov. 7 " 8	4 38	W, E E, W	65 5 47·94 47·97	+ 17 13·44 12·99	61·38 60·96	61·17	0·7	0·65	0·2958
31	1104 & 1138 Gr. 80 " " "	Nov. 7 " 8	4 24	E, W W, E	65 19 45·58 45·63	+ 3 15·34 15·06	60·92 60·69	60·81	0·7	1·01	0·7141
32	1186 & 1197 Gr. 80 " " "	Nov. 7 " 8	0 35	W, E E, W	65 4 25·05 25·12	+ 18 36·46 36·14	61·51 61·26	61·39	1·0	0·43	0·1849
33	1227 & 1235 Gr. 80	Nov. 8	0 18	W, E	65 24 51·78	− 1 49·54	62·24	62·24	0·5	0·42	0·0882
34	1227 & 1237 Gr. 80 " " "	Nov. 7 " 8	0 23	E, W W, E	65 19 36·77 36·85	+ 3 26·77 26·52	63·54 63·37	63·46	0·7	1·64	1·8827
35	1261 & 1272 Gr. 80 " " "	Nov. 7 " 8	12 33	W, E E, W	65 35 47·97 48·05	− 12 46·44 46·45	61·53 61·60	61·57	1·0	0·25	0·0625
36	1281 & 1287 Gr. 80 " " "	Nov. 7 " 8	3 20	E, W W, E	65 1 0·53 0·61	+ 21 59·85 59·97	60·38 60·58	60·48	1·0	1·34	1·7956
37	1299 & 1311 Gr. 80 " " "	Nov. 7 " 8	7 6	W, E E, W	64 59 55·89 55·97	+ 23 4·86 4·16	60·75 60·13	60·44	1·0	1·38	1·9044
38	1324 & 1349 Gr. 80 " " "	Nov. 7 " 8	4 4	E, W W, E	65 47 48·13 48·22	− 24 45·20 46·24	62·93 61·98	62·46	1·0	0·64	0·4096
39	1363 & 1378 Gr. 80 " " "	Nov. 7 " 8	1 23	W, E E, W	65 42 39·51 39·63	− 19 37·78 37·75	61·73 61·88	61·81	0·7	0·01	0·0001
40	1378 & 1390 Gr. 80 " " "	Nov. 7 " 8	1 27	E, W W, E	65 38 20·81 20·92	− 15 18·46 18·50	62·35 62·42	62·39	0·7	0·57	0·2274
41	1397 & 1411 Gr. 80 " " "	Nov. 7 " 8	5 39	W, E E, W	65 42 0·82 0·95	− 18 59·85 59·95	60·97 61·00	60·99	1·0	0·83	0·6889
42	1431 & 1443 Newcomb " " "	Nov. 3 " 4	24 22	E, W W, E	65 30 17·80 17·78	− 7 15·65 16·45	62·15 61·33	61·74	1·0	0·08	0·0064
43	3725 Gr. 80 & 1474 Newc. " " " "	Nov. 3 " 4	12 47	E, W W, E	65 30 52·11 52·08	− 7 48·37 48·95	63·74 63·13	63·44	1·0	1·62	2·6244

174. Khankharia—*Co-latitude* 65° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
44	3759 Gr. 80 & 1488 Newc. " " " "	Nov. 3 " 4	25 9	W, E E, W	65 22 21·41 21·35	+ 0 42·33 40·82	63·74 62·17	62·96	1·0	1·14	1·2996
45	1349 & 1357 Newcomb " " "	Nov. 4 " 5	9 1	W, E E, W	65 24 50·05 50·09	− 1 48·57 48·70	61·48 61·39	61·44	1·0	0·38	0·1444
46	1385 & 1394 Newcomb " " "	Nov. 4 6	14 38	W, E W, E	65 38 20·21 20·22	− 15 18·20 16·56	62·01 63·66	62·84	0·7	1·02	0·7283
47	1553 & 1568 Newcomb " " "	Nov. 5 " 7	18 27	E, W W, E	65 43 6·36 6·20	− 20 4·97 5·77	61·39 60·49	60·94	1·0	0·88	0·7744
48	1569 & 1572 Newcomb	Nov. 5	19 21	W, E	65 33 30·19	− 10 27·71	62·48	62·48	0·7	0·66	0·3049
49	3866 & 3882 Gr. 80 " " "	Nov. 7 " 9	21 18	W, E E, W	65 25 34·33 34·25	− 2 32·68 32·94	61·65 61·31	61·48	0·7	0·34	0·0809
50	3882 & 3904 Gr. 80 " " " " " "	Nov. 5 " 7 " 9	21 34	E, W E, W W, E	65 41 56·81 56·74 56·66	− 18 54·96 54·84 54·81	61·85 61·90 61·85	61·87	0·8	0·05	0·0020
51	3908 Gr. 80 & 1552 Newc. " " " "	Nov. 7 " 9	23 53	W, E E, W	65 24 7·52 7·44	− 1 5·51 5·96	62·01 61·48	61·75	1·0	0·07	0·0049
								Σ P =	41·9	Σ Pvv	31·0652

Summary.

No. of pairs 51

No. of observations 93

Mean difference between observations taken E, W and those taken W, E = − 0″·20

Observed Co-latitude (weighted mean) 65° 23′ 1″·82 ± 0″·082

Correction for Height above Sea-level + 0″·01

Final Co-latitude 65° 23′ 1″·83

		°	′	″	″
Astronomical Latitude (A)	=	24	36	58·17	± 0·082
Geodetic Latitude (G)	=	24	36	56·19	
Deflection of plumb-line (A−G)	=		+	1·98	

175. Khanpisura 2nd visit*—*Co-latitude* 71° 14′ +

Latitude	... 18° 46′	*Instrument*—Zenith Telescope	
Longitude	... 74 49	*Mean Height of Barometer*	in. 27·23
Height	... 2751 feet	*Mean Temperature*	65°·3

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	51 Dy. 75 & 386 Gr. 80 „ „ „ „	Jan. 14 „ 17	12 29	E, W W, E	71 9 3·19 3·30	+ 5 35·13 36·55	38·3 39·8	39·0	1·0	1·6	2·56
2	896 & 405 Gr. 80 „ „ „	Jan. 14 „ 17	8 10	W, E E, W	71 33 18·90 19·00	− 18 41·86 41·45	37·0 37·5	37·2	1·0	0·2	0·04
3	414 & 433 Gr. 80 „ „ „	Jan. 14 „ 17	10 26	E, W W, E	71 37 18·55 18·64	− 22 40·49 40·63	38·1 38·0	38·0	1·0	0·6	0·36
4	444 & 467 Gr. 80 „ „ „	Jan. 14 „ 17	1 43	W, E E, W	70 48 31·95 32·04	+ 26 5·49 5·62	37·4 37·7	37·5	0·7	0·1	0·01
5	467 & 488 Gr. 80 „ „ „	Jan. 14 „ 17	1 36	E, W W, E	70 56 28·15 28·23	+ 18 9·74 8·82	37·9 37·0	37·4	0·7	0·0	0·00
6	69 Dy. 75 & 539 Gr. 80 „ „ „ „	Jan. 14 „ 17	6 21	W, E E, W	71 4 30·70 30·75	+ 10 8·15 7·51	38·8 38·3	38·5	0·7	1·1	0·85
7	539 & 562 Gr. 80 „ „ „	Jan. 14 „ 17	6 13	E, W W, E	71 13 18·49 18·53	+ 1 19·13 18·51	37·6 37·0	37·3	0·7	0·1	0·01
8	597 & 610 Gr. 80 „ „ „	Jan. 14 „ 17	20 45	E, W W, E	71 2 16·17 16·19	+ 12 23·19 20·[illegible]	39·4 37·0	38·2	0·7	0·8	0·45
9	610 & 626 Gr. 80 „ „ „	Jan. 14 „ 17	20 47	W, E E, W	71 4 22·57 22·10	+ 10 16·49 14·69	39·1 36·8	37·9	0·7	0·5	0·18
10	633 & 664 Gr. 80 „ „ „	Jan. 14 „ 17	3 18	E, W W, E	71 34 19·13 19·17	− 19 42·41 42·21	36·7 37·0	36·8	1·0	0·6	0·36
11	682 & 694 Gr. 80 „ „ „	Jan. 14 „ 17	5 9	W, E E, W	71 5 3·50 3·53	+ 9 35·23 35·06	38·7 38·6	38·6	1·0	1·2	1·44
12	704 & 717 Gr. 80 „ „ „	Jan. 14 „ 17	3 35	W, E E, W	71 0 39·62 39·65	+ 13 57·07 57·96	36·7 37·6	37·1	1·0	0·3	0·09

* For the 1st visit to this station *see* No. 52, Volume XI of the *Account of the Operations &c.*

175. Khanpisura 2nd visit—*Co-latitude* 71° 14′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
13	727 & 754 Gr. 80 " " "	Jan. 14 " 17	4 4	E, W W, E	71 18 46·46 46·48	− 4 8·57 9·13	37·9 37·3	37·6	1·0	0·2	0·04
14	590 Gr. 64 & 792 Gr. 80 " " " "	Jan. 14 " 17	4 55	W, E E, W	71 1 8·85 8·87	+ 13 28·00 26·97	36·8 35·8	36·3	1·0	1·1	1·21
15	803 Gr. 80 & 622 Gr. 64 " " " "	Jan. 14 " 17	5 13	E, W W, E	71 26 6·31 6·33	− 11 28·60 28·03	37·7 38·3	38·0	1·0	0·6	0·36
16	823 & 846 Gr. 80 " " "	Jan. 14 " 17	2 59	E, W W, E	71 32 58·39 58·40	− 18 21·12 21·17	37·3 37·2	37·2	0·7	0·2	0·03
17	846 & 877 Gr. 80 " " "	Jan. 14 " 17	3 16	W, E E, W	71 16 31·33 31·34	− 1 53·15 53·88	38·2 37·5	37·8	0·7	0·4	0·11
18	898 & 928 Gr. 80 " " "	Jan. 14 " 17	9 33	E, W W, E	71 1 53·50 53·52	+ 12 44·00 44·53	37·5 38·0	37·7	1·0	0·3	0·09
19	943 & 946 Gr. 80 " " "	Jan 14 " 17	2 4	W, E E, W	70 58 22·51 22·51	+ 16 15·25 14·98	37·8 37·5	37·6	0·7	0·2	0·03
20	946 & 962 Gr. 80 " " "	Jan. 14 " 17	2 18	E, W W, E	71 13 14·76 14·77	+ 1 22·72 22·32	37·5 37·1	37·3	0·7	0·1	0·01
21	977 & 995 Gr. 80	Jan. 17	1 18	E, W	71 1 1·57	+ 13 35·56	37·1	37·1	0·7	0·3	0·06
22	1021 & 1037 Gr. 80 " " "	Jan. 12 " 13	3 49	W, E E, W	71 24 32·12 32·12	− 9 56·50 55·16	35·6 37·0	36·3	0·7	1·1	0·85
23	1037 & 1043 Gr. 80 " " "	Jan. 12 " 13	4 11	E, W W, E	71 2 33·28 33·28	+ 12 3·05 3·97	36·3 37·2	36·7	0·7	0·7	0·34
24	1053 & 1057 Gr. 80 " " "	Jan. 12 " 13	4 9	W, E E, W	71 36 48·06 48·08	− 22 11·65 11·00	36·4 37·1	36·7	1·0	0·7	0·49
25	1099 Gr. 80 & 637 Gr. 64 " " " "	Jan. 12 " 13	11 28	E, W W, E	70 53 28·79 28·80	+ 21 8·33 8·07	37·1 36·9	37·0	1·0	0·4	0·16
26	116 & 1168 Gr. 80 " " "	Jan. 12 " 13	6 7	W, E E, W	70 52 29·14 29·15	+ 22 8·36 7·64	37·5 36·8	37·1	1·0	0·3	0·09
27	1179 & 1187 Gr. 80 " " "	Jan. 12 " 13	2 47	E, W W, E	70 53 34·84 34·86	+ 21 2·18 2·68	37·0 37·5	37·2	1·0	0·2	0·04
28	1184 & 1197 Gr. 80 " " "	Jan. 12 " 13	5 32	W, E E, W	71 9 29·20 29·21	+ 5 8·95 7·22	38·1 36·4	37·2	1·0	0·2	0·04
29	1206 & 1218 Gr. 80 " " "	Jan. 12 " 13	2 19	E, W W, E	71 35 4·52 4·54	− 20 26·54 27·11	38·0 37·4	37·7	1·0	0·3	0·09
30	1233 Gr. 80 & 716 Gr. 72 " " " "	Jan. 12 " 13	2 9	W, E E, W	71 30 21·00 21·02	− 15 43·96 44·25	37·0 36·8	36·9	1·0	0·5	0·25
31	1271 & 1285 Gr. 80 " " "	Jan. 12 " 13	9 27	E, W W, E	71 25 21·62 21·64	− 10 43·08 44·47	38·5 37·2	37·8	0·7	0·4	0·11

175. Khanpisura 2nd visit—*Co-latitude* 71° 14′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
32	1285 & 1289 Gr. 80	Jan. 12	9 30	W, E	71 21 34·97	− 6 56·74	38·2				
	" " "	" 13		E, W	35·00	57·86	37·1	37·6	0·7	0·2	0·03
33	937 Gr. 64 & 1309 Gr. 80	Jan. 12	16 21	E, W	71 30 48·15	− 16 11·36	36·8				
	" " " "	" 13		W, E	48·18	11·22	37·0	36·9	1·0	0·5	0·25
34	758 & 764 Gr. 72	Jan. 12	7 30	E, W	71 27 53·84	− 13 17·22	36·6				
	" " "	" 13		W, E	53·87	17·71	36·2	36·4	1·0	1·0	1·00
35	1349 & 1365 Gr. 80	Jan. 12	1 17	W, E	71 6 55·30	+ 7 43·34	38·6				
	" " "	" 13		E, W	55·33	42·83	38·2	38·4	1·0	1·0	1·00
36	1378 Gr. 80 & 801 Gr. 72	Jan. 12	4 19	E, W	71 22 1·79	− 7 24·22	37·6				
	" " " "	" 13		W, E	1·82	24·80	37·0	37·3	1·0	0·1	0·01
37	1402 & 1405 Gr. 80	Jan. 12	9 2	W, E	71 27 35·18	− 12 56·95	38·2				
	" " "	" 13		E, W	35·22	57·55	37·7	37·9	1·0	0·5	0·25
38	1413 & 1442 Gr. 80	Jan. 12	1 17	E, W	71 19 17·02	− 4 39·18	37·8				
	" " "	" 13		W, E	17·07	38·55	38·5	38·1	1·0	0·7	0·49
39	1450 & 1453 Gr. 80	Jan. 12	14 44	W, E	71 33 12·59	− 18 36·75	35·8				
	" " "	" 13		E, W	12·64	34·71	37·9	36·8	1·0	0·6	0·36
40	1480 & 1489 Gr. 80	Jan. 12	12 23	E, W	71 23 27·54	− 8 49·69	37·8				
	" " "	" 13		W, E	27·59	49·31	38·3	38·0	0·7	0·6	0·25
41	1489 & 1493 Gr. 80	Jan. 12	12 19	W, E	71 19 51·74	− 5 13·82	37·9				
	" " "	" 13		E, W	51·79	14·20	37·6	37·7	0·7	0·3	0·06
42	1504 & 1511 Gr. 80	Jan. 12	6 19	E, W	71 25 36·62	− 10 59·33	37·3				
	" " "	" 13		W, E	36·68	58·97	37·7	37·5	1·0	0·1	0·01
43	1524 & 1533 Gr. 80	Jan. 12	3 32	W, E	71 2 49·91	+ 11 45·74	35·6				
	" " "	" 13		E, W	49·97	46·84	36·8	36·2	0·7	1·2	1·01
44	1538 & 1536 Gr. 80	Jan. 12	3 9	E, W	71 25 27·95	− 10 51·46	36·5				
	" " "	" 13		W, E	28·01	50·50	37·5	37·0	0·7	0·4	0·11
45	1536 & 1541 Gr. 80	Jan. 12	3 10	W, E	71 26 43·58	− 12 6·35	37·2				
	" " "	" 13		E, W	43·64	6·34	37·3	37·2	0·7	0·2	0·03
46	1554 & 1572 Gr. 80	Jan. 16	6 56	E, W	71 17 35·78	− 2 58·20	37·6	37·6	0·7	0·2	0·03
47	1584 & 1599 Gr. 80	Jan. 15	11 35	E, W	71 6 33·97	+ 8 5·15	39·1				
	" " "	" 16		W, E	34·04	4·02	38·1	38·6	1·0	1·2	1·44
48	1606 & 1632 Gr. 80	Jan. 15	5 40	W, E	71 23 21·74	− 8 44·89	36·8				
	" " "	" 16		E, W	21·82	43·91	37·9	37·3	1·0	0·1	0·01
49	1667 & 1668 Gr. 80	Jan. 15	4 42	W, E	71 2 54·30	+ 11 42·85	37·1				
	" " "	" 16		E, W	54·39	42·14	36·5	36·8	1·0	0·6	0·36
50	1674 & 1714 Gr. 80	Jan. 15	1 51	W, E	71 28 2·25	− 13 24·31	37·9				
	" " "	" 16		E, W	2·34	25·43	36·9	37·4	1·0	0·0	0·00

175. Khanpisura 2nd visit—*Co-latitude* 71° 14′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
51	1728 & 1729 Gr. 80	Jan. 15	12 10	W, E	70 54 34·09	+ 20 3·38	37·5				
	" " "	" 16		W, E	34·19	2·72	36·9	37·2	1·0	0·2	0·04
52	1743 & 1777 Gr. 80	Jan. 15	16 8	E, W	71 20 13·40	− 5 36·22	37·2	37·2	0·7	0·2	0·03
53	1791 & 1816 Gr. 80	Jan. 15	2 2	W, E	70 55 26·86	+ 19 10·74	37·6				
	" " "	" 16		E, W	26·98	9·54	36·5	37·0	1·0	0·4	0·16
54	1827 Gr. 80	Jan. 15	0 14	W, E	71 0 9·34	+ 14 28·80	38·1	38·1	0·7	0·7	0·34
55	1831 & 1850 Gr. 80	Jan. 15	3 30	E, W	71 32 51·92	− 18 14·82	37·1				
	" " "	" 16		W, E	52·05	13·58	38·5	37·8	1·0	0·4	0·16
56	1862 & 1874 Gr. 80	Jan. 15	2 17	W, E	71 28 26·11	− 13 48·47	37·6				
	" " "	" 16		E, W	26·25	48·67	37·6	37·6	1·0	0·2	0·04
57	1884 & 1908 Gr. 80	Jan. 15	3 36	E, W	70 54 34·06	+ 20 3·30	37·4				
	" " "	" 16		W, E	34·19	3·55	37·7	37·5	1·0	0·1	0·01
								ΣP = 50·1		ΣPvv = 18·23	

Summary.

No. of pairs 57
No. of observations 110

Mean difference between observations taken E, W and those taken W, E = + 0″·08

Observed Co-latitude (weighted mean) 71° 14′ 37″·43 ± 0″·055

Correction for Height above Sea-level + 0″·09

Final Co-latitude 71° 14′ 37″·52

		°	′	″	″
Astronomical Latitude (A)	=	18	45	22·48	± 0·055
Geodetic Latitude (G)	=	18	45	30·65	
Deflection of plumb-line (A−G)	=		−	8·17	

176. Khirsar—*Co-latitude* 61° 30′ +

Latitude ... 28° 30′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 72 42 *Mean Height of Barometer* 29·42 in.

Height ... 603 feet *Mean Temperature* 67°·3

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1893	° ′		° ′ ″	′ ″	″	″			
1	241 & 268 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	19 47	E, W W, E	61 35 40·90 40·86	− 5 25·98 25·62	14·92 15·24	15·08	0·7	1·14	0·9097
2	247 & 268 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	19 44	E, W W, E	61 38 23·53 23·49	− 8 8·25 7·33	15·28 16·16	15·72	0·7	0·50	0·1750
3	290 & 291 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	8 14	W, E E, W	61 28 24·38 24·34	+ 1 50·99 50·76	15·37 15·10	15·23	0·7	0·99	0·6861
4	290 & 294 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	8 14	W, E E, W	61 29 11·49 11·45	+ 1 3·13 5·14	14·61 16·59	15·60	0·7	0·62	0·2691
5	326 & 329 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	5 46	E, W W, E	61 16 25·42 25·37	+ 13 50·99 51·32	16·41 16·69	16·55	1·0	0·33	0·1089
6	351 & 368 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	18 23	W, E E, W	61 29 12·23 12·17	+ 1 5·25 4·92	17·48 17·09	17·28	1·0	1·06	1·1236
7	374 & 401 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	11 16	E, W W, E	61 30 25·31 25·23	− 0 7·08 12·17	18·23 13·06	15·64	0·7	0·58	0·2355
8	401 & 418 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	11 22	W, E E, W	61 36 46·36 46·28	− 6 28·55 30·22	17·81 16·06	16·93	0·7	0·71	0·3529
9	431 & 438 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	10 40	E, W W, E	61 25 37·04 36·95	+ 4 39·96 40·58	17·00 17·53	17·26	0·7	1·04	0·7571
10	432 & 438 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	10 49	E, W W, E	61 34 40·16 40·08	− 4 24·73 24·02	15·43 16·06	15·74	0·7	0·48	0·1613
11	460 & 475 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	9 34	W, E E, W	61 7 9·99 9·90	+ 23 5·00 8·08	14·99 17·98	16·48	1·0	0·26	0·0676
12	499 & 531 Gr. 80 ,, ,, ,,	Dec. 18 ,, 20	5 42	E, W W, E	61 51 38·25 38·15	− 21 23·16 21·50	15·09 16·65	15·87	1·0	0·35	0·1225

176. Khirsar—*Co-latitude* 61° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
13	543 & 556 Gr. 80	Dec. 18	34 10	W, E	61 16 49·49	+ 13 26·66	16·15				
	" " "	" 20		E, W	49·39	28·44	17·83	16·99	1·0	0·77	0·5929
14	564 & 574 Gr. 80	Dec. 18	38 30	E, W	61 37 27·31	− 7 12·07	15·24				
	" " "	" 20		W, E	27·21	10·72	16·49	15·86	1·0	0·36	0·1296
15	601 & 606 Gr. 80	Dec. 18	32 4	W, E	61 12 6·08	+ 18 9·70	15·78				
	" " "	" 20		E, W	5·98	11·39	17·37	16·57	0·7	0·35	0·0858
16	601 & 607 Gr. 80	Dec. 18	32 4	W, E	61 12 9·09	+ 18 6·77	15·86				
	" " "	" 20		E, W	8·99	8·24	17·23	16·54	0·7	0·32	0·0717
17	613 & 630 Gr. 80	Dec. 18	6 51	E, W	61 21 29·11	+ 8 47·91	17·02				
	" " "	" 20		W, E	29·00	48·03	17·03	17·02	0·7	0·80	0·4480
18	613 & 633 Gr. 80	Dec. 20	6 53	W, E	61 23 34·15	+ 6 43·02	17·17	17·17	0·5	0·95	0·4513
19	613 & 634 Gr. 80	Dec. 18	6 52	E, W	61 22 9·54	+ 8 8·09	17·63				
	" " "	" 20		W, E	9·44	7·36	16·80	17·21	0·7	0·99	0·6861
20	623 & 630 Gr. 80	Dec. 18	6 37	E, W	61 35 32·70	− 5 17·28	15·42				
	" " "	" 20		W, E	32·60	15·48	17·12	16·27	0·7	0·05	0·0018
21	623 & 633 Gr. 80	Dec. 18	6 39	E, W	61 37 37·84	− 7 21·28	16·56				
	" " "	" 20		W, E	37·75	20·48	17·27	16·91	0·7	0·69	0·3333
22	623 & 634 Gr. 80	Dec. 18	6 38	E, W	61 36 13·13	− 5 57·09	16·04				
	" " "	" 20		W, E	13·04	56·13	16·91	16·47	0·7	0·25	0·0438
23	643 & 646 Gr. 80	Dec. 18	9 13	W, E	61 27 6·81	+ 3 9·77	16·58				
	" " "	" 20		E, W	6·71	10·82	17·53	17·05	1·0	0·83	0·6889
24	664 & 675 Gr. 80	Dec. 18	13 13	E, W	61 39 13·36	− 8 57·58	15·78				
	" " "	" 20		W, E	13·26	58·05	15·21	15·49	1·0	0·73	0·5329
25	675 & 680 Gr. 80	Dec. 18	13 6	W, E	61 32 8·11	− 1 50·46	17·65				
	" " "	" 20		E, W	8·01	52·99	15·02	16·33	1·0	0·11	0·0121
26	693 & 704 Gr. 80	Dec. 18	5 40	E, W	61 46 6·13	− 15 51·16	14·97				
	" " "	" 20		W, E	6·03	49·88	16·15	15·56	0·7	0·66	0·3049
27	695 & 707 Gr. 80	Dec. 18	5 29	E, W	61 45 39·55	− 15 24·23	15·32	15·32	0·5	0·90	0·4050

176. Khirsar—*Co-latitude* 61° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = p	v	pvv
		1893	° ′		° ′ ″	′ ″	″	″			
28	693 & 707 Gr. 80	Dec. 20	5 34	W, E	61 40 34·18	− 10 18·78	15·40	15·40	0·5	0·82	0·3362
29	695 & 704 Gr. 80 " " "	Dec. 18 " 20	5 35	E, W W, E	61 51 11·39 11·29	− 20 55·12 56·53	16·27 14·76	15·51	0·7	0·71	0·3529
30	717 & 731 Gr. 80 " " "	Dec. 18 " 20	12 50	W, E E, W	61 46 15·42 15·32	− 15 59·43 59·44	15·99 15·88	15·93	0·7	0·29	0·0589
31	719 & 731 Gr. 80 " " "	Dec. 18 " 20	12 48	W, E E, W	61 44 36·62 36·52	− 14 19·77 20·70	16·85 15·82	16·33	0·7	0·11	0·0085
32	750 Gr. 80 " "	Dec. 18 " 20	0 6	E, W W, E	61 35 17·70 17·60	− 5 1·07 1·95	16·63 15·65	16·14	1·0	0·08	0·0064
33	234 & 244 Gr. 80 " " "	Dec. 19 " 21	12 14	E, W W, E	61 21 22·78 22·77	+ 8 54·68 52·81	17·46 15·58	16·52	0·7	0·30	0·0630
34	244 & 253 Gr. 80 " " "	Dec. 19 " 21	12 32	W, E E, W	61 37 32·78 32·76	− 7 17·26 17·59	15·52 15·17	15·34	0·7	0·88	0·5421
35	300 & 348 Gr. 80 " " "	Dec. 19 " 21	5 20	W, E E, W	61 35 17·50 17·46	− 5 2·56 0·13	14·94 17·33	16·13	0·7	0·09	0·0057
36	301 & 348 Gr. 80 " " "	Dec. 19 " 21	5 20	W, E E, W	61 35 4·70 4·66	− 4 49·67 47·75	15·03 17·91	16·47	0·7	0·25	0·0438
37	358 & 368 Gr. 80 " " "	Dec. 19 " 21	0 32	E, W W, E	61 19 20·87 20·81	+ 10 55·95 55·75	16·82 16·56	16·69	1·0	0·47	0·2209
38	376 & 394 Gr. 80 " " "	Dec. 19 " 21	7 6	W, E E, W	61 24 25·95 25·89	+ 5 49·86 52·15	15·81 18·04	16·92	1·0	0·70	0·4900
39	404 & 433 Gr. 80 " " "	Dec. 19 " 21	20 25	E, W W, E	61 37 46·97 46·89	− 7 30·98 31·88	15·99 15·01	15·50	1·0	0·72	0·5184
40	467 & 472 Gr. 80 " " "	Dec. 19 " 21	10 53	W, E E, W	61 39 26·82 26·73	− 9 10·84 11·73	15·98 15·00	15·49	1·0	0·73	0·5329
41	479 & 497 Gr. 80 " " "	Dec. 19 " 21	37 36	E, W W, E	61 36 40·78 40·69	− 6 26·08 24·43	14·70 16·26	15·48	1·0	0·74	0·5476
42	523 & 525 Gr. 80 " " "	Dec. 19 " 21	20 2	W, E E, W	61 19 22·42 22·32	+ 10 53·95 54·25	16·37 16·57	16·47	1·0	0·25	0·0625

176. Khirsar—*Co-latitude* 61° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
43	546 & 551 Gr. 80	Dec. 19	19 25	E, W	61 34 11·68	− 3 55·47	16·21				
	" " "	" 21		W, E	11·58	55·24	16·34	16·27	1·0	0·05	0·0025
44	562 & 571 Gr. 80	Dec. 19	3 29	W, E	61 31 39·96	− 1 23·72	16·24				
	" " "	" 21		E, W	39·86	23·74	16·12	16·18	1·0	0·04	0·0016
45	603 & 610 Gr. 80	Dec. 19	11 21	E, W	61 38 23·57	− 8 9·27	14·30				
	" " "	" 21		W, E	23·46	6·52	16·94	15·62	1·0	0·60	0·3600
46	640 & 696 Gr. 80	Dec. 19	19 7	W, E	61 40 32·34	− 10 16·11	16·23				
	" " "	" 21		E, W	32·24	16·69	15·55	15·89	1·0	0·33	0·1089
47	720 & 727 Gr. 80	Dec. 19	14 6	E, W	61 16 59·33	+ 13 17·35	16·68				
	" " "	" 21		W, E	59·23	18·26	17·49	17·08	0·7	0·86	0·5177
48	721 & 727 Gr. 80	Dec. 19	14 7	E, W	61 16 5·01	+ 14 12·22	17·23				
	" " "	" 21		W, E	4·90	11·66	16·56	16·89	0·7	0·67	0·3142
								Σ P = 39·0		Σ Pvv = 14·8521	

Summary.

No. of pairs	48
No. of observations	93

Mean difference between observations taken E, W and those taken W, E = + 0″·10

Observed Co-latitude (weighted mean) 61° 30′ 16″·22 ± 0″·061

Correction for Height above Sea-level + 0″·03

Final Co-latitude 61° 30′ 16″·25

		°	′	″	″
Astronomical Latitude (A)	=	28	29	43·75	± 0·061
Geodetic Latitude (G)	=	28	29	40·91	
Deflection of plumb-line (A−G)	=		+	2·84	

177. Khori—*Co-latitude* 64° 59′ +

Latitude ... 25° 1′ *Instrument*—Zenith Telescope

Longitude ... 69 6 *Mean Height of Barometer* 30·04 in.

Height ... 63 feet *Mean Temperature* 57°·5

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
1	97 & 108 Newcomb	Jan. 20	16 8	W, E	65 12 44·81	− 13 15·62	29·19				
	,, ,, ,,	,, 21		E, W	44·89	15·29	29·60	29·40	1·0	0·00	0·0000
2	118 & 121 Newcomb	Jan. 20	4 23	E, W	65 17 13·43	− 17 43·94	29·49				
	,, ,, ,,	,, 21		W, E	13·49	43·71	29·78	29·64	1·0	0·24	0·0576
3	296 & 317 Gr. 80	Jan. 18	7 44	E, W	64 55 36·73	+ 3 52·43	29·16				
	,, ,, ,,	,, 20		W, E	36·87	53·10	29·97				
	,, ,, ,,	,, 21		E, W	36·93	52·57	29·50	29·65	1·2	0·25	0·0750
4	334 & 339 Gr. 80	Jan. 20	4 33	E, W	64 42 18·52	+ 17 10·75	29·27				
	,, ,, ,,	,, 21		W, E	18·58	10·73	29·31	29·29	1·0	0·11	0·0121
5	141 & 155 Newcomb	Jan. 18	8 4	E, W	64 40 11·86	+ 19 18·21	30·07				
	,, ,, ,,	,, 20		W, E	11·98	15·66	27·64				
	,, ,, ,,	,, 21		E, W	12·03	16·84	28·87	28·56	1·2	0·84	0·8467
6	161 Newc. & 414 Gr. 80	Jan. 18	3 39	W, E	64 48 47·58	+ 10 40·87	28·45				
	,, ,, ,, ,,	,, 20		W, E	47·67	41·62	29·29				
	,, ,, ,, ,,	,, 21		E, W	47·72	41·72	29·44	29·16	0·8	0·24	0·0461
7	414 Gr. 80 & 185 Newc.	Jan. 18	3 57	E, W	65 6 28·20	− 6 58·09	30·11				
	,, ,, ,, ,,	,, 20		E, W	28·29	59·21	29·08				
	,, ,, ,, ,,	,, 21		W, E	28·34	58·83	29·51	29·56	0·8	0·16	0·0205
8	471 Gr. 80 & 203 Newc.	Jan. 18	4 1	W, E	65 18 36·34	− 19 6·77	29·57				
	,, ,, ,, ,,	,, 20		W, E	36·41	6·59	29·82				
	,, ,, ,, ,,	,, 21		E, W	36·45	6·64	29·81	29·76	0·8	0·36	0·1037
9	471 Gr. 80 & 209 Newc.	Jan. 18	3 58	W, E	65 15 13·73	− 15 44·25	29·48				
	,, ,, ,, ,,	,, 20		W, E	13·80	44·05	29·75				
	,, ,, ,, ,,	,, 21		E, W	13·84	43·70	30·14	29·88	0·8	0·48	0·1843
10	211 & 224 Newcomb	Jan. 18	24 43	E, W	65 12 1·65	− 12 32·09	29·56				
	,, ,, ,,	,, 20		E, W	1·71	31·69	30·02				
	,, ,, ,,	,, 21		W, E	1·73	31·98	29·75	29·77	1·2	0·37	0·1643
11	589 Gr. 80 & 248 Newc.	Jan. 20	14 27	W, E	64 43 3·93	+ 16 25·87	29·80				
	,, ,, ,, ,,	,, 21		E, W	3·94	25·79	29·73	29·77	1·0	0·37	0·1369
12	256 & 258 Newcomb	Jan. 18	3 28	W, E	64 43 35·48	+ 15 53·69	29·17				
	,, ,, ,,	,, 20		E, W	35·51	53·50	29·01				
	,, ,, ,,	,, 21		W, E	35·52	53·52	29·04	29·06	1·2	0·34	0·1387

177. Khori—*Co-latitude* 64° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
13	273 & 283 Newcomb ,, ,, ,, ,, ,, ,,	Jan. 18 ,, 20 ,, 21	9 27	E, W W, E E, W	65 7 28·81 28·83 28·84	− 7 59·53 59·59 59·44	29·28 29·24 29·40	29·29	1·2	0·11	0·0145
14	740 & 776 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	12 30	E, W W, E	65 11 13·15 13·14	− 11 44·10 42·76	29·05 30·38	29·72	0·7	0·32	0·0717
15	749 & 776 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	12 39	E, W W, E	65 20 29·58 29·58	− 20 59·86 59·30	29·72 30·28	30·00	0·7	0·60	0·2520
16	305 & 313 Newcomb ,, ,, ,,	Jan. 22 ,, 23	19 7	W, E E, W	65 26 37·26 37·25	− 27 7·02 7·25	30·24 30·00	30·12	1·0	0·72	0·5184
17	327 Newc. & 869 Gr. 80 ,, ,, ,, ,,	Jan. 22 ,, 23	13 35	W, E E, W	65 12 6·25 6·25	− 12 36·65 36·85	29·60 29·40	29·50	1·0	0·10	0·0100
18	343 Newc. & 902 Gr. 80 ,, ,, ,, ,,	Jan. 22 ,, 23	3 20	E, W W, E	64 48 44·53 44·52	+ 10 44·88 45·18	29·41 29·70	29·56	1·0	0·16	0·0256
19	348 Newc. & 943 Gr. 80 ,, ,, ,, ,,	Jan. 22 ,, 23	7 35	W, E E, W	65 27 6·35 6·33	− 27 36·82 36·16	29·53 30·17	29·85	0·7	0·45	0·1418
20	348 & 371 Newcomb ,, ,, ,,	Jan. 22 ,, 23	7 13	W, E E, W	65 5 43·08 43·06	− 6 14·66 12·40	28·42 30·66	29·54	0·7	0·14	0·0137
21	387 & 394 Newcomb ,, ,, ,,	Jan. 22 ,, 23	20 24	E, W W, E	65 27 1·01 1·00	− 27 31·17 31·14	29·84 29·86	29·85	0·7	0·45	0·1418
22	387 & 415 Newcomb ,, ,, ,,	Jan. 22 ,, 23	20 9	E, W W, E	65 12 39·21 39·19	− 13 9·31 10·01	29·90 29·18	29·54	0·7	0·14	0·0137
23	426 & 430 Newcomb ,, ,, ,,	Jan. 22 ,, 23	14 45	W, E E, W	65 16 8·61 8·59	− 16 39·47 38·58	29·14 30·01	29·58	1·0	0·18	0·0324
24	440 & 458 Newcomb ,, ,, ,,	Jan. 22 ,, 23	9 0	E, W W, E	64 55 2·65 2·63	+ 4 26·70 26·60	29·35 29·23	29·29	0·7	0·11	0·0085
25	440 & 464 Newcomb ,, ,, ,,	Jan. 22 ,, 23	8 53	E, W W, E	64 47 53·97 53·94	+ 11 34·76 35·04	28·73 28·98	28·86	0·7	0·54	0·2041
26	468 & 479 Newcomb ,, ,, ,,	Jan. 22 ,, 23	16 17	E, W W, E	65 13 42·56 42·55	− 14 12·91 13·28	29·65 29·27	29·46	0·7	0·06	0·0025
27	475 & 479 Newcomb ,, ,, ,,	Jan. 22 ,, 23	16 11	E, W W, E	65 19 35·26 35·22	− 20 6·37 5·79	28·89 29·43	29·16	0·7	0·24	0·0403
28	484 Newc. & 1311 Gr. 80 ,, ,, ,, ,,	Jan. 22 ,, 23	7 7	W, E E, W	64 59 59·08 59·06	− 0 30·29 29·97	28·79 29·09	28·94	1·0	0·46	0·2116
29	498 & 511 Newcomb ,, ,, ,,	Jan. 22 ,, 23	8 48	W, E E, W	65 8 46·79 46·77	− 9 17·57 16·59	29·22 30·18	29·70	1·0	0·30	0·0900
30	517 & 521 Newcomb	Jan. 24	3 7	E, W	65 1 57·91	− 2 28·76	29·15	29·15	0·5	0·25	0·0313

177. Khori—*Co-latitude* 64° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
31	521 & 531 Newcomb	Jan. 24	2 51	W, E	65 17 58·88	− 18 29·37	29·51				
	„ „ „	„ 25		E, W	58·87	29·30	29·57	29·54	0·7	0·14	0·0137
32	533 & 547 Newcomb	Jan. 24	18 44	E, W	65 13 33·76	− 14 5·27	28·49				
	„ „ „	„ 25		W, E	33·74	4·36	29·38	28·94	0·7	0·46	0·1481
33	533 & 559 Newcomb	Jan. 24	18 22	E, W	64 51 34·34	+ 7 55·99	30·33				
	„ „ „	„ 25		W, E	34·33	55·00	29·33	29·83	0·7	0·43	0·1294
34	578 & 583 Newcomb	Jan. 24	13 54	E, W	65 2 48·44	− 3 18·63	29·81				
	„ „ „	„ 25		W, E	48·45	19·11	29·34	29·58	1·0	0·18	0·0324
35	1565 & 1571 Gr. 80	Jan. 24	1 36	W, E	64 59 52·18	− 0 22·89	29·29				
	„ „ „	„ 25		E, W	52·19	22·61	29·58	29·44	1·0	0·04	0·0016
36	1585 Gr. 80 & 623 Newc.	Jan. 24	0 27	E, W	65 19 54·94	− 20 25·33	29·61				
	„ „ „ „	„ 25		W, E	54·95	25·82	29·13	29·37	1·0	0·03	0·0009
37	634 & 638 Newcomb	Jan. 24	16 31	W, E	64 58 52·89	+ 0 36·32	29·21				
	„ „ „	„ 25		E, W	52·92	36·04	28·96	29·09	1·0	0·31	0·0961
38	641 Newc. & 1662 Gr. 80	Jan. 24	7 22	E, W	65 24 8·00	− 24 39·62	28·38				
	„ „ „ „	„ 25		W, E	8·02	38·98	29·04	28·71	1·0	0·69	0·4761
39	657 & 673 Newcomb	Jan. 24	17 16	W, E	65 16 27·62	− 16 58·18	29·44				
	„ „ „	„ 25		E, W	27·64	58·66	28·98	29·21	1·0	0·19	0·0361
40	683 & 694 Newcomb	Jan. 24	0 47	E, W	65 30 45·94	− 31 16·73	29·21				
	„ „ „	„ 25		W, E	45·98	16·34	29·64	29·43	1·0	0·03	0·0009
41	699 & 708 Newcomb	Jan. 29	20 27	W, E	65 24 45·55	− 25 15·63	29·92	29·92	0·7	0·52	0·1893
42	713 & 718 Newcomb	Jan. 27	8 50	E, W	65 12 9·26	− 12 40·23	29·03				
	„ „ „	„ 29		W, E	9·34	39·76	29·58	29·31	1·0	0·09	0·0081
43	720 & 728 Newcomb	Jan. 27	18 34	W, E	64 51 39·12	+ 7 50·19	29·31				
	„ „ „	„ 29		E, W	39·21	50·51	29·72	29·52	0·7	0·12	0·0101
44	728 & 739 Newcomb	Jan. 27	18 19	E, W	64 36 17·13	+ 23 11·78	28·91				
	„ „ „	„ 29		W, E	17·21	12·56	29·77	29·34	0·7	0·06	0·0025
45	758 & 768 Newcomb	Jan. 27	15 58	W, E	64 45 29·67	+ 13 58·91	28·58				
	„ „ „	„ 29		E, W	29·81	60·12	29·93	29·26	1·0	0·14	0·0196
46	783 & 787 Newcomb	Jan. 27	3 41	E, W	64 52 25·65	+ 7 3·06	28·71				
	„ „ „	„ 29		W, E	25·80	3·20	29·00	28·86	1·0	0·54	0·2916
47	791 & 807 Newcomb	Jan. 27	16 51	W, E	64 57 0·79	+ 2 28·89	29·68				
	„ „ „	„ 29		E, W	0·94	28·55	29·49	29·59	0·7	0·19	0·0253
48	798 & 807 Newcomb	Jan. 27	16 36	W, E	65 11 17·46	− 11 48·14	29·32				
	„ „ „	„ 29		E, W	17·61	48·00	29·61	29·47	0·7	0·07	0·0034
49	818 & 821 Newcomb	Jan. 27	13 41	W, E	64 49 58·91	+ 9 30·35	29·26				
	„ „ „	„ 29		E, W	59·09	29·67	28·76	29·01	0·7	0·39	0·1065

177. Khori—*Co-latitude* 64° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
50	821 & 828 Newcomb " " "	Jan 27 " 29	13 46	E, W W, E	64 44 49·32 49·51	+ 14 39·72 39·38	29·04 28·89	28·97	0·7	0·43	0·1294
51	852 & 866 Newcomb " " "	Jan. 27 " 29	24 57	E, W W, E	65 8 45·18 45·40	− 9 15·98 16·15	29·20 29·25	29·23	1·0	0·17	0·0289
52	2173 & 2176 Gr. 80	Jan. 27	2 54	W, E	64 55 36·02	+ 3 52·86	28·88	28·88	0·5	0·52	0·1352
53	2176 Gr. 80 & 880 Newc. " " " "	Jan. 27 " 29	2 51	E, W W, E	64 58 58·74 58·99	+ 0 30·72 29·92	29·46 28·91	29·19	0·7	0·21	0·0309
54	893 & 910 Newcomb " " "	Jan. 27 " 29	5 34	E, W W, E	64 45 10·17 10·46	+ 14 18·58 18·75	28·75 29·21	28·98	0·7	0·42	0·1235
55	905 & 910 Newcomb " " "	Jan. 27 " 29	5 34	E, W W, E	64 45 56·40 56·68	+ 13 32·84 31·91	29·24 28·59	28·92	0·7	0·48	0·1613
56	915 & 938 Newcomb " " "	Jan 27 " 29	5 20	W, E E, W	65 9 39·53 39·82	− 10 9·49 10·25	30·04 29·57	29·81	1·0	0·41	0·1681
								ΣP = 48·3		ΣPvv = 5·9788	

Summary.

No. of pairs 56
No. of observations 118

Mean difference between observations taken E, W and those taken W, E = + 0″·09

Observed Co-latitude (weighted mean) 64° 59′ 29″·40 ± 0″·032

Correction for Height above Sea-level 0″·00

Final Co-latitude 64° 59′ 29″·40

		°	′	″	″
Astronomical Latitude (A)	=	25	0	30·60	± 0·032
Geodetic Latitude (G)	=	25	0	31·53	
Deflection of plumb-line (A−G)	=		−	0·93	

178. Khundabolo—*Co-latitude* 70° 8′ +

Latitude	... 19° 51′	*Instrument*—Zenith Telescope	
Longitude	... 85 1	*Mean Height of Barometer*	in. 26·75
Height	... 3115 feet	*Mean Temperature*	58°·8

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	382 & 387 Gr. 80	Jan. 23	14 33	W, E	70 17 51·10	− 8 58·81	52·29				
	" " "	" 24		E, W	51·17	58·83	52·34	52·32	1·0	0·55	0·3025
2	395 & 401 Gr. 80	Jan. 23	19 57	E, W	70 10 3·46	− 1 10·63	52·83				
	" " "	" 24		W, E	3·50	10·14	53·36	53·10	1·0	0·23	0·0529
3	406 & 411 Gr. 80	Jan. 23	7 38	W, E	70 20 54·23	− 11 59·67	54·56				
	" " "	" 24		E, W	54·27	12 0·27	54·00	54·28	0·7	1·41	1·3917
4	411 & 419 Gr. 80	Jan. 23	7 25	E, W	70 33 53·81	− 24 59·87	53·94				
	" " "	" 24		W, E	53·86	59·03	54·83	54·39	0·7	1·52	1·6173
5	444 & 475 Gr. 80	Jan. 23	0 48	W, E	69 51 24·75	+ 17 28·77	53·52				
	" " "	" 24		E, W	24·80	28·17	52·97	53·25	0·7	0·38	0·1011
6	475 & 488 Gr. 80	Jan. 23	0 40	E, W	69 59 24·09	+ 9 29·35	53·44				
	" " "	" 24		W, E	24·13	31·14	55·27	54·36	0·7	1·49	1·5541
7	520 & 565 Gr. 80	Jan. 23	0 32	E, W	70 5 12·53	+ 3 40·39	52·92				
	" " "	" 24		W, E	12·57	40·98	53·55	53·24	1·0	0·37	0·1369
8	580 & 610 Gr. 80	Jan. 23	20 10	W, E	70 26 46·21	− 17 53·50	52·71				
	" " "	" 24		E, W	46·74	53·63	53·11	52·91	1·0	0·04	0·0016
9	620 & 637 Gr. 80	Jan. 23	7 34	E, W	70 13 55·10	− 5 2·39	52·71				
	" " "	" 24		W, E	55·12	1·75	53·37	53·04	1·0	0·17	0·0289
10	648 & 682 Gr. 80	Jan. 23	6 13	E, W	69 59 37·76	+ 9 15·63	53·39				
	" " "	" 24		W, E	37·78	15·04	52·82	53·11	0·7	0·24	0·0403
11	682 & 686 Gr. 80	Jan. 23	5 49	W, E	70 24 25·74	− 15 30·44	55·30				
	" " "	" 24		E, W	25·75	32·70	53·05	54·18	0·7	1·31	1·2013
12	703 & 707 Gr. 80	Jan. 23	2 32	E, W	69 45 55·90	+ 22 57·89	53·79				
	" " "	" 24		W, E	55·92	55·52	51·44	52·62	1·0	0·25	0·0625
13	749 & 750 Gr. 80	Jan. 23	8 13	W, E	69 47 20·70	+ 21 32·18	52·88				
	" " "	" 24		E, W	20·71	29·51	50·22	51·55	1·0	1·32	1·7424
14	776 & 798 Gr. 80	Jan. 23	17 32	E, W	70 12 22·00	− 3 29·98	52·02				
	" " "	" 24		W, E	22·01	28·40	53·61	52·82	0·7	0·05	0·0018

178. Khundabolo—*Co-latitude* 70° 8′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
15	798 & 809 Gr. 80 " " "	Jan. 23 " 24	17 44	W, E E, W	69 59 33·17 33·18	+ 9 20·14 20·74	53·31 53·92	53·62	0·7	0·75	0·3938
16	823 & 833 Gr. 80 " " "	Jan. 23 " 24	1 29	E, W W, E	70 1 16·86 16·88	+ 7 35·46 36·35	52·32 53·23	52·78	1·0	0·09	0·0081
17	877 & 892 Gr. 80 " " "	Jan. 23 " 24	2 21	W, E E, W	70 21 30·91 30·92	− 12 37·48 37·27	53·43 53·65	53·54	0·7	0·67	0·3142
18	892 & 902 Gr. 80 " " "	Jan. 23 " 24	2 17	E, W W, E	70 25 45·14 45·15	− 16 51·89 52·13	53·25 53·02	53·14	0·7	0·27	0·0510
19	916 & 946 Gr. 80 " " "	Jan. 23 " 24	1 17	W, E E, W	70 11 58·06 58·07	− 3 6·58 6·03	51·48 52·04	51·76	1·0	1·11	1·2321
20	953 & 975 Gr. 80 " " "	Jan. 23 " 24	5 42	E, W W, E	69 51 14·46 14·47	+ 17 39·42 39·56	53·88 54·03	53·96	1·0	1·09	1·1881
21	1022 & 1025 Gr. 80 " " "	Jan. 23 " 24	0 14	W, E E, W	70 5 0·58 0·59	+ 3 52·65 52·07	53·23 52·66	52·95	0·7	0·08	0·0045
22	1025 & 1059 Gr. 80 " " "	Jan. 23 " 24	0 29	E, W W, E	70 20 3·51 3·52	− 11 11·12 11·43	52·39 52·09	52·24	0·7	0·63	0·2778
23	1383 & 1395 Gr 80 " " "	Jan. 21 " 22	1 58	W, E E, W	70 5 18·59 18·63	+ 3 35·01 35·43	53·60 54·06	53·83	1·0	0·96	0·9216
24	1419 & 1428 Gr. 80 " " "	Jan. 21 " 22	5 10	E, W W, E	70 17 46·49 48·72	− 8 53·15 55·03	53·34 53·69	53·52	0·7	0·65	0·2958
25	1428 & 1432 Gr. 80 " " "	Jan. 21 " 22	4 57	W, E E, W	70 31 8·81 8·86	− 22 16·99 14·03	51·82 54·83	53·33	0·7	0·46	0·1481
26	1465 & 1470 Gr. 80 " " "	Jan. 21 " 22	1 40	W, E E, W	69 49 26·64 26·67	+ 19 26·62 26·28	53·26 52·95	53·11	1·0	0·24	0·0576
27	1477 & 1483 Gr. 80 " " "	Jan. 21 " 22	13 2	E, W W, E	70 10 54·27 54·33	− 2 1·12 1·32	53·15 53·01	53·08	1·0	0·21	0·0441
28	1511 & 1533 Gr. 80 " " "	Jan. 21 " 22	4 44	E, W W, E	69 52 34·84 34·89	+ 16 18·75 16·69	53·59 51·58	52·59	1·0	0·28	0·0784
29	1540 & 1546 Gr. 80 " " "	Jan. 21 " 22	17 15	W, E E, W	70 1 4·79 4·84	+ 7 48·79 47·31	53·58 52·15	52·87	1·0	0·00	0·0000
30	1554 & 1582 Gr. 80 " " "	Jan. 21 " 22	5 24	E, W W, E	69 46 51·91 51·98	+ 21 61·83 59·82	53·74 51·80	52·77	0·6	0·10	0·0060
31	1582 & 1585 Gr. 80 " " "	Jan. 21 " 22	5 9	W, E E, W	70 1 35·07 35·15	+ 7 18·35 16·98	53·42 52·13	52·78	0·6	0·09	0·0049
32	1585 & 1603 Gr. 80 " " "	Jan. 21 " 22	5 19	E, W W, E	70 11 59·28 59·35	− 3 5·82 6·27	53·46 53·08	53·27	0·6	0·40	0·0960

178. Khundabolo—*Co-latitude* 70° 8′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
33	1554 & 1603 Gr. 80	Jan. 21	5 34	E, W	69 57 16·11	+ 11 37·65	53·76	53·26	0·6	0·39	0·0913
	" " "	" 22		W, E	16·18	36·57	52·75				
34	1621 & 1632 Gr. 80	Jan. 21	6 47	W, E	70 17 57·12	− 9 5·12	52·00	52·31	1·0	0·56	0·3136
	" " "	" 22		E, W	57·18	4·57	52·61				
35	1666 & 1681 Gr. 80	Jan. 21	4 13	W, E	70 18 5·14	− 9 12·02	53·12	53·16	1·0	0·29	0·0841
	" " "	" 22		E, W	5·21	12·01	53·20				
36	1701 & 1708 Gr. 80	Jan. 21	12 43	W, E	69 49 6·38	+ 19 45·98	52·36	52·35	0·6	0·52	0·1622
	" " "	" 22		E, W	6·47	45·87	52·34				
37	1708 & 1713 Gr. 80	Jan. 21	12 31	E, W	70 1 1·19	+ 7 50·88	52·07	51·94	0·6	0·93	0·5189
	" " "	" 22		W, E	1·29	50·52	51·81				
38	1685 & 1713 Gr. 80	Jan. 21	12 44	E, W	70 13 34·33	− 4 42·17	52·16	52·36	0·6	0·51	0·1561
	" " "	" 22		W, E	34·44	41·88	52·56				
39	1726 & 1743 Gr. 80	Jan. 21	14 45	W, E	69 59 9·01	+ 9 42·42	51·43	51·27	1·0	1·60	2·5600
	" " "	" 22		E, W	9·10	42·01	51·11				
40	1748 & 1767 Gr. 80	Jan. 21	18 46	E, W	69 58 26·88	+ 10 25·58	52·46	52·96	1·0	0·09	0·0081
	" " "	" 22		W, E	26·99	26·46	53·45				
41	1793 & 1794 Gr. 80	Jan. 21	3 50	W, E	70 11 27·14	− 2 34·15	52·99	52·40	1·0	0·47	0·2209
	" " "	" 22		E, W	27·24	35·43	51·81				
42	1802 & 1807 Gr. 80	Jan. 21	13 32	E, W	69 53 25·91	+ 15 26·01	51·92	52·31	1·0	0·56	0·3136
	" " "	" 22		W, E	25·99	26·71	52·70				
43	1827 & 1862 Gr. 80	Jan. 21	0 55	W, E	70 7 54·78	+ 0 57·60	52·38	52·46	1·0	0·41	0·1681
	" " "	" 22		E, W	54·90	57·63	52·53				
44	1884 & 1895 Gr. 80	Jan. 21	2 39	E, W	69 59 27·48	+ 9 24·59	52·07	52·07	1·0	0·80	0·6400
	" " "	" 22		W, E	27·61	24·46	52·07				
45	1908 & 1923 Gr. 80	Jan. 21	4 4	W, E	70 28 35·97	− 19 42·49	53·48	53·20	1·0	0·33	0·1089
	" " "	" 22		E, W	36·11	43·19	52·92				
46	1970 & 1977 Gr. 80	Jan. 21	2 0	E, W	70 22 23·90	− 13 31·41	52·49	52·86	1·0	0·01	0·0001
	" " "	" 22		W, E	24·04	30·82	53·22				
47	1983 & 1990 Gr. 80	Jan. 21	20 22	W, E	70 32 21·40	− 23 29·01	52·39	52·22	1·0	0·65	0·4225
	" " "	" 22		E, W	21·54	29·49	52·05				
48	2008 & 2024 Gr. 80	Jan. 21	1 55	E, W	70 7 52·77	+ 0 59·89	52·66	52·67	0·6	0·20	0·0240
	" " "	" 22		W, E	52·93	59·74	52·67				
49	2024 & 2039 Gr. 80	Jan. 21	1 52	W, E	70 10 50·75	− 1 56·76	53·99	53·49	0·6	0·62	0·2306
	" " "	" 22		E, W	50·91	57·92	52·99				
50	2039 & 2046 Gr. 80	Jan. 21	1 49	E, W	70 7 32·92	+ 1 19·93	52·85	52·44	0·6	0·43	0·1109
	" " "	" 22		W, E	33·08	18·95	52·03				

178. Khundabolo—*Co-latitude* 70° 8′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
51	2008 & 2046 Gr. 80	Jan. 21	1 52	E, W	70 4 34·93	+ 4 16·61	51·54				
	” ” ”	” 22		W, E	35·10	16·65	51·75	51·65	0·6	1·22	0·8930
52	2050 & 2090 Gr. 80	Jan. 21	8 32	W, E	70 8 20·94	+ 0 30·87	51·81				
	” ” ”	” 22		E, W	21·11	31·53	52·64	52·23	1·0	0·64	0·4096
53	1638 & 1648 Gr. 80	Jan. 21	2 36	E, W	70 9 30·16	− 0 37·71	52·45				
	” ” ”	” 22		W, E	30·23	37·26	52·97	52·71	1·0	0·16	0·0256
54	2127 & 2150 Gr. 80	Jan. 21	3 22	E, W	70 21 7·24	− 12 14·47	52·77				
	” ” ”	” 22		W, E	7·42	14·77	52·65	52·71	1·0	0·16	0·0256
55	2200 & 2205 Gr. 80	Jan. 21	6 5	W, E	70 30 13·23	− 21 19·02	54·21				
	” ” ”	” 22		E, W	13·39	19·40	53·99	54·10	1·0	1·23	1·5129
								ΣP = 46·4		ΣPvv = 22·3580	

Summary.

No. of pairs 55

No. of observations 110

Mean difference between observations taken E,W and those taken W, E = − 0″·11

Observed Co-latitude (weighted mean) 70° 8′ 52″·87 ± 0″·063

Correction for Height above Sea-level + 0″·10

Final Co-latitude 70° 8′ 52″·97

		°	′	″	″
Astronomical Latitude (A)	=	19	51	7·03	± 0·063
Geodetic Latitude (G)	=	19	51	12·90	
Deflection of plumb-line (A−G)	=		−	5·87	

179. Kidarkanta—*Co-latitude* 58° 59′ +

Latitude	... 31° 1′	*Instrument*—Zenith Telescope		
Longitude	... 78 13	*Mean Height of Barometer*	in. 18·95	
Height	... 12509 feet	*Mean Temperature*	27°·4	

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
1	1431 & 1444 Newcomb " " "	Oct. 21 " 22	18 7	E, W W, E	59 13 59·09 59·01	− 14 51·05 51·48	8·04 7·53	7·79	0·8	0·06	0·0029
2	1449 & 1452 Newcomb " " "	Oct. 21 " 22	31 33	W, E E, W	59 13 51·10 51·02	− 14 42·97 42·95	8·13 8·07	8·10	0·8	0·25	0·0500
3	1456 Newc. & 3708 Gr. 80 " " " "	Oct. 21 " 22	25 20	E, W W, E	58 57 9·23 9·14	+ 1 57·84 58·33	7·07 7·47	7·27	1·0	0·58	0·3364
4	3724 & 3733 Gr. 80	Oct. 22	25 38	E, W	59 3 38·03	− 4 29·48	8·55	8·55	0·7	0·70	0·3430
5	1482 & 1496 Newcomb " " "	Oct. 21 " 22	31 48	W, E E, W	58 42 36·35 36·25	+ 16 31·70 31·87	8·05 8·12	8·09	0·7	0·24	0·0403
6	1490 & 1496 Newcomb	Oct. 22	31 52	E, W	58 45 37·10	+ 13 30·66	7·76	7·76	0·5	0·09	0·0041
7	3827 & 3846 Gr. 80 " " "	Oct. 21 " 22	10 36	E, W W, E	59 8 50·35 50·23	− 9 41·97 41·28	8·38 8·95	8·67	0·5	0·82	0·3362
8	3846 Gr. 80 & 1520 Newc. " " " "	Oct. 21 " 22	10 47	W, E E, W	58 57 53·21 53·09	+ 1 14·78 15·07	7·99 8·16	8·08	0·7	0·23	0·0370
9	1535 & 1553 Newcomb	Oct. 22	25 24	W, E	58 45 8·33	+ 13 59·09	7·42	7·42	0·5	0·43	0·0925
10	3930 Gr. 80 & 1553 Newc. " " " "	Oct. 20 " 22	25 35	E, W W, E	58 34 3·21 2·96	+ 25 4·84 4·89	8·05 7·85	7·95	0·7	0·10	0·0070
11	3963 & 4001 Gr. 80 " " "	Oct. 20 " 22	30 27	W, E E, W	58 45 58·34 58·08	+ 13 9·18 9·53	7·52 7·61	7·57	1·0	0·28	0·0784
12	4019 & 4029 Gr. 80	Oct. 22	24 19	W, E	59 8 38·29	− 9 29·33	8·96	8·96	0·5	1·11	0·6161
13	4029 Gr. 80 & 1592 Newc. " " " "	Oct. 20 " 22	24 25	W, E E, W	59 14 47·81 47·53	− 15 39·19 39·19	8·62 8·34	8·48	0·5	0·63	0·1985
14	4046 & 4050 Gr. 80 " " "	Oct. 20 " 22	34 34	E, W W, E	58 59 50·82 50·57	− 0 42·08 42·25	8·74 8·32	8·53	0·7	0·68	0·3237
15	4050 Gr. 80 & 2 Newc. " " " "	Oct. 20 " 22	34 17	W, E E, W	58 42 26·21 25·95	+ 16 41·31 40·95	7·52 6·90	7·21	0·7	0·64	0·2867
16	22 & 27 Newcomb " " "	Oct. 20 " 22	31 30	W, E E, W	59 5 18·62 18·35	− 6 11·18 10·94	7·44 7·41	7·43	0·8	0·42	0·1411

179. Kidarkanta—*Co-latitude* 58° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1803	° ′		° ′ ″	′ ″	″	″			
17	32 & 35 Newcomb	Oct. 20	2 12	E, W	59 0 28·60	− 1 21·44	7·16				
	" " "	" 22		W, E	28·30	20·59	7·71	7·44	1·0	0·41	0·1681
18	45 & 55 Newcomb	Oct. 20	7 7	E, W	59 8 13·80	− 9 5·90	7·90				
	" " "	" 22		W, E	13·49	6·13	7·36	7·63	0·8	0·22	0·0387
19	61 & 65 Newcomb	Oct. 20	23 33	W, E	59 5 16·48	− 6 8·93	7·55				
	" " "	" 22		E, W	16·20	8·42	7·78	7·67	0·7	0·18	0·0227
20	65 & 76 Newcomb	Oct. 20	23 42	E, W	59 14 26·72	− 15 18·85	7·87				
	" " "	" 22		W, E	26·44	19·10	7·34	7·61	0·5	0·24	0·0288
								Σ P = 14·1		Σ Pvv = 3·1522	

Summary.

No. of pairs 20
No. of observations 36

Mean difference between observations taken E, W and those taken W, E = + 0″·04

Observed Co-latitude (weighted mean) 58° 59′ 7″·85 ± 0″ 073

Correction for Height above Sea-level + 0″·57

Final Co-latitude 58° 59′ 8″·42

		°	′	″	″
Astronomical Latitude (A)	=	31	0	51·58	± 0·073
Geodetic Latitude (G)	=	31	1	21·71	
Deflection of plumb-line (A − G)	=		−	30·13	

180. Kistama—*Co-latitude* 75° 32′ +

Latitude	... 14° 27′	*Instrument*—Zenith Telescope	
Longitude	... 79 48	*Mean Height of Barometer*	in. 29·55
Height	... 458 feet	*Mean Temperature*	69°·3

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
1	1363 & 1370 Gr. 80	Jan. 31	11 32	E, W	75 50 16·65	− 17 29·85	46·8				
	„ „ „	Feb. 1		W, E	16·67	28·89	47·8				
	„ „ „	„ 4		E, W	16·74	29·51	47·2				
	„ „ „	„ 5		W, E	16·78	28·97	47·8	47·4	0·9	0·3	0·08
2	1370 & 1390 Gr. 80	Feb. 1	11 36	E, W	75 45 52·15	− 13 3·64	48·5	48·5	0·5	0·8	0·32
3	1402 & 1411 Gr. 80	Jan. 31	4 35	W, E	75 53 55·56	− 21 8·29	47·3				
	„ „ „	Feb. 1		E, W	55·59	7·65	47·9				
	„ „ „	„ 4		W, E	55·66	7·80	47·9				
	„ „ „	„ 5		E, W	55·69	8·28	47·4	47·6	1·3	0·1	0·01
4	1434 & 1449 Gr. 80	Jan. 31	4 13	W, E	75 45 8·09	− 12 18·94	49·2				
	„ „ „	Feb. 1		E, W	8·12	19·34	48·8				
	„ „ „	„ 4		W, E	8·20	19·99	48·2				
	„ „ „	„ 5		E, W	8·23	19·74	48·5	48·7	1·3	1·0	1·30
5	1465 & 1477 Gr. 80	Jan. 31	7 32	E, W	75 39 39·32	− 6 50·47	48·9				
	„ „ „	Feb. 1		W, E	39·35	51·11	48·2				
	„ „ „	„ 4		E, W	39·44	51·29	48·2				
	„ „ „	„ 5		W, E	39·47	51·78	47·7	48·2	1·3	0·5	0·33
6	1500 & 1504 Gr. 80	Jan. 31	1 52	W, E	75 51 38·98	− 18 50·83	48·2				
	„ „ „	Feb. 1		E, W	39·01	50·93	48·1				
	„ „ „	„ 4		W, E	39·11	52·16	47·0				
	„ „ „	„ 5		E, W	39·15	51·05	48·1	47·9	1·3	0·2	0·05
7	1517 & 1524 Gr. 80	Jan. 31	8 29	E, W	75 59 36·37	− 26 48·46	47·9				
	„ „ „	Feb. 1		W, E	36·40	48·43	48·0				
	„ „ „	„ 4		E, W	36·52	48·89	47·7				
	„ „ „	„ 5		W, E	36·55	49·30	47·3	47·7	1·3	0·0	0·00
8	1543 & 1550 Gr. 80	Jan. 31	20 23	W, E	75 31 22·90	+ 1 25·56	48·5				
	„ „ „	Feb. 1		E, W	22·94	24·77	47·7				
	„ „ „	„ 4		W, E	23·04	25·14	48·2				
	„ „ „	„ 5		E, W	23·08	24·81	47·9	48·1	1·3	0·4	0·21
9	1559 & 1577 Gr. 80	Jan. 31	22 32	E, W	75 39 10·01	− 6 22·05	47·9				
	„ „ „	Feb. 1		W, E	10·04	23·28	46·8				
	„ „ „	„ 4		E, W	10·15	23·27	46·9				
	„ „ „	„ 5		W, E	10·19	23·41	46·8	47·0	1·3	0·7	0·64
10	1590 & 1606 Gr. 80	Jan. 31	9 34	E, W	75 17 30·70	+ 15 16·90	47·6				
	„ „ „	Feb. 1		W, E	30·74	16·38	47·1				
	„ „ „	„ 4		E, W	30·86	16·31	47·2				
	„ „ „	„ 5		W, E	30·90	16·15	47·0	47·2	1·3	0·5	0·33

180. Kistama—*Co-latitude* 75° 32′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
11	1650 Gr 80 & 967 Gr. 72	Jan. 31	3 53	W, E	75 35 36·83	− 2 49·01	47·8				
	” ” ” ”	Feb. 1		E, W	36·89	48·73	48·2				
	” ” ” ”	” 5		E, W	37·10	49·63	47·5	47·8	1·2	0·1	0·01
12	974 Gr. 72 & 1686 Gr. 80	Jan. 31	21 45	E, W	75 46 22·11	− 13 33·48	48·6				
	” ” ” ”	Feb. 1		W, E	22·17	34·13	48·0				
	” ” ” ”	” 5		W, E	22·39	34·77	47·6	48·1	1·2	0·4	0·19
13	991 Gr. 72 & 1713 Gr 80	Jan. 31	17 52	W, E	75 19 18·32	+ 13 28·71	47·0				
	” ” ” ”	Feb. 4		W, E	18·56	28·17	46·7				
	” ” ” ”	” 5		E, W	18·62	28·33	47·0	46·9	1·3	0·8	0·83
14	1011 Gr. 72 & 1747 Gr. 80	Feb. 1	10 35	W, E	75 15 33·27	+ 17 15·86	49·1				
	” ” ” ”	” 4		E, W	33·47	13·28	46·8				
	” ” ” ”	” 5		W, E	33·53	14·32	47·9	47·9	0·8	0·2	0·03
15	1747 & 1758 Gr. 80	Jan. 31	10 34	W, E	75 14 3·40	+ 18 44·74	48·1				
	” ” ”	Feb 1		E, W	3·47	45·32	48·8				
	” ” ”	” 4		W, E	3·67	44·23	47·9				
	” ” ”	” 5		E, W	3·73	44·19	47·9	48·2	0·9	0·5	0·23
16	1762 & 1769 Gr 80	Jan 31	6 26	E, W	75 39 22·04	− 6 35·06	47·0				
	” ” ”	Feb 1		W, E	22·11	35·21	46·9				
	” ” ”	” 4		E W	22·32	34·88	47·4				
	” ” ”	” 5		W, E	22·39	34·61	47·8	47·2	0·9	0·5	0·23
17	1769 & 1791 Gr. 80	Jan. 31	6 36	W, E	75 28 40·79	+ 4 7·26	48·1				
	” ” ”	Feb. 1		E, W	40·86	5·91	46·8				
	” ” ”	” 4		W, E	41·06	7·17	48·2				
	” ” ”	” 5		E, W	41·13	6·17	47·3	47·6	0·9	0·1	0·01
18	1803 & 1813 Gr. 80	Jan 31	24 32	E, W	75 44 23·14	− 11 35·50	47·6				
	” ” ”	Feb 1		W, E	23·21	35·77	47·4				
	” ” ”	” 4		E, W	23·44	36·32	47·1				
	” ” ”	” 5		W, E	23·50	36·57	46·9	47·3	1·3	0·4	0·21
19	1850 & 1857 Gr. 80	Jan. 31	7 25	W, E	75 27 7·53	+ 5 40·65	48·2				
	” ” ”	Feb 1		E, W	7·61	40·12	47·7				
	” ” ”	” 5		E, W	7·95	40·03	48·0	48·0	1·2	0·3	0·11
20	1870 & 1881 Gr. 80	Jan 31	24 11	E, W	75 39 47·59	− 6 58·89	48·7				
	” ” ”	Feb. 1		W, E	47·68	60·65	47·0				
	” ” ”	” 4		E, W	47·97	60·19	47·8				
	” ” ”	” 5		W, E	48·00	60·67	47·4	47·7	1·3	0·0	0·00
21	1892 & 1898 Gr 80	Jan. 31	11 59	W, E	75 30 27·76	+ 2 20·75	48·5				
	” ” ”	Feb. 1		E, W	27·86	20·28	48·1				
	” ” ”	” 4		W, E	28·14	19·99	48·1				
	” ” ”	” 5		E, W	28·24	19·24	47·5	48·1	1·3	0·4	0·21

180. Kistama—*Co-latitude* 75° 32′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
22	1664 Cape 80 & 628 Gr. 80	Feb. 2	8 35	E, W	75 43 39·68	− 10 51·36	48·3				
	" " " "	" 3		W, E	39·71	51·95	47·8				
	" " " "	" 6		E, W	39·79	52·42	47·4				
	" " " "	" 7		W, E	39·82	54·26	45·6	47·3	1·3	0·4	0·21
23	633 & 661 Gr. 80	Feb. 2	7 9	W, E	75 25 28·30	+ 7 17·94	46·2				
	" " "	" 3		E, W	28·34	19·89	48·2				
	" " "	" 6		W, E	28·40	18·41	46·8				
	" " "	" 7		E, W	28·43	19·79	48·2	47·4	1·3	0·3	0·12
24	664 & 682 Gr. 80	Feb. 2	0 41	E, W	75 33 1·83	− 0 13·83	48·0				
	" " "	" 3		W, E	1·86	13·31	48·6				
	" " "	" 6		E, W	1·93	12·98	48·9				
	" " "	" 7		W, E	1·96	13·80	48·1	48·4	1·3	0·7	0·64
25	696 & 712 Gr. 80	Feb. 2	4 52	W, E	75 55 39·88	− 22 50·70	49·2				
	" " "	" 3		E, W	39·90	52·18	47·7				
	" " "	" 6		W, E	39·97	51·68	48·3				
	" " "	" 7		E, W	40·00	51·63	48·4	48·4	1·3	0·7	0·64
26	734 & 740 Gr. 80	Feb. 2	2 0	E, W	75 42 34·34	− 9 46·27	48·1				
	" " "	" 3		W, E	34·36	46·36	48·0				
	" " "	" 6		E, W	34·42	46·46	48·0				
	" " "	" 7		W, E	34·45	46·84	47·6	47·9	1·3	0·2	0·05
27	754 & 782 Gr. 80	Feb. 2	8 0	W, E	75 14 28·60	+ 18 19·61	48·2				
	" " "	" 3		E, W	28·62	19·90	48·5				
	" " "	" 6		W, E	28·68	18·95	47·6				
	" " "	" 7		E, W	28·70	19·14	47·8	48·0	1·3	0·3	0·12
28	810 & 818 Gr. 80	Feb. 3	24 57	E, W	75 28 1·60	+ 4 45·62	47·2				
	" " "	" 6		W, E	1·64	46·11	47·8				
	" " "	" 7		E, W	1·65	46·91	48·6	47·9	1·2	0·2	0·05
29	847 & 851 Gr. 80	Feb. 2	23 38	E, W	75 16 11·28	+ 16 37·18	48·5				
	" " "	" 3		W, E	11·29	36·80	48·1				
	" " "	" 6		E, W	11·32	35·22	46·5				
	" " "	" 7		W, E	11·33	37·53	48·9	48·0	1·3	0·3	0·12
30	860 & 892 Gr. 80	Feb. 2	3 2	W, E	75 45 0·57	− 12 11·67	48·9				
	" " "	" 3		E, W	0·59	13·41	47·2				
	" " "	" 6		W, E	0·63	12·57	48·1				
	" " "	" 7		E, W	0·65	13·05	47·6	47·9	1·3	0·2	0·05
31	896 & 915 Gr. 80	Feb. 3	17 19	W, E	75 11 36·05	+ 21 10·89	46·9				
	" " "	" 6		E, W	36·07	10·42	46·5				
	" " "	" 7		W, E	36·08	11·08	47·2	46·8	1·2	0·9	0·97
32	523 Gr. 72 & 929 Gr. 80	Feb. 2	4 18	W, E	75 50 18·57	− 17 31·44	47·1				
	" " " "	" 3		E, W	18·58	31·66	46·9				
	" " " "	" 6		W, E	18·63	32·48	46·2				
	" " " "	" 7		E, W	18·64	31·63	47·0	46·8	1·3	0·9	1·05

180. Kistama—*Co-latitude* 75° 32′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
33	944 & 947 Gr. 80	Feb. 2	15 51	E, W	75 25 20·48	+ 7 26·87	47·4				
	" " "	" 3		W, E	20·48	27·08	47·6				
	" " "	" 6		E, W	20·52	26·44	47·0				
	" " "	" 7		W, E	20·53	27·45	48·0	47·5	1·3	0·2	0·05
34	655 Gr. 80 & 551 Gr. 72	Feb. 2	10 15	W, E	75 42 18·43	− 9 30·81	47·6				
	" " " "	" 3		E, W	18·44	31·14	47·3				
	" " " "	" 6		W, E	18·48	31·31	47·2				
	" " " "	" 7		E, W	18·49	31·62	46·9	47·2	1·3	0·5	0·33
35	993 & 1014 Gr. 80	Feb. 3	22 23	W, E	75 10 17·86	+ 22 29·56	47·4				
	" " "	" 6		E, W	17·88	29·80	47·7				
	" " "	" 7		W, E	17·89	30·44	48·3	47·8	1·2	0·1	0·01
36	1037 & 1053 Gr. 80	Feb. 6	0 16	W, E	75 29 35·01	+ 3 12·76	47·8				
	" " "	" 7		E, W	35·02	13·07	48·1	47·9	1·0	0·2	0·04
37	2868 Cape 80 & 1065 Gr. 80	Feb. 2	20 45	E, W	75 29 45·14	+ 3 1·33	46·5				
	" " " "	" 3		W, E	45·15	3·54	48·7				
	" " " "	" 6		E, W	45·17	1·81	47·0				
	" " " "	" 7		W, E	45·18	1·56	46·7	47·2	1·3	0·5	0·33
38	1092 Gr. 80 & 637 Gr. 72	Feb. 2	7 1	W, E	75 19 8·70	+ 13 39·08	47·8				
	" " " "	" 3		E, W	8·71	38·95	47·7				
	" " " "	" 6		W, E	8·74	38·30	47·0				
	" " " "	" 7		E, W	8·75	38·46	47·2	47·4	1·3	0·3	0·12
39	1139 & 1168 Gr. 80	Feb. 2	1 45	E, W	75 14 51·93	+ 17 56·40	48·4				
	" " "	" 3		W, E	51·94	55·75	47·7				
	" " "	" 6		E, W	51·97	55·64	47·6				
	" " "	" 7		W, E	51·98	56·30	48·3	48·0	0·9	0·3	0·08
40	1168 & 1179 Gr. 80	Feb. 2	1 39	W, E	75 19 50·21	+ 12 57·94	48·2				
	" " "	" 3		E, W	50·22	59·61	49·8				
	" " "	" 6		W, E	50·25	57·70	47·9				
	" " "	" 7		E, W	50·26	58·42	48·7	48·6	0·9	0·9	0·73
41	1184 & 1218 Gr. 80	Feb. 3	1 24	W, E	75 17 23·86	+ 15 24·20	48·1				
	" " "	" 6		E, W	23·89	23·46	47·4				
	" " "	" 7		W, E	23·90	24·18	48·1	47·8	1·2	0·1	0·01
42	1250 & 1273 Gr. 80	Feb. 2	2 26	W, E	75 41 25·79	− 8 37·48	48·3				
	" " "	" 3		E, W	25·80	37·64	48·2				
	" " "	" 6		W, E	25·84	37·50	48·3				
	" " "	" 7		E, W	25·86	38·36	47·5	48·1	1·3	0·4	0·21
43	1279 & 1282 Gr. 80	Feb. 3	5 59	W, E	75 30 29·98	+ 2 17·37	47·4				
	" " "	" 6		E, W	30·02	16·87	46·9				
	" " "	" 7		W, E	30·04	17·67	47·7	47·3	1·2	0·4	0·19

180. Kistama—*Co-latitude* 75° 32′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
44	1311 Gr. 80 & 764 Gr. 72	Feb. 3	3 27	E, W	75 31 18·55	+ 1 28·20	46·8				
	" " " "	" 6		W, E	18·59	27·74	46·3				
	" " " "	" 7		E, W	18·60	27·37	46·0	46·4	1·2	1·3	2·03
45	1343 & 1359 Gr. 80	Feb. 2	12 16	E, W	75 13 7·54	+ 19 40·37	47·9				
	" " "	" 3		W, E	7·55	40·31	47·9				
	" " "	" 6		E, W	7·60	40·22	47·8				
	" " "	" 7		W, E	7·61	39·48	47·1	47·7	1·3	0·0	0·00
								Σ P = 53·6		Σ Pvv = 13·48	

Summary.

No. of pairs 45
No. of observations 164

Mean difference between observations taken E, W and those taken W, E = 0″·00

Observed Co-latitude (weighted mean) 75° 32′ 47″·70 ± 0″·051

Correction for Height above Sea-level + 0″·02

Final Co-latitude 75° 32′ 47″·72

		°	′	″	″
Astronomical Latitude (A)	=	14	27	12·28	± 0·051
Geodetic Latitude (G)	=	14	27	14·56	
Deflection of plumb-line (A−G)	=		−	2·28	

181. Kurseong—*Co-latitude* 63° 8′ +

Latitude ... 26° 52′ — *Instrument*—Zenith Telescope

Longitude ... 88 18 — *Mean Height of Barometer* 25·63 in.

Height ... 4128 feet — *Mean Temperature* 46°·2

Observer—Lieut. H. M. Cowie, R E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″		″			
1	218 & 234 Newcomb	Feb. 4	15 38	W, E	63 21 52·95	− 13 7·99	44 96	44·96	0·7	0 20	0 0280
2	244 & 256 Newcomb	Feb. 3	4 54	W, E	63 17 46·27	− 9 1·52	44 75	44·84	1 0	0 08	0 0064
	,, ,, ,,	,, 4		E, W	46 29	1·36	44·93				
3	262 & 273 Newcomb	Feb. 4	7 30	E, W	63 9 35·14	− 0 50·06	45·08	45·33	1 0	0·57	0·3249
	,, ,, ,,	,, 8		W, E	35·20	49 62	45 58				
4	289 & 298 Newcomb	Feb. 3	30 4	E, W	63 29 6·55	− 20 21·62	44 93	44 59	0·8	0·17	0·0231
	,, ,, ,,	,, 4		W, E	6·55	22·05	44·50				
	,, ,, ,,	,, 8		E, W	6·54	22·12	44·42				
5	298 & 299 Newcomb	Feb. 4	30 1	E, W	63 25 33·34	− 16 49·37	43·97	43·97	0 4	0·79	0 2496
6	318 & 327 Newcomb	Feb. 3	11 33	E, W	63 10 57·47	− 2 12·82	44·65	45·03	1·2	0·27	0·0875
	,, ,, ,,	,, 4		W, E	57·46	12 09	45·37				
	,, ,, ,,	,, 8		E, W	57·43	12·70	44·73				
7	348 & 362 Newcomb	Feb. 3	5 31	W, E	63 23 59·79	− 15 14·35	45 44	44 23	1·2	0·53	0·3371
	,, ,, ,,	,, 4		E, W	59·77	16·85	42 92				
	,, ,, ,,	,, 8		W, E	59 71	14·10	45·61				
8	364 & 377 Newcomb	Feb. 4	29 11	W, E	63 29 15·15	− 20 30·50	44·65	44·62	0 8	0·14	0·0157
	,, ,, ,,	,, 6		E, W	15·10	30·43	44·67				
	,, ,, ,,	,, 8		E, W	15·05	30·54	44·51				
9	366 & 377 Newcomb	Feb. 4	28 51	W, E	63 9 23·28	− 0 38·29	44·99	44·96	0·8	0·20	0·0320
	,, ,, ,,	,, 6		E, W	23 23	37·95	45·28				
	,, ,, ,,	,, 8		E, W	23·18	38·62	44·56				
10	394 & 413 Newcomb	Feb. 6	22 35	E, W	63 15 2·48	− 6 17·22	45·26	45·04	0·7	0·28	0 0549
	,, ,, ,,	,, 7		W, E	2·44	17·62	44·82				
11	413 & 415 Newcomb	Feb. 6	22 21	W, E	63 0 41·41	+ 8 3·06	44·47				
	,, ,, ,,	,, 7		E, W	41·38	3·59	44·97	44·72	0·7	0·04	0·0011
12	430 & 432 Newcomb	Feb. 3	16 51	E, W	63 10 17·35	− 1 32·72	44·63				
	,, ,, ,,	,, 4		W, E	17·31	32·97	44·34				
	,, ,, ,,	,, 6		E, W	17·24	32·79	44 45				
	,, ,, ,,	,, 7		W, E	17·20	32·45	44·75	44·54	1·4	0·22	0·0678
13	440 & 454 Newcomb	Feb. 3	6 41	E, W	62 36 20·14	+ 32 25·36	45·50				
	,, ,, ,,	,, 4		W, E	20·10	25·06	45·16				
	,, ,, ,,	,, 6		E, W	20·01	25 81	45·82				
	,, ,, ,,	,, 7		W, E	19·97	25 39	45·36	45·46	1·4	0·70	0·6860

181. Kurseong—*Co-latitude* 63° 8′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
14	468 & 482 Newcomb	Feb. 4	14 26	W, E	63 22 10·09	− 13 25·69	44·40				
	" " "	" 6		E, W	10·00	25·16	44·84				
	" " "	" 7		W, E	9·96	25·30	44·66				
	" " "	" 8		E, W	9·92	25·39	44·53	44·61	1·4	0·15	0·0315
15	492 & 506 Newcomb	Feb. 4	21 11	E, W	63 21 21·16	− 12 36·34	44·82				
	" " "	" 6		W, E	21·07	36·51	44·56				
	" " "	" 7		E, W	21·03	36·17	44·86				
	" " "	" 8		W, E	20·98	36·05	44·93	44·79	1·4	0·03	0·0013
16	515 & 517 Newcomb	Feb. 4	1 13	E, W	63 8 17·65	+ 0 27·04	44·69				
	" " "	" 6		W, E	17·55	27·09	44·64				
	" " "	" 7		E, W	17·50	27·72	45·22				
	" " "	" 8		W, E	17·45	27·73	45·18	44·93	1·4	0·17	0·0405
17	529 & 533 Newcomb	Feb. 4	17 1	W, E	63 30 30·39	− 21 45·41	44·98				
	" " "	" 6		E, W	30·31	46·55	43·76				
	" " "	" 7		W, E	30·26	46·54	43·72				
	" " "	" 8		E, W	30·22	45·66	44·56	44·26	1·4	0·50	0·3500
18	538 & 543 Newcomb	Feb. 4	11 55	E, W	63 33 35·43	− 24 49·45	45·98				
	" " "	" 6		W, E	35·33	50·44	44·89				
	" " "	" 7		E, W	35·29	50·50	44·79				
	" " "	" 8		W, E	35·24	50·60	44·64	45·08	1·4	0·32	0·1434
19	569 & 580 Newcomb	Feb. 4	21 28	W, E	63 2 55·03	+ 5 48·76	43·79				
	" " "	" 6		E, W	54·95	49·43	44·38				
	" " "	" 7		W, E	54·90	49·37	44·27				
	" " "	" 8		E, W	54·86	49·53	44·39	44·21	1·4	0·55	0·4235
								Σ P = 20·5		Σ P v v = 2·9043	

Summary.

No. of pairs 19

No. of observations 57

Mean difference between observations taken E, W and those taken W, E = − 0″·05

Observed Co-latitude (weighted mean) 63° 8′ 44″·76 ± 0″·060

Correction for Height above Sea-level + 0″·19

Final Co-latitude 63° 8′ 44″·95

		°	′	″	″
Astronomical Latitude (A)	=	26	51	15·05	± 0·060
Geodetic Latitude (G)	=	26	52	5·56	
Deflection of plumb-line (A − G)	=		−	50·51	

182. Ladimsir—*Co-latitude* 60° 38′ +

Latitude ... 29° 22′
Longitude ... 72 2
Height ... 468 feet

Instrument—Zenith Sector No. 1 used as Zenith Telescope
Mean Height of Barometer 29·59 in.
Mean Temperature 51°·1

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	480 & 488 Gr. 80	Jan. 9	8 53	E, W	60 27 22·77	+ 10 57·24	20·01				
	„ „ „	„ 10		W, E	22·76	57·36	20·12	20·06	1·0	0·09	0·0081
2	320 Gr. 72 & 511 Gr. 80	Jan. 9	25 53	E, W	60 48 29·25	− 10 6·76	22·49				
	„ „ „ „	„ 10		W, E	29·23	10·73	18·50	20·49	1·0	0·34	0·1156
3	551 Gr. 80 & 323 Gr. 72	Jan. 9	18 27	W, E	60 35 26·51	+ 2 52·42	18·93				
	„ „ „ „	„ 10		E, W	26·48	53·50	19·98	19·45	0·7	0·70	0·3430
4	563 Gr. 80 & 323 Gr. 72	Jan. 9	18 16	W, E	60 47 11·13	− 8 51·82	19·31				
	„ „ „ „	„ 10		E, W	11·10	51·59	19·51	19·41	0·7	0·74	0·3833
5	551 & 589 Gr. 80	Jan. 9	18 31	W, E	60 40 7·22	− 1 47·47	19·75				
	„ „ „	„ 10		E, W	7·19	46·93	20·26	20·00	0·7	0·15	0·0158
6	563 & 589 Gr. 80	Jan. 9	18 20	W, E	60 51 51·85	− 13 31·70	20·15				
	„ „ „	„ 10		E, W	51·82	32·00	19·82	19·98	0·7	0·17	0·0202
7	605 Gr. 80 & 323 Gr. 72	Jan. 10	18 19	E, W	60 43 50·46	− 5 31·50	18·96	18·96	0·5	1·19	0·7081
8	605 & 589 Gr. 80	Jan. 9	18 23	W, E	60 48 31·21	− 10 11·87	19·34				
	„ „ „	„ 10		E, W	31·18	11·93	19·25	19·29	0·7	0·86	0·5177
9	610 & 646 Gr. 80	Jan. 9	10 12	W, E	60 28 50·77	+ 9 29·77	20·54				
	„ „ „	„ 10		E, W	50·74	29·59	20·33	20·43	1·0	0·28	0·0784
10	660 & 698 Gr. 80	Jan. 9	10 43	E, W	60 29 25·25	+ 8 55·77	21·02				
	„ „ „	„ 10		W, E	25·21	54·28	19·49	20·25	0·7	0·10	0·0070
11	660 & 712 Gr. 80	Jan. 9	10 38	E, W	60 25 0·82	+ 13 20·92	21·74				
	„ „ „	„ 10		W, E	0·78	19·39	20·17	20·95	0·7	0·80	0·4480
12	720 & 734 Gr. 80	Jan. 9	13 16	W, E	60 26 43·78	+ 11 37·66	21·44				
	„ „ „	„ 10		E, W	43·74	35·78	19·52	20·48	0·7	0·33	0·0762
13	721 & 734 Gr. 80	Jan. 9	13 17	W, E	60 25 49·45	+ 12 31·00	20·45				
	„ „ „	„ 10		E, W	49·41	30·90	20·31	20·38	0·7	0·23	0·0370
14	787 & 753 Gr. 80	Jan. 9	6 54	W, E	60 21 57·37	+ 16 21·89	19·26				
	„ „ „	„ 10		E, W	57·33	23·63	20·96	20·11	0·7	0·04	0·0011
15	787 & 754 Gr. 80	Jan. 9	6 53	W, E	60 21 30·80	+ 16 49·23	20·03				
	„ „ „	„ 10		E, W	30·75	49·91	20·66	20·34	0·7	0·19	0·0253

182. Ladimsir—*Co-latitude* 60° 38′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
16	809 & 823 Gr. 80	Jan. 9	8 9	W, E	60 24 47·55	+ 13 33·28	20·83	20·83	0·7	0·68	0·3237
17	872 & 833 Gr. 80 " " "	Jan. 9 " 10	10 45	W, E E, W	60 44 37·03 36·98	− 6 16·73 17·92	20·30 19·06	19·68	1·0	0·47	0·2209
18	888 & 902 Gr. 80 " " "	Jan. 9 " 10	7 44	E, W W, E	60 25 52·31 52·26	+ 12 28·78 26·53	21·09 18·79	19·94	1·0	0·21	0·0441
19	947 Gr. 80 & 526 Gr. 72	Jan. 9	1 25	E, W	60 59 10·60	− 20 51·64	18·96	18·96	0·5	1·19	0·7081
20	948 Gr. 80 & 526 Gr. 72	Jan. 9	1 25	E, W	60 59 9·79	− 20 50·62	19·17	19·17	0·5	0·98	0·4802
21	978 & 998 Gr. 80 " " "	Jan. 9 " 10	9 27	E, W W, E	60 17 49·11 49·06	+ 20 30·80 31·66	19·91 20·72	20·31	0·7	0·16	0·0179
22	984 & 998 Gr. 80 " " "	Jan. 9 " 10	9 26	E, W W, E	60 18 39·20 39·15	+ 19 41·57 41·77	20·77 20·92	20·84	0·7	0·69	0·3333
23	303 Gr. 72 & 523 Gr. 80 " " " "	Jan. 11 " 15	20 35	E, W W, E	60 45 8·32 8·28	− 6 48·82 47·94	19·50 20·34	19·92	0·7	0·23	0·0370
24	304 Gr. 72 & 523 Gr. 80 " " " "	Jan. 11 " 15	20 31	E, W W, E	60 48 55·34 55·29	− 10 36·27 35·45	19·07 19·84	19·45	0·7	0·70	0·3430
25	513 & 523 Gr. 80 " " "	Jan. 11 " 15	20 25	E, W W, E	60 55 38·35 38·30	− 17 17·76 17·75	20·59 20·55	20·57	0·7	0·42	0·1235
26	303 Gr. 72 & 526 Gr. 80 " " " "	Jan. 11 " 15	20 13	E, W W, E	60 23 55·41 55·36	+ 14 25·33 25·45	20·74 20·81	20·77	0·7	0·62	0·2691
27	304 Gr. 72 & 526 Gr. 80 " " " "	Jan. 11 " 15	20 9	E, W W, E	60 27 42·43 42·38	+ 10 37·88 37·92	20·31 20·30	20·30	0·7	0·15	0·0158
28	513 & 526 Gr. 80	Jan. 15	20 4	W, E	60 34 25·38	+ 3 55·63	21·01	21·01	0·5	0·86	0·3698
29	341 Gr. 72 & 559 Gr. 80 " " " "	Jan. 11 " 15	13 1	E, W W, E	60 46 46·17 46·09	− 8 24·79 26·31	21·38 19·78	20·58	1·0	0·43	0·1849
30	575 & 585 Gr. 80 " " "	Jan. 11 " 15	41 44	E, W W, E	60 42 42·60 42·49	− 4 20·83 21·45	21·77 21·04	21·40	1·0	1·25	1·5625
31	590 & 613 Gr. 80 " " "	Jan. 11 " 15	5 53	W, E E, W	60 23 21·66 21·56	+ 14 60·87 57·95	22·53 19·51	21·02	0·7	0·87	0·5298
32	591 & 613 Gr. 80 " " "	Jan. 11 " 15	5 51	W, E E, W	60 20 51·03 50·92	+ 17 30·65 29·17	21·68 20·09	20·88	0·7	0·73	0·3730
33	590 & 623 Gr. 80	Jan. 15	5 39	E, W	60 37 25·20	+ 0 56·27	21·47	21·47	0·5	1·32	0·8712
34	591 & 623 Gr. 80	Jan. 11	5 37	W, E	60 34 54·67	+ 3 26·85	21·52	21·52	0·5	1·37	0·9385
35	643 & 677 Gr. 80	Jan. 15	8 8	W, E	60 21 26·22	+ 16 54·16	20·38	20·38	0·7	0·23	0·0370

182. Ladimsir—*Co-latitude* 60° 38′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1894	° ′		° ′ ″	′ ″	″	″			
36	686 & 693 Gr. 80 " " "	Jan. 11 " 15	4 15	W, E E, W	60 21 54·03 53·89	+ 16 26·27 27·15	20·30 21·04	20·67	0·7	0·52	0·1893
37	687 & 695 Gr. 80 " " "	Jan. 11 " 15	4 10	W, E E, W	60 26 50·43 50·29	+ 11 31·69 29·51	22·12 19·80	20·96	0·7	0·81	0·4593
38	686 & 695 Gr. 80 " " "	Jan. 11 " 15	4 10	W, E E, W	60 26 59·30 59·16	+ 11 22·12 22·11	21·42 21·27	21·34	0·7	1·19	0·9913
39	687 & 693 Gr. 80 " " "	Jan. 11 " 15	4 15	W, E E, W	60 21 45·16 45·01	+ 16 35·84 34·55	21·00 19·56	20·28	0·7	0·13	0·0118
40	713 & 720 Gr. 80 " " "	Jan. 11 " 15	13 33	E, W W, E	60 43 48·73 48·58	− 5 26·74 28·59	21·99 19·99	20·99	0·7	0·84	0·4939
41	713 & 721 Gr. 80	Jan. 15	13 34	W, E	60 42 54·25	− 4 34·60	19·65	19·65	0·5	0·50	0·1250
42	720 & 739 Gr. 80 " " "	Jan. 11 " 15	13 30	W, E E, W	60 40 59·37 59·22	− 2 39·93 39·33	19·44 19·89	19·66	0·7	0·49	0·1681
43	720 & 742 Gr. 80 " " "	Jan. 11 " 15	13 34	W, E E, W	60 44 22·88 22·73	− 6 2·63 2·87	20·25 19·86	20·05	0·7	0·10	0·0070
44	721 & 739 Gr. 80 " " "	Jan. 11 " 15	13 31	W, E E, W	60 40 5·04 4·89	− 1 44·15 45·33	20·89 19·56	20·22	0·7	0·07	0·0034
45	721 & 742 Gr. 80 " " "	Jan. 11 " 15	13 35	W, E E, W	60 43 28·55 28·40	− 5 6·85 8·86	21·70 19·54	20·62	0·7	0·47	0·1546
46	785 & 810 Gr. 80 " " "	Jan. 11 " 15	10 25	E, W W, E	60 55 13·86 13·69	− 16 53·52 54·20	20·34 19·49	19·91	1·0	0·24	0·0576
47	874 & 905 Gr. 80 " " "	Jan. 11 " 15	4 18	E, W W, E	60 38 50·69 50·50	− 0 32·07 31·50	18·62 19·00	18·81	1·0	1·34	1·7956
48	917 & 937 Gr. 80	Jan. 11	34 30	W, E	60 24 32·18	+ 13 49·25	21·43	21·43	0·7	1·28	1·1469
49	954 & 957 Gr. 80 " " "	Jan. 11 " 15	32 3	E, W W, E	60 36 59·47 59·29	+ 1 20·18 20·83	19·65 20·12	19·88	1·0	0·27	0·0729
50	975 & 1011 Gr. 80 " " "	Jan. 11 " 15	15 15	W, E E, W	60 18 18·10 17·90	+ 20 2·87 2·46	20·97 20·36	20·66	0·7	0·51	0·1821
51	992 & 1011 Gr. 80 " " "	Jan. 11 " 15	15 24	W, E E, W	60 27 25·67 25·47	+ 10 55·76 54·51	21·43 19·98	20·70	0·7	0·55	0·2118
52	157 Gr. 72 & 273 Gr. 80	Jan. 14	12 35	W, E	60 30 54·96	+ 7 24·61	19·57	19·57	0·5	0·58	0·1682
53	157 Gr. 72 & 278 Gr. 80	Jan. 14	12 47	W, E	60 42 35·51	− 4 16·65	18·86	18·86	0·5	1·29	0·8321
54	334 & 368 Gr. 80	Jan. 14	0 19	W, E	60 29 45·22	+ 8 33·84	19·06	19·06	1·0	1·09	1·1881
55	378 & 388 Gr. 80	Jan. 14	4 57	E, W	60 52 0·01	− 13 40·70	19·31	19·31	0·5	0·84	0·3528

182. Ladimsir—*Co-latitude* 60° 38′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
56	382 & 390 Gr. 80	Jan. 14	5 2	E, W	60 47 29·83	− 9 10·53	19·30	19·30	0·5	0·85	0·3613
57	378 & 390 Gr. 80	Jan. 14	4 57	E, W	60 52 1·18	− 13 41·29	19·89	19·89	0·5	0·26	0·0338
58	404 & 412 Gr. 80 ,, ,, ,,	Jan. 12 ,, 14	19 34	E, W W, E	60 46 26·14 26·15	− 8 5·55 6·11	20·59 20·04	20·31	1·0	0·16	0·0256
59	419 & 434 Gr. 80 ,, ,, ,,	Jan. 12 ,, 14	2 21	W, E E, W	60 49 53·55 53·56	− 11 35·24 32·15	18·31 21·41	19·86	1·0	0·29	0·0841
60	444 & 460 Gr. 80 ,, ,, ,,	Jan. 12 ,, 14	8 46	E, W W, E	60 19 26·34 26·33	+ 18 51·65 55·33	17·99 21·66	19·82	1·0	0·33	0·1089
61	472 & 475 Gr. 80 ,, ,, ,,	Jan. 12 ,, 14	9 56	W, E E, W	60 43 46·71 46·70	− 5 29·90 24·81	16·81 21·89	19·35	1·0	0·80	0·6400
62	499 & 517 Gr. 80 ,, ,, ,,	Jan. 12 ,, 14	4 45	E, W W, E	60 54 19·56 19·54	− 16 1·00 0·07	18·56 19·47	19·01	1·0	1·14	1·2996
								Σ P = 45·8		Σ Pvv = 21·7332	

Summary.

No. of pairs 62

No. of observations 108

Mean difference between observations taken E, W and those taken W, E = − 0″·04

Observed Co-latitude (weighted mean) 60° 38′ 20″·15 ± 0″·059

Correction for Height above Sea-level + 0″·02

Final Co-latitude 60° 38′ 20″·17

		°	′	″	″
Astronomical Latitude (A)	=	29	21	39·83	± 0·059
Geodetic Latitude (G)	=	29	21	41·58	
Deflection of plumb-line (A−G)	=		−	1·75	

183. Lambatach—*Co-latitude* 58° 59′ +

Latitude	... 31° 1′	*Instrument*—Zenith Telescope	
Longitude	... 77 57	*Mean Height of Barometer*	in. 20·48
Height	... 10474 feet	*Mean Temperature*	34°·75

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1903	° ′		° ′ ″	′ ″	″	″			
1	1311 & 1314 Newcomb	Nov. 3	15 47	E, W	59 19 0·71	− 19 35·63	25·08	25·08	0·7	0·06	0·0025
2	1334 & 1342 Newcomb " " "	Nov. 2 " 3	17 9	E, W W, E	58 30 31·40 31·43	+ 28 52·67 53·94	24·07 25·37	24·72	0·5	0·42	0·0882
3	1334 & 1344 Newcomb " " "	Nov. 2 " 3	17 11	E, W W, E	58 32 58·67 58·71	+ 26 25·02 26·08	23·69 24·79	24·24	0·7	0·90	0·5670
4	1431 & 1444 Newcomb " " "	Nov. 1 " 3	18 6	E, W W, E	59 13 58·44 58·40	− 14 32·63 33·00	25·81 25·40	25·61	1·0	0·47	0·2209
5	1449 & 1452 Newcomb " " "	Nov. 1 " 3	31 33	W, E E, W	59 13 50·37 50·29	− 14 24·23 24·32	26·14 25·97	26·06	1·0	0·92	0·8464
6	1456 Newc. & 3708 Gr. 80 " " " "	Nov. 1 " 3	25 19	E, W W, E	58 57 8·43 8·35	+ 2 16·64 16·39	25·07 24·74	24·91	1·0	0·23	0·0529
7	3724 & 3733 Gr. 80 " " "	Nov. 1 " 3	25 38	W, E E, W	59 3 37·31 37·21	− 4 12·04 11·40	25·27 25·81	25·54	1·0	0·40	0·1600
8	1482 & 1496 Newcomb " " "	Nov. 1 " 3	31 48	E, W W, E	58 42 35·39 35·27	+ 16 49·71 51·03	25·10 26·30	25·70	0·5	0·56	0·1568
9	1490 & 1496 Newcomb " " "	Nov. 1 " 3	31 51	E, W W, E	58 45 36·24 36·12	+ 13 48·72 48·37	24·96 24·49	24·73	0·7	0·41	0·1177
10	3827 & 3846 Gr. 80 " " "	Nov. 1 " 3	10 36	W, E E, W	59 8 49·26 49·12	− 9 24·12 23·75	25·14 25·37	25·26	0·7	0·12	0·0101
11	3846 Gr. 80 & 1520 Newc. " " " "	Nov. 1 " 3	10 47	E, W W, E	58 57 52·08 51·94	+ 1 32·39 33·36	24·47 25·30	24·89	0·7	0·25	0·0438
12	1535 & 1553 Newcomb " " "	Nov. 1 " 3	25 24	W, E E, W	58 45 7·29 7·14	+ 14 17·82 17·04	25·11 24·18	24·65	0·5	0·49	0·1201
13	3930 Gr. 80 & 1553 Newc. " " " "	Nov. 1 3	25 35	W, E E, W	58 34 1·88 1·71	+ 25 23·66 22·08	25·54 23·79	24·67	0·7	0·47	0·1546
14	3968 & 4001 Gr. 80 " " "	Nov. 1 " 3	30 27	E, W W, E	58 45 56·95 56·76	+ 13 28·29 28·46	25·24 25·22	25·23	1·0	0·09	0·0081
15	4019 & 4029 Gr. 80 " " "	Nov. 1 " 3	24 19	W, E E, W	59 8 37·13 36·89	− 9 10·62 11·00	26·51 25·89	26·20	0·7	1·06	0·7865

183. Lambatach—*Co-latitude* 58° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1903	° ′		° ′ ″	′ ″	″	″			
16	4029 Gr. 80 & 1592 Newc. " " " "	Nov. 1 " 3	24 25	E, W W, E	59 14 46·38 46·14	− 15 20·61 19·68	25·77 26·46	26·12	0·7	0·98	0·6723
17	4046 & 4050 Gr. 80	Nov. 3	34 34	E, W	58 59 49·25	− 0 22·92	26·33	26·33	0·5	1·19	0·7081
18	4050 Gr. 80 & 2 Newc.	Nov. 3	34 17	W, E	58 42 24·62	+ 16 59·97	24·59	24·59	0·5	0·55	0·1513
19	22 & 27 Newcomb " " "	Nov. 1 " 3	31 30	W, E E, W	59 5 17·13 16·92	− 5 51·19 51·05	25·94 25·87	25·91	1·0	0·77	0·5929
20	32 & 35 Newcomb " " "	Nov. 1 " 3	2 12	E, W W, E	59 0 26·92 26·69	− 1 2·99 3·42	23·93 23·27	23·60	1·0	1·54	2·3716
21	45 & 55 Newcomb " " "	Nov. 1 " 3	7 7	W, E E, W	59 8 12·10 11·86	− 8 47·16 47·21	24·94 24·65	24·80	1·0	0·34	0·1156
22	61 & 65 Newcomb " " "	Nov. 1 " 3	23 33	E, W W, E	59 5 14·90 14·67	− 5 50·16 50·39	24·74 24·28	24·51	0·7	0·63	0·2778
23	65 & 76 Newcomb " " "	Nov. 1 " 3	23 42	W, E E, W	59 14 25·14 24·91	− 15 0·47 0·04	24·67 24·87	24·77	0·7	0·37	0·0958
								Σ P = 17·5		Σ Pvv = 8·3210	

Summary.

No. of pairs 23

No. of observations 43

Mean difference between observations taken E, W and those taken W, E = − 0″·18

Observed Co-latitude (weighted mean) 58° 59′ 25″·14 ± 0″·099

Correction for Height above Sea-level + 0″·48

Final Co-latitude 58° 59′ 25″·62

		°	′	″	″
Astronomical Latitude (A)	=	31	0	34·38	± 0·099
Geodetic Latitude (G)	=	31	1	8·46	
Deflection of plumb-line (A−G)	=		−	34·08	

184. Lingmara—*Co-latitude* 68° 17′ +

Latitude	... 21° 43′	*Maximum recorded Height of Barometer*	=	in. 29·111
Longitude	... 80 11	*Minimum* ,, ,, ,,	=	28·995
Height	... 1400 feet	*Maximum* ,, *Reading of Thermometer*	=	70°·1
Instrument—Zenith Sector No. 2		*Minimum* ,, ,, ,,	=	57 ·1

Observer—Lieut. S. G. Burrard, R.E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	$v v$
		1887			° ′ ″	° ′ ″	″	″	″		
1	240 Gr. 72	Jan. 10	N	E, W	0 14 37·37	68 31 42·94	5·57				
	,, ,,	,, 11	S	W, E	39·70	42·97	3·27				
	,, ,,	,, 12	,,	E, W	37·80	43·01	5·21	...	4·68	0·04	0·0016
2	246 Gr. 72	Jan. 8	N	E, W	2 11 13·42	70 28 17·89	4·47				
	,, ,,	,, 9	,,	W, E	14·18	17·93	3·75	...	4·11	0·53	0·2809
3	249 Gr. 72	Jan. 10	N	W, E	5 30 35·29	62 46 29·76	5·05				
	,, ,,	,, 11	S	E, W	35·95	29·78	5·73				
	,, ,,	,, 12	,,	W, E	34·82	29·80	4·62	5·73	...	0·59	0·3481
4	261 Gr. 72	Jan. 8	N	W, E	5 4 40·62	63 12 23·55	4·17				
	,, ,,	,, 9	,,	E, W	43·06	23·57	6·63				
	,, ,,	,, 13	S	W, E	40·34	23·66	4·00	4·93	...	0·39	0·1521
5	264 Gr. 72	Jan. 10	N	E, W	7 6 3·52	75 23 9·07	5·55				
	,, ,,	,, 11	S	W, E	3·79	9·12	5·33				
	,, ,,	,, 12	,,	E, W	2·48	9·17	6·69	...	5·86	1·22	1·4884
6	268 Gr. 72	Jan. 8	N	E, W	3 50 36·13	72 7 41·19	5·06				
	,, ,,	,, 9	,,	W, E	37·90	41·22	3·32				
	,, ,,	,, 13	S	E, W	36·39	41·38	4·99	...	4·46	0·18	0·0324
7	270 Gr. 72	Jan. 10	N	W, E	4 8 42·05	72 25 45·48	3·43				
	,, ,,	,, 11	S	E, W	40·97	45·52	4·55				
	,, ,,	,, 12	,,	W, E	42·27	45·56	3·29	...	3·76	0·88	0·7744
8	274 Gr. 72	Jan. 8	N	W, E	0 49 44·24	69 6 47·70	3·46				
	,, ,,	,, 9	,,	E, W	43·54	47·73	4·19				
	,, ,,	,, 13	S	W, E	43·50	47·85	4·35	...	4·00	0·64	0·4096
9	286 Gr. 72	Jan. 11	S	W, E	4 16 24·61	72 33 30·22	5·61				
	,, ,,	,, 12	,,	E, W	24·64	30·26	5·62	...	5·61	0·97	0·9409
10	292 Gr. 72	Jan. 8	N	E, W	2 25 4·97	70 42 9·46	4·49				
	,, ,,	,, 9	,,	W, E	5·56	9·49	3·93				
	,, ,,	,, 13	S	E, W	4·62	9·60	4·98	...	4·47	0·17	0·0289
11	297 Gr. 72	Jan. 10	N	W, E	1 5 30·40	69 22 34·47	4·07				
	,, ,,	,, 11	S	E, W	29·11	34·50	5·39				
	,, ,,	,, 12	,,	W, E	30·32	34·52	4·20	...	4·55	0·09	0·0081
12	309 Gr. 72	Jan. 8	N	W, E	0 58 40·43	69 15 44·63	4·20				
	,, ,,	,, 9	,,	E, W	38·59	44·65	6·06				
	,, ,,	,, 13	S	W, E	39·61	44·74	5·13	...	5·13	0·49	0·2401

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

184. Lingmara—*Co-latitude* 68° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1887			° ′ ″	° ′ ″	″	″	″		
13	313 Gr. 72	Jan. 10	N	E, W	2 36 24·15	65 40 40·88	5·03				
	" "	" 11	S	W, E	24·24	40·89	5·13				
	" "	" 12	"	E, W	24·86	40·90	5·76	5·31	...	0·77	0·5929
14	319 Gr. 72	Jan. 8	N	E, W	12 22 46·29	80 39 51·45	5·16				
	" "	" 9	"	W, E	47·34	51·50	4·16				
	" "	" 13	S	E, W	45·96	51·72	5·76	...	5·03	0·39	0·1521
15	321 Gr. 72	Jan. 10	N	W, E	0 41 49·86	67 35 15·19	5·05				
	" "	" 11	S	E, W	49·75	15·21	4·96				
	" "	" 12	"	W, E	49·94	15·22	5·16	5·06	...	0·52	0·2704
16	328 Gr. 72	Jan. 10	N	E, W	4 15 19·90	72 32 25·97	6·07				
	" "	" 11	S	W, E	20·56	26·00	5·44				
	" "	" 12	"	E, W	19·79	26·02	6·23	...	5·91	1·27	1·6129
17	329 Gr. 72	Jan. 8	N	W, E	2 22 4·72	65 55 0·55	5·27				
	" "	" 9	"	E, W	5·22	0·55	5·77				
	" "	" 13	S	W, E	4·09	0·58	4·67	5·24	...	0·70	0·4900
18	335 Gr. 72	Jan. 8	N	E, W	3 14 49·76	65 2 17·02	6·78				
	" "	" 9	"	W, E	47·30	17·02	4·32				
	" "	" 13	S	E, W	48·53	17·03	5·56	5·55	...	1·01	1·0201
19	340 Gr. 72	Jan. 10	N	W, E.	10 12 46·96	58 4 15·77	2·73				
	" "	" 11	S	E, W	47·84	15·75	3·59				
	" "	" 12	"	W, E	47·89	15·72	3·61	3·31	...	1·23	1·5129
20	345 Gr. 72	Jan. 8	N	W, E	2 2 26·30	66 14 38·19	4·49				
	" "	" 9	"	E, W	25·44	38·19	3·63				
	" "	" 13	S	W, E	26·31	38·21	4·52	4·21	...	0·33	0·1089
21	349 Gr. 72	Jan. 8	N	E, W	2 2 17·97	66 14 47·08	5·05				
	" "	" 9	"	W, E	16·86	47·08	3·94				
	" "	" 13	S	E, W	17·67	47·09	4·76	4·58	...	0·04	0·0016
22	355 Gr. 72	Jan. 10	N	E, W	9 49 51·76	58 27 13·33	5·09				
	" "	" 11	S	W, E	51·42	13·30	4·72				
	" "	" 12	"	E, W	52·41	13·27	5·68	5·16	...	0·62	0·3844
23	362 Gr. 72	Jan. 8	N	W, E	1 7 46·36	67 9 17·26	3·62				
	" "	" 9	"	E, W	47·00	17·26	4·26				
	" "	" 13	S	W, E	46·74	17·28	4·02	3·97	...	0·57	0·3249
24	367 Gr. 72	Jan. 10	N	W, E	9 32 51·57	77 49 55·61	4·04				
	" "	" 11	S	E, W	51·27	55·65	4·38				
	" "	" 12	"	W, E	50·71	55·69	4·98	...	4·47	0·17	0·0289
25	373 Gr. 72	Jan. 8	N	E, W	0 3 18·84	68 13 46·07	4·91				
	" "	" 9	"	W, E	17·60	46·07	3·67				
	" "	" 13	S	E, W	18·86	46·10	4·96	4·51	...	0·03	0·0009
26	374 Gr. 72	Jan. 10	N	E, W	0 0 49·25	68 17 54·59	5·34				
	" "	" 11	S	W, E	50·83	54·60	3·77				
	" "	" 12	"	E, W	50·54	54·61	4·07	...	4·39	0·25	0·0625
27	379 Gr. 72	Jan. 8	N	W, E	2 24 28·10	70 41 32·23	4·13				
	" "	" 9	"	E, W	26·88	32·25	5·37	...	4·75	0·11	0·0121

184. Lingmara—*Co-latitude* 68° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1887			° ′ ″	° ′ ″	″	″	″		
28	381 Gr. 72	Jan. 10	N	W, E	4 28 5·82	63 48 58·05	3·87				
	" "	" 11	S	E, W	5·83	58·03	3·86				
	" "	" 12	"	W, E	6·22	58·02	4·24	3·99	...	0·55	0·3025
29	388 Gr. 72	Jan. 8	N	E, W	6 36 1·18	74 53 6·70	5·52				
	" "	" 9	"	W, E	2·58	6·73	4·15				
	" "	" 13	S	E, W	1·10	6·85	5·75	...	5·14	0·50	0·2500
30	392 Gr. 72	Jan. 10	N	E, W	1 25 3·56	69 42 7·47	3·91				
	" "	" 11	S	W, E	4·61	7·48	2·87				
	" "	" 12	"	E, W	2·99	7·49	4·50	..	3·76	0·88	0·7744
31	401 Gr 72	Jan. 10	N	W, E	3 38 40·99	64 38 23·13	4·12				
	" "	" 11	S	E, W	41·81	23·11	4·92				
	" "	" 12	"	W, E	41·88	23·10	4·98	4·67	.	0·13	0·0169
32	408 Gr. 72	Jan. 8	N	W, E	11 58 54·91	56 18 8·95	3·86				
	" "	" 9	"	E, W	55·62	8·90	4·53				
	" "	" 13	S	W, E	55·41	8·70	4·11	4·16	.	0·38	0·1444
33	419 Gr. 72	Jan. 8	N	E, W	2 47 18·92	71 4 23·08	4·16				
	" "	" 9	"	W, E	18·84	23·09	4·25				
	" "	" 13	S	E, W	18·30	23·14	4·84	.	4·42	0·22	0·0484
34	422 Gr. 72	Jan. 10	N	E, W	5 46 11·97	74 3 17·97	6·00				
	" "	" 11	S	W, E	13·38	18·00	4·62				
	" "	" 12	"	E, W	11·75	18·02	6·27	.	5·63	0·99	0·9801
35	429 Gr. 72	Jan. 8	N	W, E	5 26 10·92	73 43 15·12	4·20				
	" "	" 9	"	E, W	10·79	15·15	4·36				
	" "	" 13	S	W, E	11·32	15·24	3·92	..	4·16	0·48	0·2304
36	434 Gr. 72	Jan. 10	N	W, E	9 26 4·73	77 43 9·50	4·77				
	" "	" 11	S	E, W	4·59	9·54	4·95				
	" "	" 12	"	W, E	4·16	9·58	5·42	.	5·05	0·41	0·1681
37	441 Gr. 72	Jan. 8	N	E, W	1 1 19·81	67 15 45·58	5·39				
	" "	" 9	"	W, E	18·62	45·58	4·20				
	" "	" 13	S	E, W	17·03	45·55	2·58	4·06	..	0·48	0·2304
38	445 Gr. 72	Jan. 10	N	E, W	3 11 17·35	71 28 22·51	5·16				
	" "	" 11	S	W, E	17·66	22·52	4·86				
	" "	" 12	"	E, W	16·96	22·53	5·57	...	5·20	0·56	0·3136
39	449 Gr. 72	Jan. 8	N	W, E	3 4 15·96	71 21 20·41	4·45				
	" "	" 9	"	E, W	14·82	20·42	5·60				
	" "	" 13	S	W, E	14·68	20·46	5·78	...	5·28	0·64	0·4096
40	450 Gr. 72	Jan. 11	S	E, W	14 47 40·22	53 29 23·52	3·74				
	" "	" 12	"	W, E	40·57	23·44	4·01	3·88	.	0·66	0·4356
41	456 Gr. 72	Jan. 9	N	W, E	11 16 8·21	57 0 54·43	2·64				
	" "	" 13	S	E, W	10·21	54·19	4·40	3·52	...	1·02	1·0404
42	460 Gr. 72	Jan. 10	N	E, W	3 9 28·80	65 7 37·21	6·01				
	" "	" 11	S	W, E	28·25	37·19	5·44				
	" "	" 12	"	E, W	28·13	37·17	5·30	5·58	...	1·04	1·0816

184. Lingmara—*Co-latitude* 68° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1887			° ′ ″	° ′ ″	″	″	″		
43	468 Gr. 72	Jan. 8	N	W, E	0 17 24·06	68 34 28·71	4·65				
	" "	" 9	"	E, W	23·58	28·71	5·13				
	" "	" 13	S	W, E	23·33	28·69	5·36	...	5·05	0·41	0·1681
44	472 Gr. 72	Jan. 10	N	W, E	3 13 31·61	71 30 35·00	3·39				
	" "	" 11	S	E, W	30·82	35·01	4·19				
	" "	" 12	"	W, E	29·88	35·02	5·14	...	4·24	0·40	0·1600
45	474 Gr. 72	Jan. 8	N	E, W	1 26 56·62	69 44 1·84	5·22				
	" "	" 9	"	W, E	58·85	1·84	2·99				
	" "	" 13	S	E, W	56·54	1·85	5·31	...	4·51	0·13	0·0169
46	498 Gr. 72	Jan. 10	N	E, W	6 7 27·54	62 9 37·35	4·89				
	" "	" 12	S	W, E	26·97	37·28	4·25	4·57	...	0·03	0·0009
47	500 Gr. 72	Jan. 8	N	W, E	4 26 25·32	72 43 29·49	4·17				
	" "	" 9	"	E, W	25·53	29·50	3·97				
	" "	" 13	S	W, E	25·99	29·57	3·58	...	3·91	0·73	0·5329
48	506 Gr. 72	Jan. 10	N	W, E	6 47 36·36	61 29 27·47	3·83				
	" "	" 11	S	E, W	37·39	27·42	4·81				
	" "	" 12	"	E, W	38·56	27·38	5·94	4·86	...	0·32	0·1024
49	519 Gr. 72	Jan. 10	N	E, W	3 12 30·50	71 29 35·46	4·96				
	" "	" 12	S	W, E	32·02	35·47	3·45	...	4·21	0·43	0·1849
50	526 Gr. 72	Jan. 8	N	E, W	5 52 12·61	62 24 51·63	4·24				
	" "	" 9	"	W, E	12·04	51·59	3·63				
	" "	" 13	S	E, W	13·52	51·43	4·95	4·27	...	0·27	0·0729
51	530 Gr. 72	Jan. 10	N	W, E	0 38 43·79	68 55 47·42	3·63				
	" "	" 12	S	E, W	41·83	47·41	5·58	...	4·60	0·04	0·0016
52	541 Gr. 72	Jan. 8	N	W, E	0 53 4·67	67 23 58·84	3·51				
	" "	" 9	"	E, W	6·33	[illegible]	5·16				
	" "	" 13	S	W, E	5·51	58·77	4·28	4·32	...	0·22	0·0484
53	551 Gr. 72	Jan. 8	N	E, W	2 48 39·51	65 28 24·76	4·27				
	" "	" 9	"	W, E	38·16	24·73	2·89				
	" "	" 13	S	E, W	39·65	24·63	4·28	3·81	...	0·73	0·5329
54	559 Gr. 72	Jan. 10	N	W, E	5 51 59·39	62 25 3·88	3·27				
	" "	" 12	S	E, W	61·46	3·80	5·26	4·27	...	0·27	0·0729
55	562 Gr. 72	Jan. 8	N	W, E	1 27 49·68	69 44 53·89	4·21				
	" "	" 9	"	E, W	48·80	53·89	5·09				
	" "	" 13	S	W, E	49·62	53·89	4·27	...	4·52	0·12	0·0144
56	569 Gr. 72	Jan. 12	S	W, E	4 13 15·38	64 3 48·54	3·92	3·92	...	0·62	0·3844
57	572 Gr. 72	Jan. 8	N	E, W	8 55 18·22	77 12 23·55	5·33				
	" "	" 9	"	W, E	18·82	23·59	4·77				
	" "	" 13	S	E, W	18·71	23·76	5·05	...	5·05	0·41	0·1681
58	579 Gr. 72	Jan. 10	N	W, E	1 33 0·67	66 44 2·56	3·23				
	" "	" 12	S	E, W	3·13	2·53	5·66	4·45	...	0·09	0·0081

184. Lingmara—*Co-latitude* 68° 17′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	$v v$
		1887			° ′ ″	° ′ ″	″	″	″		
59	581 Gr. 72	Jan. 8	N	W. E	1 55 48·14	66 21 16 44	4·58				
	„ „	„ 9	„	E, W	48·24	16·42	4·66	4·62	.	0·08	0·0064
60	589 Gr. 72	Jan. 10	N	E, W	1 24 47·63	66 52 18·26	5 89				
	„ „	„ 12	S	W, E	45·78	18·23	4·01	4·95	.	0·41	0·1681
61	590 Gr. 72	Jan. 8	N	E. W	2 43 36·70	65 33 30·81	7·51				
	„ „	„ 9	„	W, E	34·35	30·78	5·13	6·32	.	1·78	3·1684
62	600 Gr. 72	Jan. 10	N	W, E	0 49 13·30	67 27 49·93	3·23				
	„ „	„ 12	S	E, W	15·48	49·90	5·38	4 31		0·23	0·0529
63	610 Gr. 72	Jan. 8	N	W, E	0 51 9·61	67 25 55·16	4·77				
	„ „	„ 9	„	E, W	9·10	55·15	4·25	4·51		0 03	0·0009
64	618 Gr. 72	Jan. 10	N	E, W	0 51 36 36	69 8 40·49	4·13				
	„ „	„ 12	S	W, E	37·78	40·48	2·70	...	3·42	1·22	1·4884
65	626 Gr. 72	Jan. 9	N	W, E	6 34 3·53	61 43 0·28	3·81	3·81	.	0·73	0·5329
66	645 Gr. 72	Jan. 8	N	W, E	5 13 24·68	73 30 28·31	3 63				
	„ „	„ 9	„	E, W	24·25	28 34	4·09	. .	3·86	0·78	0·6084
								Σ vv by N Stars = 13·6115			
								Σ vv by S Stars = 12·5921			

Summary.

No. of North Stars 33 No. of South Stars 33

No. of observations 182

	°	′	″	″
Co-latitude by North Stars	68	17	4·540	± 0·077
„ „ South „	68	17	4·612	± 0·074
Mean Co-latitude	68	17	4·591	± 0·053
Correction for Height above Sea-level			+ 0·05	

Final Co-latitude 68° 17′ 4″·641

		°	′	″	″
Astronomical Latitude (A)	=	21	42	55·359	± 0·053
Geodetic Latitude (G)	=	21	48	3·07	
Deflection of plumb-line (A – G)	=			– 7·71	

185. Lohagara—*Co-latitude* 63° 57′ +

Latitude	...	26° 2′	*Instrument*—Zenith Telescope		
Longitude	...	88 24	*Mean Height of Barometer*	in. 29·81	
Height	...	205 feet	*Mean Temperature*	53°·6	

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	55 & 64 Newcomb " " "	Jan. 7 " 9	11 47	W, E E, W	63 48 13·54 13·69	+ 9 32·48 32·87	46·02 46·56	46·29	1·0	0·24	0·0576
2	105 & 120 Newcomb	Jan. 9	23 45	E, W	63 32 54·08	+ 24 51·87	45·95	45·95	0·4	0·10	0·0040
3	115 & 120 Newcomb	Jan. 9	23 49	E, W	63 29 30·42	+ 28 16·18	46·60	46·60	0·4	0·55	0·1210
4	141 & 143 Newcomb " " "	Jan. 7 " 9	6 59	W, E E, W	63 34 37·55 37·62	+ 23 8·64 8·85	46·19 46·47	46·33	1·0	0·28	0·0784
5	155 Newc. & 382 Gr. 80 " " " "	Jan. 7 " 9	8 30	W, E E, W	64 13 58·81 58·86	− 16 13·27 12·84	45·54 46·02	45·78	1·0	0·27	0·0729
6	165 & 182 Newcomb " " "	Jan. 7 " 9	26 14	W, E E, W	63 51 53·91 53·93	+ 5 51·64 51·83	45·55 45·76	45·66	1·0	0·39	0·1521
7	196 & 208 Newcomb " " "	Jan. 7 " 9	23 7	W, E E, W	63 52 26·85 26·86	+ 5 19·37 20·51	46·22 47·37	46·80	0·7	0·75	0·3938
8	215 & 234 Newcomb " " "	Jan. 7 " 9	16 27	E, W W, E	64 10 9·48 9·48	− 12 23·89 23·08	45·59 46·40	46·00	1·0	0·05	0·0025
9	273 & 277 Newcomb " " "	Jan. 10 " 11	8 31	W, E E, W	64 10 43·04 43·01	− 12 57·43 57·35	45·61 45·66	45·64	0·7	0·41	0·1177
10	273 & 278 Newcomb " " "	Jan. 10 " 11	8 19	W, E E, W	63 58 59·23 59·20	− 1 13·13 13·11	46·10 46·09	46·10	0·7	0·05	0·0018
11	304 & 309 Newcomb " " "	Jan. 10 " 11	7 10	E, W W, E	64 9 30·81 30·79	− 11 44·97 44·75	45·84 46·04	45·94	1·0	0·11	0·0121
12	329 & 342 Newcomb " " " " " "	Jan. 8 " 10 " 11	19 49	W, E W, E E, W	63 55 16·94 16·89 16·86	+ 2 29·32 29·02 28·97	46·26 45·91 45·83	45·96	1·2	0·09	0·0097

185. Lohagara—*Co-latitude* 63° 57′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
13	382 & 387 Newcomb	Jan. 8	18 47	W, E	63 50 18·58	+ 7 27·44	46·02				
	" " "	" 10		W, E	18·53	27·50	46·03				
	" " "	" 11		E, W	18·50	26·69	45·19	45·61	1·2	0·44	0·2323
14	426 & 433 Newcomb	Jan. 10	13 14	W, E	63 45 47·07	+ 11 58·63	45·70				
	" " "	" 11		E, W	47·04	59·44	46·48	46·09	0·7	0·04	0·0011
15	426 & 445 Newcomb	Jan. 10	13 5	W, E	63 36 45·39	+ 20 60·61	46·00				
	" " "	" 11		E, W	45·36	59·45	44·81	45·41	0·7	0·64	0·2867
16	454 Newc. & 1221 Gr. 80	Jan. 7	4 51	W, E	64 26 34·02	− 28 49·42	44·60				
	" " " "	" 10		E, W	34·00	48·85	45·15	44·88	1·0	1·17	1·3689
17	485 & 495 Newcomb	Jan. 7	1 14	W, E	64 7 47·82	− 10 2·11	45·71				
	" " "	" 9		E, W	47·80	1·88	45·92	45·82	0·7	0·23	0·0370
18	495 & 505 Newcomb	Jan. 7	1 12	E, W	64 10 37·49	− 12 51·97	45·52				
	" " "	" 9		W, E	37·48	52·12	45·36	45·44	0·7	0·61	0·2605
19	604 & 617 Newcomb	Jan. 7	26 25	E, W	64 17 27·48	− 19 41·92	45·56				
	" " "	" 9		W, E	27·56	41·81	45·75	45·66	1·0	0·39	0·1521
20	638 & 647 Newcomb	Jan. 7	17 27	E, W	64 2 43·01	− 4 57·80	45·21				
	" " "	" 9		W, E	43·14	57·12	46·02	45·62	1·0	0·43	0·1849
21	653 & 674 Newcomb	Jan. 10	6 5	E, W	63 35 35·79	+ 22 10·55	46·34				
	" " "	" 11		W, E	35·86	9·50	45·36	45·85	0·7	0·20	0·0280
22	674 Newc. & 1730 Gr. 80	Jan. 10	6 33	W, E	64 3 28·30	− 5 42·72	45·58				
	" " " "	" 11		E, W	28·38	42·71	45·67	45·63	0·7	0·42	0·1235
23	689 & 697 Newcomb	Jan. 10	14 57	E, W	63 59 45·08	− 1 60·47	44·61				
	" " "	" 11		W, E	45·16	59·29	45·87	45·24	1·0	0·81	0·6561
24	706 & 715 Newcomb	Jan. 10	23 46	W, E	63 45 18·42	+ 12 27·17	45·59				
	" " "	" 11		E, W	18·52	27·27	45·79	45·69	1·0	0·36	0·1296
25	726 & 740 Newcomb	Jan. 11	22 24	E, W	64 4 9·86	− 6 24·43	45·43	45·43	0·4	0·62	0·1538
26	727 & 740 Newcomb	Jan. 10	22 28	W, E	64 8 42·10	− 10 56·03	46·07				
	" " "	" 11		E, W	42·22	57·62	44·60	45·34	0·7	0·71	0·3529
27	1861 & 1885 Gr. 80	Jan. 10	17 24	E, W	63 48 53·41	+ 8 52·58	45·99				
	" " "	" 11		W, E	53·53	54·26	47·79	46·89	0·7	0·84	0·4939
28	1885 & 1888 Gr. 80	Jan. 10	17 10	W, E	63 34 16·53	+ 23 30·80	47·33				
	" " "	" 11		E, W	16·65	30·29	46·94	47·14	0·7	1·09	0·8317
29	783 & 794 Newcomb	Jan. 10	2 49	W, E	64 0 47·76	− 3 2·34	45·42				
	" " "	" 11		E, W	47·90	2·44	45·46	45·44	1·0	0·61	0·3721
30	798 & 802 Newcomb	Jan. 10	15 19	W, E	63 54 33·83	+ 3 12·40	45·23	45·23	0·7	0·82	0·4707
31	821 & 836 Newcomb	Jan. 10	14 48	W, E	63 43 0·28	+ 14 45·92	46·20				
	" " "	" 11		E, W	0·45	45·81	46·26	46·23	0·7	0·18	0·0227

185. Lohagara—*Co-latitude* 63° 57′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
32	845 & 854 Newcomb	Jan. 10	11 42	W, E	64 0 37·45	− 2 51·88	45·57				
	" " "	" 11		E, W	37·64	51·79	45·85	45·71	0·7	0·34	0·0809
33	845 & 856 Newcomb	Jan. 10	11 15	W, E	64 27 21·51	− 29 36·11	45·40				
	" " "	" 11		E, W	21·69	36·43	45·26	45·33	0·7	0·72	0·3629
								ΣP = 26·8		ΣPvv = 6·1553	

Summary.

No. of pairs 33
No. of observations 64

Mean difference between observations taken E, W and those taken W, E = − 0″·08

Observed Co-latitude (weighted mean) 63° 57′ 45″·82 ± 0″·057

Correction for Height above Sea-level + 0″·01

Final Co-latitude 63° 57′ 45″·83

		°	′	″	″
Astronomical Latitude (A)	=	26	2	14·17	± 0·057
Geodetic Latitude (G)	=	26	2	12·02	
Deflection of plumb-line (A − G)	=		+	2·15	

186. Losalli—*Co-latitude* 65° 53′ +

Latitude	... 24° 6′		*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 77 36		*Mean Height of Barometer*	in. 28·23
Height	... 1749 feet		*Mean Temperature*	59°·8

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	686 & 704 Gr. 80 „ „ „	Feb. 5 „ 6	1 24	E, W W, E	66 0 37·48 37·51	− 6 55·28 54·16	42·20 43·35	42·78	0·5	1·04	0·5408
2	707 & 686 Gr. 80 „ „ „	Feb 5 „ 6	1 19	W, E E, W	65 55 5·68 5 70	− 1 23·42 22·64	42·26 43·06	42·66	0·7	0·92	0·5925
3	800 & 846 Gr. 80 „ „ „	Feb. 5 „ 6	8 46	E, W W, E	65 45 40·27 40·28	+ 7 61·45 59·83	41·72 40·11	40·91	0·7	0·83	0·4822
4	846 & 861 Gr. 80 „ „ „	Feb. 5 „ 6	8 33	W, E E, W	65 58 45·23 45·24	− 5 4·73 2·76	40·50 42·48	41·49	0·7	0·25	0·0438
5	577 & 584 Gr. 80 „ „ „	Feb. 6 „ 8	0 11	W, E E, W	66 1 33·31 33·38	− 7 53·71 53·33	39·60 40·05	39·83	0·5	1·91	1·8241
6	590 & 577 Gr. 80 „ „ „	Feb. 6 „ 8	0 13	E, W W, E	66 3 0·66 0·73	− 9 20·37 20·36	40·29 40·37	40·33	0·5	1·41	0·9941
7	613 & 620 Gr. 80 „ „ „	Feb. 6 „ 7	11 39	E, W W, E	66 8 42·22 42·25	− 15 0·81 1·28	41·41 40·97	41·19	0·5	0·55	0·1513
8	630 & 648 Gr. 80 „ „ „	Feb. 6 „ 7	2 13	W, E E, W	65 59 10·48 10·51	− 5 28·79 28·71	41·69 41·80	41·74	0·7	0·00	0·0000
9	648 & 633 Gr. 80 „ „ „	Feb. 6 „ 7	2 15	E, W W, E	66 1 15·81 15·84	− 7 34·70 34·64	41·11 41·20	41·16	0·7	0·58	0·2355
10	869 & 888 Gr. 80	Feb. 6	13 2	W, E	65 44 22·42	+ 9 18·76	41·18	41·18	0·7	0·56	0·2195
11	1342 & 1363 Gr. 80 „ „ „	Feb. 6 „ 7	1 33	E, W W, E	65 52 12·72 12·69	+ 1 28·70 29·48	41·42 42·17	41·80	1·0	0·06	0·0036
12	1373 & 1390 Gr. 80 „ „ „	Feb. 6 „ 7	1 44	W, E E, W	65 55 5·61 5·58	− 1 23·11 23·85	42·50 41·73	42·11	0·7	0·37	0·0958
13	1390 & 1373 Gr. 80 „ „ „	Feb. 6 „ 7	1 27	E, W W, E	65 37 59·83 59·79	+ 15 43·16 41·95	42·99 41·74	42·37	0·7	0·63	0·2778
14	1397 & 1411 Gr. 80 „ „ „	Feb. 6 „ 7	5 39	E, W W, E	65 41 39·51 39·47	+ 12 2·10 2·67	41·61 42·14	41·87	1·0	0·13	0·0169
15	1483 & 1498 Gr. 80 „ „ „	Feb. 6 „ 7	8 35	W, E E, W	65 43 17·74 17·70	+ 10 24·92 23·92	42·66 41·62	42·14	0·7	0·40	0·1120

186. Losalli—*Co-latitude* 65° 53′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
16	1498 & 1507 Gr. 80	Feb. 6	8 28	E, W	65 49 28·23	+ 4 14·65	42·88				
	" " "	" 7		W, E	28·19	11·94	40·13	41·50	0·7	0·24	0·0403
17	1520 & 1547 Gr. 80	Feb. 6	5 58	E, W	65 54 22·85	− 0 42·00	40·85				
	" " "	" 7		W, E	22·82	40·61	42·21	41·53	1·0	0·21	0·0441
18	1572 & 1577 Gr. 80	Feb. 6	12 33	W, E	65 42 25·09	+ 11 16·96	42·05				
	" " "	" 7		E, W	25·07	15·43	40·50	41·28	0·7	0·46	0·1481
19	1580 & 1572 Gr. 80	Feb. 6	12 16	E, W	65 59 47·47	− 6 5·98	41·49				
	" " "	" 7		W, E	47·45	6·58	40·87	41·18	0·7	0·56	0·2195
20	1595 & 1617 Gr. 80	Feb. 6	2 22	W, E	65 59 33·62	− 5 52·19	41·43				
	" " "	" 7		E, W	33·59	51·85	41·74	41·59	0·7	0·15	0·0158
21	1617 & 1631 Gr. 80	Feb. 6	2 25	E, W	65 56 15·60	− 2 34·64	40·96				
	" " "	" 7		W, E	15·58	34·07	41·51	41·23	0·7	0·51	0·1821
22	994 & 998 Gr. 80	Feb. 8	3 40	W, E	66 4 35·77	− 10 53·60	42·17				
	" " "	" 10		E, W	35·76	53·06	42·70	42·43	1·0	0·69	0·4761
23	1010 & 1021 Gr. 80	Feb. 8	1 46	E, W	65 49 47·30	+ 3 54·91	42·21				
	" " "	" 10		W, E	47·28	55·85	43·13	42·67	1·0	0·93	0·8649
24	1104 & 1127 Gr. 80	Feb. 8	3 55	W, E	65 48 41·32	+ 4 59·29	40·61				
	" " "	" 10		E, W	41·28	61·04	42·32	41·46	1·0	0·28	0·0784
25	1181 & 1193 Gr. 80	Feb. 8	2 10	E, W	65 57 12·80	− 3 32·56	40·24				
	" " "	" 10		W, E	12·76	30·26	42·50	41·37	1·0	0·37	0·1369
26	1206 & 1240 Gr. 80	Feb. 8	3 41	E, W	65 36 18·16	+ 17 25·08	43·24				
	" " "	" 10		W, E	18·10	24·68	42·78	43·01	1·0	1·27	1·6129
27	1261 & 1272 Gr. 80	Feb. 8	12 33	W, E	65 35 31·83	+ 18 8·84	40·67	40·67	0·7	1·07	0·8014
28	1284 & 1297 Gr. 80	Feb. 8	7 59	E, W	65 59 12·02	− 5 30·63	41·39				
	" " "	" 10		W, E	11·97	29·06	42·91	42·15	1·0	0·41	0·1681
29	1632 & 1646 Gr. 80	Feb. 8	11 25	W, E	65 40 20·35	+ 13 22·32	42·67				
	" " "	" 9		E, W	20·32	21·38	41·70				
	" " "	" 10		E, W	20·29	21·39	41·68	42·18	0·8	0·44	0·1549
30	1646 & 1652 Gr. 80	Feb. 8	11 39	E, W	65 54 18·70	− 0 36·91	41·79				
	" " "	" 10		W, E	18·66	36·70	41·96	41·87	0·7	0·13	0·0118
31	1652 & 1686 Gr. 80	Feb. 8	11 45	W, E	65 48 14·65	+ 5 27·21	41·86				
	" " "	" 10		E, W	14·61	27·74	42·35	42·11	0·7	0·37	0·0958
32	1706 & 1632 Gr. 80	Feb. 8	11 18	E, W	65 47 11·92	+ 6 30·29	42·21				
	" " "	" 9		W, E	11·94	28·99	40·93				
	" " "	" 10		W, E	11·87	32·02	43·89	42·31	0·8	0·57	0·2599
33	1714 & 1728 Gr. 80	Feb. 8	7 17	E, W	66 4 15·20	− 10 33·78	41·42				
	" " "	" 9		W, E	15·19	33·67	41·52				
	" " "	" 10		W, E	15·17	33·79	41·38	41·44	1·2	0·30	0·1080

186. Losalli—*Co-latitude* 65° 53′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
34	1730 & 1733 Gr. 80	Feb. 8	4 33	W, E	66 2 21·34	− 8 39·29	42·05				
	" " "	" 10		E, W	21·31	39·82	41·49	41·77	1·0	0·03	0·0009
35	1751 & 1759 Gr. 80	Feb. 8	17 10	W, E	66 11 52 99	− 18 8·62	44·37				
	" " "	" 10		E, W	52·97	11·38	41·59	42·98	1·0	1·24	1·5376
36	1780 & 1794 Gr. 80	Feb. 8	0 47	E, W	65 34 46·34	+ 18 56·13	42·47				
	" " "	" 10		W, E	46·33	52·17	38·50	40·48	1·0	1·26	1·5876
37	1817 & 1843 Gr. 80	Feb. 8	20 19	W, E	66 7 50·60	− 14 9 05	41·55				
	" " "	" 10		E, W	50·60	9·47	41·13	41·34	0·7	0 40	0·1120
38	1843 & 1819 Gr. 80	Feb. 8	20 23	E, W	66 12 22·55	− 18 41·16	41·39				
	" " "	" 10		W, E	22·57	40·12	42·45	41·92	0·7	0·18	0·0227
								Σ P = 30 1		Σ Pvv = 14 2697	

Summary.

No. of pairs 38
No. of observations 77

Mean difference between observations taken E,W and those taken W, E = 0″·00

Observed Co-latitude (weighted mean) 65° 53′ 41″·74 ± 0″·076

Correction for Height above Sea-level + 0″·07

Final Co-latitude 65° 53′ 41″·81

		°	′	″	″
Astronomical Latitude (A)	=	24	6	18·19	± 0·076
Geodetic Latitude (G)	=	24	6	19·17	
Deflection of plumb-line (A − G)	=		−	0·98	

187. Lunki—*Co-latitude* 65° 1′ +

Latitude ... 24° 58′
Longitude ... 70 42
Height ... 588 feet

Instrument—Zenith Telescope
Mean Height of Barometer 29·48 in.
Mean Temperature 64°·0

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	1520 & 1528 Newcomb	Dec. 9	16 28	W, E	64 39 41·18	+ 21 58·97	40·15	40·15	0·5	1·10	0·6050
2	1520 & 1534 Newcomb	Dec. 9	16 49	W, E	65 0 27·16	+ 1 13·25	40·41	40·41	0·5	0·84	0·3528
3	3908 Gr. 80 & 1552 Newc.	Dec. 9	23 53	E, W	65 24 7·41	− 22 25·36	42·05	42·05	0·7	0·80	0·4480
4	1561 & 1583 Newcomb	Dec. 9	6 7	W, E	65 19 16·02	− 17 34·98	41·04	41·04	0·7	0·21	0·0309
5	10 & 14 Newcomb	Dec. 9	10 48	E, W	64 33 40·52	+ 28 0·63	41·15	41·15	0·7	0·10	0·0070
6	36 Newc. & 113 Gr. 80	Dec. 9	5 39	E, W	65 19 4·56	− 17 23·04	41·52	41·52	0·7	0·27	0·0510
7	136 & 160 Gr. 80	Dec. 9	6 19	W, E	65 2 4·10	− 0 22·55	41·55	41·55	0·5	0·30	0·0450
8	136 & 181 Gr. 80	Dec. 9	6 25	W, E	64 55 43·74	+ 5 57·62	41·36	41·36	0·5	0·11	0·0061
9	185 Gr. 80 & 79 Newc.	Dec. 9	21 49	E, W	65 5 35·68	− 3 54·21	41·47	41·47	0·7	0·22	0·0339
10	82 & 93 Newcomb	Dec. 9	19 41	W, E	64 40 30·13	+ 21 10·66	40·79	40·79	0·7	0·46	0·1481
11	97 & 108 Newcomb	Dec. 9	16 8	E, W	65 12 43·62	− 11 2·05	41·57	41·57	0·7	0·32	0·0717
12	118 & 121 Newcomb	Dec. 9	4 24	W, E	65 17 12·36	− 15 31·12	41·24	41·24	0·7	0·01	0·0001
13	296 & 317 Gr. 80	Dec. 9	7 44	E, W	64 55 35·99	+ 6 5·15	41·14	41·14	0·7	0·11	0·0085
14	347 Gr. 80 & 155 Newc.	Dec. 9	7 49	E, W	64 54 54·33	+ 6 46·70	41·03	41·03	0·7	0·22	0·0339
15	161 Newc. & 414 Gr. 80	Dec. 9	3 39	E, W	64 48 47·45	+ 12 53·88	41·33	41·33	0·5	0·08	0·0032

187. Lunki—*Co-latitude* 65° 1′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1900	° ′		° ′ ″	′ ″	″	″			
16	414 Gr. 80 & 185 Newc.	Dec. 9	3 57	W, E	65 6 28·11	− 4 46·59	41·52	41·52	0·5	0·27	0·0365
17	471 Gr. 80 & 203 Newc.	Dec. 9	4 1	E, W	65 18 36·44	− 16 54·55	41·89	41·89	0·5	0·64	0·2048
18	471 Gr. 80 & 209 Newc.	Dec. 9	3 58	E, W	65 15 13·88	− 13 32·01	41·87	41·87	0·5	0·62	0·1922
19	229 Newc. & 577 Gr. 80	Dec. 9	0 26	W, E	65 24 56·78	− 23 15·39	41·39	41·39	0·7	0·14	0·0137
20	589 Gr. 80 & 248 Newc.	Dec. 8	14 27	E, W	64 43 4·51	+ 18 37·51	42·02	42·02	0·7	0·77	0·4150
21	256 & 258 Newcomb	Dec. 8	3 28	E, W	64 43 36·08	+ 18 5·22	41·30	41·30	0·7	0·05	0·0018
22	740 & 776 Gr. 80	Dec. 8	12 30	W, E	65 11 13·84	− 9 32·13	41·71	41·71	0·5	0·46	0·1058
23	749 & 776 Gr. 80	Dec. 8	12 39	W, E	65 20 30·21	− 18 48·50	41·71	41·71	0·5	0·46	0·1058
24	305 & 313 Newcomb	Dec. 8	19 7	E, W	65 26 37·84	− 24 56·75	41·09	41·09	0·7	0·16	0·0179
25	343 Newc. & 902 Gr. 80	Dec. 8	3 20	W, E	64 48 45·15	+ 12 56·07	41·22	41·22	0·7	0·03	0·0006
26	387 & 394 Newcomb	Dec. 8	20 24	W, E	65 27 1·25	− 25 20·18	41·07	41·07	0·5	0·18	0·0162
27	387 & 415 Newcomb	Dec. 8	20 9	W, E	65 12 39·37	− 10 58·94	40·43	40·43	0·5	0·82	0·3362
28	426 & 430 Newcomb	Dec. 8	14 45	E, W	65 16 8·50	− 14 27·39	41·11	41·11	0·7	0·14	0·0137
29	440 & 458 Newcomb	Dec. 8	9 0	E, W	64 55 2·37	+ 6 39·69	42·06	42·06	0·5	0·81	0·3281
30	440 & 464 Newcomb	Dec. 8	8 53	E, W	64 47 53·69	+ 13 47·03	40·72	40·72	0·5	0·53	0·1405
31	468 & 479 Newcomb	Dec. 8	16 17	W, E	65 13 41·87	− 12 0·67	41·20	41·20	0·5	0·05	0·0013
32	475 & 479 Newcomb	Dec. 8	16 11	W, E	65 19 34·47	− 17 53·91	40·56	40·56	0·5	0·69	0·2381
33	484 Newc. & 1311 Gr. 80	Dec. 8	7 7	E, W	64 59 58·19	+ 1 42·79	40·98	40·98	0·7	0·27	0·0510
34	498 & 511 Newcomb	Dec. 8	8 48	W, E	65 8 45·59	− 7 4·62	40·97	40·97	0·7	0·28	0·0549

187. Lunki—*Co-latitude* 65° 1′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
35	517 & 521 Newcomb	Dec. 8	3 6	E, W	65 1 56·43	− 0 14·79	41·64	41·64	0·5	0·39	0·0761
36	521 & 531 Newcomb	Dec. 8	2 50	W, E	65 17 57·11	− 16 15·40	41·71	41·71	0·5	0·46	0·1058
37	544 & 558 Newcomb	Dec. 8	4 11	E, W	65 3 12·00	− 1 32·04	39·96	39·96	0·7	1·29	1·1649
38	1495 & 1500 Gr. 80	Dec. 8	8 40	W, E	65 22 36·18	− 20 54·97	41·21	41·21	0·7	0·04	0·0011
39	578 & 583 Newcomb	Dec. 8	13 54	E, W	65 2 45·59	− 1 3·96	41·63	41·63	0·7	0·38	0·1011
								Σ P = 23·7		Σ Pvv = 5·5683	

Summary.

No. of pairs 39

No. of observations 39

Mean difference between observations taken E, W and those taken W, E = + 0″·26

Observed Co-latitude (weighted mean) 65° 1′ 41″·25 ± 0″·053

Correction for Height above Sea-level + 0″·02

Final Co-latitude 65° 1′ 41″·27

		°	′	″	″
Astronomical Latitude (A)	=	24	58	18·73	± 0·053
Geodetic Latitude (G)	=	24	58	23·15	
Deflection of plumb-line (A − G)	=		−	4·42	

188. Madhupur—*Co-latitude* 66° 3′ +

Latitude	... 23° 57′	*Instrument*—Zenith Telescope	
Longitude	... 88 32	*Mean Height of Barometer*	in. 29·87
Height	... 92 feet	*Mean Temperature*	62°·4

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
1	3644 Gr. 80 & 1443 Newc.	Nov. 22	24 22	E, W	65 30 1·27	+ 33 15·71	16·98	16·98	0·4	0·20	0·0160
2	3644 Gr. 80 & 1449 Newc.	Nov. 22	24 50	E, W	65 57 56·16	+ 5 21·56	17·72	17·72	0·4	0·54	0·1166
3	1473 & 1488 Newcomb	Nov. 22	25 50	W, E	66 2 49·33	+ 0 27·60	16·93				
	" " "	" 30		E, W	49·58	27·80	17·38				
	" " "	Dec. 1		E, W	49·61	27·91	17·52	17·19	1·2	0·01	0·0001
4	1495 & 1499 Newcomb	Nov. 22	14 7	E, W	65 33 56·39	+ 29 21·22	17·61				
	" " "	" 30		W, E	56·64	20·54	17·18				
	" " "	Dec. 1		W, E	56·67	20·84	17·51	17·48	1·2	0·30	0·1080
5	1504 & 1507 Newcomb	Nov. 22	0 31	W, E	66 25 43·10	− 22 26·52	16·58				
	" " "	" 30		E, W	43·34	26·19	17·15				
	" " "	Dec. 1		E, W	43·37	27·01	16·36	16·67	1·2	0·51	0·3121
6	1553 & 1568 Newcomb	Nov. 22	18 27	W, E	65 42 46·94	+ 20 30·67	17·61				
	" " "	" 30		E, W	46·93	30·53	17·46				
	" " "	Dec. 1		E, W	46·93	30·95	17·88	17·64	1·2	0·46	0·2539
7	1569 & 1572 Newcomb	Nov. 22	19 21	E, W	65 33 10·93	+ 30 6·43	17·36	17·36	0·7	0·18	0·0227
8	1577 & 1584 Newcomb	Nov. 22	22 10	W, E	66 17 7·76	− 13 50·69	17·07				
	" " "	" 30		E, W	7·73	50·64	17·09				
	" " "	Dec. 1		E, W	7·72	51·06	16·66	16·98	0·8	0·20	0·0320
9	1584 & 6 Newcomb	Nov. 22	22 0	E, W	66 27 37·06	− 24 20·95	16·11				
	" " "	" 30		W, E	36·94	19·65	17·29				
	" " "	Dec. 1		W, E	36·93	19·64	17·29	16·70	0·8	0·48	0·1843
10	49 & 50 Newcomb	Nov. 22	16 45	W, E	66 11 55·13	− 8 38·65	16·48				
	" " "	Dec. 1		E, W	54·89	37·90	16·99	16·74	0·7	0·44	0·1355
11	50 & 61 Newcomb	Nov. 22	16 36	E, W	66 2 35·95	+ 0 40·95	16·90				
	" " "	Dec. 1		W, E	35·69	41·65	17·34	17·12	0·7	0·06	0·0025

188. Madhupur—*Co-latitude* 66° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1901	° ′		° ′ ″	′ ″	″	″			
12	79 & 82 Newcomb " " "	Nov. 22 Dec. 1	20 58	W, E E, W	65 56 27·02 26·68	+ 6 50·82 51·28	17·84 17·96	17·90	0·7	0·72	0·3629
13	79 & 88 Newcomb	Nov. 22	20 55	W, E	65 59 52·88	+ 3 23·96	16·84	16·84	0·4	0·34	0·0462
14	102 & 108 Newcomb " " "	Nov. 22 " 30	15 43	E, W W, E	65 37 30·73 30·40	+ 25 46·87 47·73	17·60 18·13	17·87	1·0	0·69	0·4761
15	118 & 119 Newcomb " " "	Nov. 22 " 30	5 9	W, E E, W	66 2 25·99 25·66	+ 0 50·15 50·80	16·14 16·46	16·30	0·7	0·88	0·5421
16	118 & 135 Newcomb " " "	Nov. 22 " 30	5 2	W, E E, W	65 55 42·12 41·78	+ 7 34·87 35·96	16·99 17·74	17·37	0·7	0·19	0·0253
17	138 Newc. & 401 Gr. 80 " " " "	Nov. 22 " 30	15 42	E, W W, E	65 54 55·58 55·20	+ 8 22·00 22·72	17·58 17·92	17·75	0·7	0·57	0·2274
18	153 Newc. & 401 Gr. 80 " " " "	Nov. 22 " 30	15 53	E, W W, E	66 5 54·92 54·56	− 2 38·33 37·08	16·59 17·48	17·04	0·7	0·14	0·0137
19	178 & 185 Newcomb " " "	Nov. 22 " 30	2 58	W, E E, W	66 5 47·12 46·77	− 2 30·03 29·01	17·09 17·76	17·43	0·7	0·25	0·0438
20	178 & 203 Newcomb " " "	Nov. 22 " 30	3 6	W, E E, W	66 13 48·41 48·07	− 10 31·63 30·58	16·78 17·49	17·14	0·7	0·04	0·0011
21	217 & 224 Newcomb " " "	Nov. 29 " 30	23 47	E, W W, E	66 7 32·92 32·89	− 4 15·85 15·26	17·07 17·63	17·35	0·7	0·17	0·0202
22	224 & 230 Newcomb " " "	Nov. 29 " 30	23 42	W, E E, W	66 13 2·36 2·33	− 9 44·65 44·95	17·71 17·38	17·55	0·7	0·37	0·0938
23	250 & 252 Newcomb " " "	Nov. 28 " 29	11 39	E, W W, E	66 8 19·15 19·11	− 5 1·59 2·28	17·56 16·83	17·20	1·0	0·02	0·0004
24	256 & 263 Newcomb " " "	Nov. 28 " 29	2 13	W, E E, W	65 58 49·43 49·38	+ 4 27·23 27·63	16·66 17·01	16·84	1·0	0·34	0·1156
25	273 & 287 Newcomb " " "	Nov. 28 " 29	9 51	E, W W, E	65 30 58·16 58·11	+ 32 18·76 20·12	16·92 18·23	17·58	1·0	0·40	0·1600
26	308 & 314 Newcomb " " "	Nov. 28 " 29	17 4	W, E E, W	66 8 21·67 21·63	− 5 4·50 4·40	17·17 17·23	17·20	0·7	0·02	0·0003

188. Madhupur—*Co-latitude* 66° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	′	″			
27	303 & 319 Newcomb	Nov. 28	17 9	W, E	66 3 17·47	− 0 0·23	17·24				
	,, ,, ,,	,, 29		E, W	17·44	+ 0·05	17·49	17·37	0·7	0·19	0·0253
28	329 & 341 Newcomb	Nov. 28	22 4	E, W	66 10 25·43	− 7 8·23	17·20				
	,, ,, ,,	,, 29		W, E	25·43	8·43	17·00	17·10	1·0	0·08	0·0064
29	364 & 369 Newcomb	Nov. 29	26 13	E, W	66 26 17·34	− 23 0·58	16·76	16·76	0·4	0·42	0·0706
30	366 & 369 Newcomb	Nov. 29	25 53	E, W	66 6 25·57	− 3 8·04	17·53	17·53	0·4	0·35	0·0490
31	405 & 431 Newcomb	Nov. 28	1 21	E, W	66 7 13·32	− 3 56·16	17·16				
	,, ,, ,,	,, 29		W, E	13·37	56·36	17·01	17·09	0·7	0·09	0·0057
32	412 & 431 Newcomb	Nov. 28	1 20	E, W	66 6 21·77	− 3 4·85	16·92				
	,, ,, ,,	,, 29		W, E	21·82	4·96	16·86	16·89	0·7	0·29	0·0589
33	433 & 440 Newcomb	Nov. 28	10 33	W, E	66 27 42·79	− 24 26·73	16·06				
	,, ,, ,,	,, 29		E, W	42·86	26·51	16·35	16·21	0·7	0·97	0·6586
34	440 & 445 Newcomb	Nov. 28	10 24	E, W	66 18 41·11	− 15 24·33	16·78				
	,, ,, ,,	,, 29		W, E	41·17	24·91	16·26	16·52	0·7	0·66	0·3049
35	458 & 481 Newcomb	Nov. 28	7 57	W, E	65 58 9·19	+ 5 8·13	17·32				
	,, ,, ,,	,, 29		E, W	9·26	7·82	17·08	17·20	0·7	0·02	0·0003
36	469 & 481 Newcomb	Nov. 28	7 38	W, E	65 39 15·34	+ 24 2·01	17·35				
	,, ,, ,,	,, 29		E, W	15·42	2·51	17·93	17·64	0·7	0·46	0·1481
37	482 & 480 Newcomb	Nov. 28	11 18	E, W	66 29 36·79	− 26 20·51	16·28	16·28	0·7	0·90	0·5670
38	496 Newc. & 1349 Gr. 80	Nov. 28	4 4	W, E	65 48 0·55	+ 15 17·35	17·90	17·90	0·7	0·72	0·3629
39	515 & 521 Newcomb	Nov. 28	1 54	E, W	66 14 21·13	− 11 4·40	16·73				
	,, ,, ,,	,, 29		W, E	21·26	3·55	17·71	17·22	1·0	0·04	0·0016
40	529 & 543 Newcomb	Nov. 28	14 26	E, W	66 4 58·14	− 1 40·46	17·68				
	,, ,, ,,	,, 29		W, E	58·28	41·20	17·08	17·38	1·0	0·20	0·0400
41	556 & 558 Newcomb	Nov. 28	5 18	W, E	66 11 11·36	− 7 54·76	16·60				
	,, ,, ,,	,, 20		E, W	11·52	54·15	17·37	16·99	0·7	0·19	0·0253
42	556 & 565 Newcomb	Nov. 28	5 6	W, E	66 23 35·00	− 20 17·90	17·10				
	,, ,, ,,	,, 29		E, W	35·16	18·16	17·00	17·05	0·7	0·13	0·0118

188. Madhupur—*Co-latitude* 66° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
43	577 & 584 Newcomb	Nov. 28	1 12	W, E	66 21 45·57	− 18 28·79	16·78				
	„ „ „	„ 29		E, W	45·75	28·85	16·90	16·84	1·0	0·34	0·1156
44	605 & 607 Newcomb	Nov. 28	12 33	E, W	65 43 10·91	+ 20 6·15	17·06				
	„ „ „	„ 29		W, E	11·10	6·69	17·79	17·43	1·0	0·25	0·0625
45	1617 Gr. 80 & 630 Newc.	Nov. 28	2 25	E, W	65 57 2·38	+ 6 14·85	17·23				
	„ „ „ „	„ 29		W, E	2·60	14·62	17·22	17·23	1·0	0·05	0·0025
46	1646 Gr. 80 & 642 Newc.	Nov. 29	11 38	E, W	65 55 7·05	+ 8 10·59	17·64	17·64	0·7	0·46	0·1481
47	662 & 669 Newcomb	Nov. 28	13 42	E, W	66 29 33·09	− 26 16·16	16·93				
	„ „ „	„ 29		W, E	33·33	16·38	16·95	16·94	1·0	0·24	0·0576
								ΣP = 36·9		ΣPvv = 6·0373	

Summary.

No. of pairs 47

No. of observations 91

Mean difference between observations taken E, W and those taken W, E = 0″·00

Observed Co-latitude (weighted mean) 66° 3′ 17″·18 ± 0″·040

Correction for Height above Sea-level 0″·00

Final Co-latitude 66° 3′ 17″·18

		°	′	″	″
Astronomical Latitude (A)	=	23	56	42·82	± 0·040
Geodetic Latitude (G)	=	23	56	38·97	
Deflection of plumb-line (A − G)	=		+	3·85	

189. Madras Observatory—*Co-latitude* 76° 55′ +

Latitude	... 13° 4′	*Maximum recorded Height of Barometer*	= 30·17 in.
Longitude	... 80 17	*Minimum* „ „ „	= 30·14
Height	... 54 feet	*Maximum* „ *Reading of Thermometer*	= 78°·8
Instrument—Zenith Sector No. 2		*Minimum* „ „ „	= 70 ·0

Observer—Captain S. G. Burrard, R.E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	*v*	*v v*
		1896-97			° ′ ″	° ′ ″	″	″	″		
1	177 Gr. 80	Jan. 3	N	W, E	0 39 44·34	77 35 37·82	53·48				
	„ „	„ 4	„	E, W	46·71	37·88	51·17	...	52·33	1·15	1·3225
2	199 Gr. 80	Jan. 3	N	E, W	6 2 10·90	82 58 2·70	51·80	...	51·80	0·62	0·3844
3	219 Gr. 80	Jan. 1	N	E, W	5 34 12·26	71 21 37·82	50·08				
	„ „	„ 3	„	W, E	12·79	37·92	50·71				
	„ „	„ 4	„	E, W	12·31	37·97	50·28	50·36	...	0·51	0·2601
4	232 Gr. 80	Dec. 31	N	E, W	1 44 54·93	75 10 56·53	51·46				
	„ „	Jan. 1	„	W, E	53·87	56·79	50·66				
	„ „	„ 3	„	E, W	54·24	56·91	51·15				
	„ „	„ 4	„	W, E	55·15	56·98	52·13	51·35	...	0·48	0·2304
5	251 Gr. 80	Dec. 31	N	W, E	0 41 48·13	76 14 4·30	52·43				
	„ „	Jan. 3	„	E, W	47·75	4·46	52·21	52·32	...	1·45	2·1025
6	268 Gr. 80	Dec. 31	N	E, W	4 25 38·29	81 21 30·08	51·79				
	„ „	Jan. 1	„	W, E	39·45	30·14	50·69				
	„ „	„ 3	„	E, W	39·02	30·26	51·24	...	51·24	0·06	0·0036
7	281 Gr. 80	Dec. 30	N	W, E	2 32 1·16	79 27 51·65	50·49				
	„ „	„ 31	„	E, W	0·66	51·71	51·05				
	„ „	Jan. 1	„	W, E	0·84	51·76	50·92				
	„ „	„ 3	„	E, W	1·19	51·88	50·69	...	50·79	0·39	0·1521
8	296 Gr. 80	Dec. 31	N	W, E	4 14 53·94	72 40 56·26	50·20				
	„ „	Jan. 1	„	E, W	53·84	56·30	50·14				
	„ „	„ 3	„	W, E	55·67	56·38	52·05	50·80	...	0·07	0·0049
9	326 Gr. 80	Dec. 30	N	E, W	9 54 35·04	67 1 15·12	50·16				
	„ „	„ 31	„	W, E	35·42	15·14	50·56				
	„ „	Jan. 1	„	W, E	35·29	15·16	50·45	50·39	...	0·48	0·2304
10	342 Gr. 80	Dec. 30	N	W, E	4 42 11·64	81 38 2·70	51·06				
	„ „	Jan. 1	„	E, W	12·64	2·82	50·18				
	„ „	„ 3	„	W, E	11·13	2·93	51·80	...	51·01	0·17	0·0289

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

189. Madras Observatory—*Co-latitude* 76° 55′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Mean by North Star	Mean by South Star	v	v v
		1896-97			° ′ ″	° ′ ″	″	″	″		
11	350 Gr. 80	Dec. 31	N	E, W	6 21 31·36	70 34 19·02	50·38	50·68	...	0·19	0·0361
	" "	Jan. 3	"	W, E	31·88	19·09	50·97				
12	363 Gr. 80	Dec. 30	N	E, W	2 55 22·23	79 51 12·71	50·48				
	" "	" 31	"	W, E	20·33	12·77	52·44				
	" "	Jan. 1	"	E, W	20·99	12·82	51·83				
	" "	" 3	"	W, E	21·49	12·92	51·43	...	51·55	0·37	0·1369
13	374 Gr. 80	Dec. 30	N	W, E	4 10 55·62	72 44 55·13	50·75				
	" "	" 31	"	E, W	54·38	55·17	49·55	50·59	...	0·28	0·0784
	" "	Jan. 1	"	W, E	56·25	55·21	51·46				
14	389 Gr. 80	Dec. 30	N	E, W	1 3 55·94	77 59 47·37	51·43	...	51·56	0·38	0·1444
	" "	" 31	"	W, E	55·73	47·41	51·68				
15	403 Gr. 80	Jan. 1	N	E, W	6 30 23·19	70 25 27·07	50·26	50·73	...	0·14	0·0196
	" "	" 3	"	W, E	24·08	27·12	51·20				
16	411 Gr. 80	Dec. 31	N	E, W	1 3 15·17	77 59 6·42	51·25	...	51·25	0·07	0·0049
17	425 Gr. 80	Jan. 1	N	W, E	1 35 28·62	75 20 22·29	50·91	50·90	...	0·03	0·0009
	" "	" 3	"	E, W	28·52	22·37	50·89				
18	444 Gr. 80	Jan. 1	N	E, W	7 51 48·34	69 4 5·32	53·66	52·06	...	1·19	1·4161
	" "	" 3	"	W, E	45·09	5·36	50·45				
19	630 Gr. 80	Dec. 31	N	W, E	8 44 4·30	68 11 47·50	51·80	51·28	...	0·41	0·1681
	" "	Jan. 1	"	E, W	3·25	47·50	50·75				
20	646 Gr. 80	Dec. 30	N	E, W	6 16 12·08	70 39 37·33	49·41	49·94	...	0·93	0·8649
	" "	Jan. 1	"	W, E	13·12	37·34	50·46				
21	664 Gr. 80	Dec. 31	N	E, W	2 4 33·71	74 51 16·38	50·09	50·19	...	0·68	0·4624
	" "	Jan. 1	"	W, E	33·85	16·43	50·28				
22	680 Gr. 80	Dec. 30	N	W, E	2 18 44·49	74 37 6·92	51·41	51·41	...	0·54	0·2916
23	700 Gr. 80	Dec. 31	N	W, E	8 59 30·86	67 56 21·24	52·10	51·59	...	0·72	0·5184
	" "	Jan. 1	"	E, W	29·84	21·23	51·07				
24	712 Gr. 80	Dec. 30	N	E, W	5 53 7·34	71 2 43·48	50·82	50·39	...	0·48	0·2304
	" "	Jan. 3	"	W, E	6·42	43·53	49·95				

189. Madras Observatory—*Co-latitude* 76° 55′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1896-97			° ′ ″	° ′ ″	″	″	″		
25	734 Gr. 80	Dec. 30	N	W, E	3 14 7·82	73 41 43·31	51·13				
	" "	" 31	"	E, W	7·28	43·35	50·63				
	" "	Jan. 1	"	W, E	6·89	43·39	50·28				
	" "	" 3	"	E, W	7·65	43·47	51·12	50·79	...	0·08	0·0064
26	754 Gr. 80	Dec. 30	N	E, W	9 41 32·03	67 14 16·50	48·53				
	" "	" 31	"	W, E	34·01	16 50	50·51	49·52	...	1 35	1·8225
27	771 Gr. 80	Jan. 1	N	E, W	16 30 40·86	93 26 31·65	50·79	...	50·79	0·39	0·1521
28	789 Gr. 80	Dec. 30	N	W, E	7 38 17·60	84 34 8·91	51·31				
	" "	" 31	"	E, W	18 43	9 00	50 57				
	" "	Jan. 1	"	W, E	18 39	9 09	50·70				
	" "	" 3	"	E, W	20·01	9·26	49 25	.	50·46	0·72	0·5184
29	811 Gr. 80	Dec. 30	N	E, W	11 30 42·00	88 26 33·36	51·36	...	51 36	0·18	0·0324
30	823 Gr. 80	Dec. 31	N	W, E	8 22 33·41	68 33 17·30	50·71				
	" "	Jan. 1	"	E, W	33·03	17 30	50·32	50·52	...	0·35	0·1225
31	836 Gr. 80	Dec. 30	N	W, E	11 3 43·80	65 52 6 77	50·57				
	" "	" 31	"	E, W	44·16	6 76	50·92				
	" "	Jan. 3	"	E, W	43·00	6·72	49·72	50·40		0·47	0·2209
32	877 Gr. 80	Dec. 30	N	E, W	8 55 22·71	68 0 29·46	52·17				
	" "	" 31	"	W, E	21·89	29 47	51 36				
	" "	Jan. 1	"	E, W	22·03	29·47	51 49	51·67	..	0·80	0·6400
33	892 Gr. 80	Dec. 30	N	W, E	4 13 14·65	72 42 37·23	51·88				
	" "	" 31	"	E, W	13 21	37·26	50·47				
	" "	Jan. 1	"	W, E	13·45	37·29	50 74	51·03	..	0·16	0·0256
34	918 Gr. 80	Dec. 30	N	E, W	13 26 36 51	90 22 26·79	50·28				
	" "	Jan. 3	"	W, E	35·68	27 27	51·59	...	50 94	0·24	0·0576
35	944 Gr. 80	Dec. 31	N	W, E	14 20 8·93	91 15 58·97	50·04				
	" "	Jan. 1	"	E, W	9·14	59·10	49·96				
	" "	" 3	"	E, W	9·16	59·36	50·20	...	50·07	1·11	1·2321
36	962 Gr. 80	Dec. 30	N	W, E	3 24 46·77	73 31 4·11	50·88				
	" "	" 31	"	E, W	48·52	4·15	52 67				
	" "	Jan. 1	"	W, E	45·79	4·19	49·98				
	" "	" 3	"	E, W	46·02	4·27	50·29	50·96	..	0·09	0·0081
37	975 Gr. 80	Dec. 30	N	E, W	1 22 56·07	75 32 54·43	50·50				
	" "	" 31	"	W, E	56·91	54·48	51·39				
	" "	Jan. 3	"	W, E	58·67	54·62	53·29	51·73	...	0·86	0·7396

189. Madras Observatory—*Co-latitude* 76° 55′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1896-97			° ′ ″	° ′ ″	″	″	″		
38	994 Gr. 80	Dec. 31	N	E, W	14 31 13·53	62 24 37·02	50·55				
	„ „	Jan. 1	„	W, E	12·15	37·00	49·15	49·85	...	1·02	1·0404
39	1001 Gr. 80	Dec. 30	N	W, E	5 40 46·92	82 36 38·38	51·46				
	„ „	Jan. 3	„	E, W	48·58	38·75	50·17	...	50·82	0·36	0·1296
40	1016 Gr. 80	Jan. 1	N	E, W	11 14 28·20	88 10 19·98	51·78				
	„ „	„ 3	„	W, E	28·55	20·23	51·68	...	51·73	0·55	0·3025
41	1026 Gr. 80	Jan. 3	N	E, W	10 12 4·27	66 43 46·45	50·72	50·72	...	0·15	0·0225
42	1037 Gr. 80	Jan. 3	N	W, E	1 42 47·09	75 13 4·69	51·78	51·78	...	0·91	0·8281
43	1052 Gr. 80	Jan. 3	N	E, W	9 51 49·70	67 4 0·78	50·48	50·48	...	0·39	0·1521

Σ vv by N. Stars = 12·5439
Σ vv by S. Stars = 4·6024

Summary.

No. of North Stars 28 No. of South Stars 15

No. of observations 101

	°	′	″	″
Co-latitude by North Stars	76	55	50·87	± 0·087
„ „ South „	76	55	51·18	± 0·100
Mean Co-latitude	76	55	51·03	± 0·066

Correction for Height above Sea-level 0·00

Final Co-latitude 76° 55′ 51″·03

		°	′	″	″
Astronomical Latitude (A)	=	13	4	8·97	± 0·066
Geodetic Latitude (G)	=	13	4	4·17	
Deflection of plumb-line (A−G)	=	+		4·80	

190. Mahadeo Pokra—*Co-latitude* 62° 19′ +

Latitude ... 27° 42′ *Height* ... 7095 feet

Longitude ... 85 34 *Instrument*—T. S. 6-inch Theodolite

Observer—Captain H. Wood, R.E.

Star	Date	Seconds of Co-latitude
	1903	″
Polaris ...	Nov. 7	5·7
β Gruis ...	" "	7·9
Polaris ...	" 8	2·8
α Gruis ...	" "	7·9

Summary.

No. of observations 15

	°	′	″
Observed Co-latitude	62	19	6·1
Correction for Height above Sea-level		+	0·3
Final Co-Latitude	**62°**	**19′**	**6″·4**

		°	′	″
Astronomical Latitude (A)	=	27	40	53·6
Geodetic Latitude (G)	=	27	41	31·5
Deflection of plumb-line (A − G)	=		−	37·9

191. Majhar—*Co-latitude* 63° 53′ +

Latitude	... 26° 6′	*Instrument*—Zenith Telescope	
Longitude	... 78 31	*Mean Height of Barometer*	in. 28·98
Height	... 1028 feet	*Mean Temperature*	67°·7

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = p	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	1456 Newc. & 3740 Gr. 80	Nov. 13	20 10	E, W	64 6 41·28	− 13 1·38	39·90				
	" " " "	" 14		W, E	41·29	1·19	40·10	40·00	1·0	0·34	0·1156
2	1483 & 1496 Newcomb	Nov. 13	37 8	W, E	64 2 36·40	− 8 57·33	39·07				
	" " "	" 14		E, W	36·40	57·10	39·30				
	" " "	" 15		W, E	36·40	56·84	39·56	39·31	1·2	0·35	0·1470
3	1499 & 1508 Newcomb	Nov. 13	15 30	E, W	64 10 41·96	− 17 2·04	39·92				
	" " "	" 14		W, E	41·96	2·11	39·85				
	" " "	" 15		E, W	41·96	2·46	39·50	39·78	1·2	0·12	0·0173
4	1517 & 1520 Newcomb	Nov. 13	15 18	W, E	63 29 19·19	+ 24 21·13	40·32				
	" " "	" 14		E, W	19·19	20·80	39·99				
	" " "	" 15		W, E	19·18	21·24	40·42	40·18	1·2	0·52	0·3245
5	1522 & 1529 Newcomb	Nov. 13	22 44	E, W	63 57 49·88	− 4 9·90	39·98				
	" " "	" 14		W, E	49·86	9·66	40·20				
	" " "	" 15		E, W	49·85	8·97	40·88	40·32	0·8	0·66	0·3485
6	1529 & 1540 Newcomb	Nov. 13	23 1	W, E	64 14 12·14	− 20 32·21	39·93				
	" " "	" 14		E, W	12·12	32·51	39·61				
	" " "	" 15		W, E	12·11	31·54	40·57	39·93	0·8	0·27	0·0583
7	1543 & 1550 Newcomb	Nov. 13	35 57	E, W	64 11 32·43	− 17 52·58	39·85				
	" " "	" 14		W, E	32·45	53·00	39·45				
	" " "	" 15		E, W	32·47	52·13	40·34	39·78	1·2	0·12	0·0173
8	1555 & 1565 Newcomb	Nov. 13	13 45	W, E	64 1 58·96	− 8 18·72	40·24				
	" " "	" 14		E, W	58·93	19·35	39·58				
	" " "	" 15		W, E	58·91	18·94	39·97	39·85	1·2	0·19	0·0433
9	3975 & 3993 Gr. 80	Nov. 13	23 30	E, W	63 33 19·17	+ 20 21·37	40·54				
	" " "	" 14		W, E	19·14	21·10	40·24				
	" " "	" 15		E, W	19·11	21·04	40·15	40·30	1·2	0·64	0·4915
10	1586 & 1590 Newcomb	Nov. 13	30 32	E, W	63 33 51·56	+ 19 48·10	39·66				
	" " "	" 14		W, E	51·52	48·29	39·81				
	" " "	" 15		E, W	51·48	47·94	39·42	39·68	1·2	0·02	0·0005

191. Majhar—*Co-latitude* 63° 53′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
11	1 & 4 Newcomb	Nov. 13	32 26	W, E	63 48 54·47	+ 4 44·18	38·65				
	" " "	" 14		E, W	54·43	45 00	39 43	39·04	1·0	0·62	0·3844
12	10 & 18 Newcomb	Nov 13	11 24	E, W	63 57 33·64	− 3 54·14	39 50				
	" " "	" 14		W, E	33·59	53·75	39 84				
	" " "	" 15		E, W	33·54	53 33	40·21	39·85	1·2	0·19	0·0433
13	22 & 31 Newcomb	Nov. 13	26 59	W, E	63 36 33·99	+ 17 5 90	39·89				
	" " "	" 14		E, W	33·94	5·76	39·70	39 80	1·0	0·14	0·0196
14	35 & 45 Newcomb	Nov. 13	2 32	E, W	63 44 6·64	+ 9 32 89	39·53				
	" " "	" 14		W, E	6·58	33 29	39 87				
	" " "	" 15		E, W	6·53	32·74	39·27	39·64	1·2	0·02	0·0005
15	55 & 64 Newcomb	Nov. 13	11 47	W, E	63 47 56·44	+ 5 43·34	39·78				
	" " "	" 14		E, W	56·38	43 50	39 88				
	" " "	" 15		W, E	56·32	43 73	40·05	39·90	1·2	0·24	0·0691
16	86 Newc. & 238 Gr. 80	Nov. 13	33 38	W, E	63 53 37·12	+ 0 2·45	39·57				
	" " " "	" 14		E, W	37 07	2·05	40 02				
	" " " "	" 15		W, E	37·01	2 59	39·60	39·81	1·2	0·15	0·0270
17	98 & 102 Newcomb	Nov. 13	14 14	E, W	64 7 58 63	− 14 19 11	39·52				
	" " "	" 14		W, E	58 56	19 36	39 20				
	" " "	" 15		E, W	58 49	18 84	39·65	39·40	1·2	0·26	0·0811
18	114 & 117 Newcomb	Nov. 13	37 11	W, E	63 59 9·53	− 5 29·68	39·85				
	" " "	" 14		E, W	9·48	30·20	39·28				
	" " "	" 15		W, E	9·42	30·17	39·25	39·42	1·2	0·24	0·0691
19	130 & 137 Newcomb	Nov. 13	24 10	E, W	63 32 38·19	+ 21 1·58	39·77				
	" " "	" 14		W, E	38·13	1 66	39·79				
	" " "	" 15		E, W	38·06	1·95	40·01	39·84	1·2	0·18	0·0389
20	141 & 143 Newcomb	Nov. 13	6 59	W, E	63 34 24·88	+ 19 14 66	39·54				
	" " "	" 14		E, W	24 82	15 34	40·16				
	" " "	" 15		W, E	24·76	14·89	39 65	39 88	1·2	0·22	0·0582
21	190 & 201 Newcomb	Nov. 16	27 21	E, W	64 12 58·06	− 19 18·60	39·46				
	" " "	" 17		W, E	58·00	19·74	38·26				
	" " "	" 18		E, W	57·94	18·06	39·88	38·98	1·2	0·68	0·5549
22	208 & 211 Newcomb	Nov. 16	23 15	W, E	63 44 5·88	+ 9 33·66	39·54				
	" " "	" 17		E, W	5·81	33·43	39·24				
	" " "	" 18		W, E	5·74	33·51	39·25	39·32	1·2	0·34	0·1387

191. Majhar—*Co-latitude* 63° 53′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
23	225 & 235 Newcomb	Nov. 16	36 30	E, W	63 35 43·48	+ 17 56·18	39·66				
	” ” ”	” 17		W, E	43·42	56·01	39·43				
	” ” ”	” 18		E, W	43·37	56·36	39·73	39·57	1·2	0·09	0·0097
24	248 & 252 Newcomb	Nov. 16	13 45	W, E	64 1 40·03	− 7 61·19	38·84				
	” ” ”	” 17		E, W	39·97	59·94	40·03				
	” ” ”	” 18		W, E	39·92	60·96	38·96	39·47	1·2	0·19	0·0433
25	273 & 277 Newcomb	Nov. 16	8 31	W, E	64 10 38·26	− 16 58·55	39·71				
	” ” ”	” 17		E, W	38·21	59·11	39·10				
	” ” ”	” 18		W, E	38·16	58·28	39·88	39·45	0·8	0·21	0·0353
26	273 & 278 Newcomb	Nov. 16	8 19	W, E	63 58 54·58	− 5 14·69	39·89				
	” ” ”	” 17		E, W	54·54	15·12	39·42				
	” ” ”	” 18		W, E	54·49	14·41	40·08	39·71	0·8	0·05	0·0020
27	289 & 298 Newcomb	Nov. 16	30 4	E, W	63 29 3·69	+ 24 36·13	39·82				
	” ” ”	” 17		W, E	3·66	36·30	39·96				
	” ” ”	” 18		E, W	3·62	36·05	39·67	39·86	1·2	0·20	0·0480
28	304 & 309 Newcomb	Nov. 16	7 10	W, E	64 9 28·27	− 15 48·38	39·89				
	” ” ”	” 17		E, W	28·25	49·47	38·78				
	” ” ”	” 18		W, E	28·22	48·41	39·81	39·32	1·2	0·34	0·1387
29	312 Newc. & 822 Gr. 80	Nov. 16	33 49	E, W	63 30 34·46	+ 23 5·10	39·56				
	” ” ” ”	” 17		W, E	34·43	5·95	40·38				
	” ” ” ”	” 18		E, W	34·40	4·96	39·36	39·92	1·2	0·26	0·0811
30	329 & 342 Newcomb	Nov. 16	19 50	W, E	63 55 16·26	− 1 36·02	40·24				
	” ” ”	” 17		E, W	16·25	36·68	39·57				
	” ” ”	” 18		W, E	16·23	36·79	39·44	39·71	1·2	0·05	0·0030
31	907 Gr. 80 & 357 Newc.	Nov. 16	31 19	E, W	64 9 8·89	− 15 29·56	39·33				
	” ” ” ”	” 17		W, E	8·88	29·28	39·60	39·47	0·7	0·19	0·0253
32	907 Gr. 80 & 358 Newc.	Nov. 16	31 19	E, W	64 9 55·84	− 16 17·21	38·63				
	” ” ” ”	” 17		W, E	55·84	16·41	39·43				
	” ” ” ”	” 18		E, W	55·83	18·08	37·75	38·81	0·8	0·85	0·5780
33	364 & 383 Newcomb	Nov. 16	28 28	W, E	64 11 29·41	− 17 49·88	39·53				
	” ” ”	” 17		E, W	29·42	50·70	38·72				
	” ” ”	” 18		W, E	29·42	50·28	39·14	39·03	0·8	0·63	0·3175
34	366 & 383 Newcomb	Nov. 16	28 8	W, E	63 51 37·75	+ 2 2·01	39·76				
	” ” ”	” 17		E, W	37·76	1·33	39·09				
	” ” ”	” 18		W, E	37·76	1·39	39·15	39·28	0·8	0·38	0·1155

191. Majhar—*Co-latitude* 63° 53′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
35	388 & 396 Newcomb	Nov. 16	11 13	E, W	64 0 33·50	− 6 53·94	39·56				
	" " "	" 17		W, E	33·51	53·50	40·01				
	" " "	" 18		E, W	33·52	53·02	40·50	40·02	0·8	0·36	0·1037
36	388 & 401 Newcomb	Nov. 16	11 30	E, W	64 17 2·59	− 23 22·93	39·66				
	" " "	" 17		W, E	2·60	22·79	39·81				
	" " "	" 18		E, W	2·61	22·58	40·03	39·83	0·8	0·17	0·0231
								ΣP = 38·5		ΣPvv = 4·5727	

Summary.

No. of pairs 36
No. of observations 104

Mean difference between observations taken E, W and those taken W, E = − 0″·06

Observed Co-latitude (weighted mean) 63° 53′ 39″·66 ± 0″·039

Correction for Height above Sea-level + 0″·04

Final Co-latitude 63° 53′ 39″·70

		°	′	″	″
Astronomical Latitude (A)	=	26	6	20·30	± 0·039
Geodetic Latitude (G)	=	26	6	17·00	
Deflection of plumb-line (A−G)	=		+	3·30	

192. Mal—*Co-latitude* 71° 12′ +

Latitude	... 18° 47′	*Instrument*—Zenith Telescope	
Longitude	... 84 33	*Mean Height of Barometer*	in. 29·53
Height	... 483 feet	*Mean Temperature*	66°·1

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	273 & 290 Gr. 80 „ „ „	Jan. 12 „ 14	1 43	E, W W, E	71 23 10·78 10·90	− 10 17·80 17·70	52·98 53·20	53·09	0·7	0·14	0·0137
2	290 & 296 Gr. 80 „ „ „	Jan. 12 „ 14	1 30	W, E E, W	71 10 39·40 39·52	+ 2 14·23 14·14	53·63 53·66	53·65	0·7	0·42	0·1235
3	334 & 342 Gr. 80 „ „ „	Jan. 12 „ 14	10 44	E, W W, E	70 53 44·52 44·60	+ 19 8·97 10·13	53·49 54·73	54·11	0·6	0·88	0·4640
4	342 & 368 Gr. 80 „ „ „	Jan. 12 „ 14	10 26	W, E E, W	71 12 5·00 5·09	+ 0 47·85 49·28	52·85 54·37	53·61	0·6	0·38	0·0866
5	368 & 369 Gr. 80 „ „ „	Jan. 12 „ 14	10 37	E, W W, E	71 23 3·22 3·31	− 10 10·19 9·75	53·03 53·56	53·30	0·6	0·07	0·0029
6	334 & 369 Gr. 80 „ „ „	Jan. 12 „ 14	10 55	E, W W, E	71 4 42·73 42·83	+ 8 11·49 11·12	54·22 53·95	54·09	0·6	0·86	0·4438
7	539 & 562 Gr. 80	Jan. 12	6 13	E, W	71 12 3·71	+ 0 49·02	52·73	52·73	0·7	0·50	0·1750
8	610 & 626 Gr. 80 „ „ „	Jan. 12 „ 14	20 47	E, W W, E	71 3 18·91 18·96	+ 9 32·28 33·65	51·19 52·61	51·90	1·0	1·33	1·7689
9	630 & 664 Gr. 80 „ „ „	Jan. 12 „ 14	3 20	W, E E, W	71 31 16·40 16·45	− 18 22·83 23·47	53·57 52·98	53·28	1·0	0·05	0·0025
10	677 & 680 Gr. 80 „ „ „	Jan. 12 „ 14	3 5	E, W W, E	71 32 30·28 30·32	− 19 38·57 37·44	51·71 52·88	52·30	0·7	0·93	0·6054
11	680 & 700 Gr. 80 „ „ „	Jan. 12 „ 14	3 21	W, E E, W	71 16 30·77 30·81	− 3 37·17 37·98	53·60 52·83	53·22	0·7	0·01	0·0001
12	707 & 717 Gr. 80 „ „ „	Jan. 12 „ 14	3 41	E, W W, E	70 54 19·44 19·48	+ 18 33·05 33·29	52·49 52·77	52·63	1·0	0·60	0·3600
13	750 & 783 Gr. 80 „ „ „	Jan. 12 „ 14	9 51	W, E E, W	71 25 31·28 31·32	− 12 38·98 38·94	52·30 52·38	52·34	1·0	0·89	0·7921
14	803 & 808 Gr. 80 „ „ „	Jan. 12 „ 14	5 46	E, W W, E	70 52 26·97 27·00	+ 20 25·49 24·92	52·46 51·92	52·19	1·0	1·04	1·0816
15	1791 & 1816 Gr. 80 „ „ „	Jan. 12 „ 14	2 2	W, E E, W	70 57 36·24 36·50	+ 15 16·82 14·08	53·06 50·58	51·82	1·0	1·41	1·9881

192. Mal—Co-latitude 71° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
16	1831 & 1850 Gr. 80 " " "	Jan. 12 " 14	3 30	W, E E, W	71 35 2·73 3·01	− 22 10·27 9·18	52·46 53·83	53·15	1·0	0·08	0·0064
17	1862 & 1874 Gr. 80 " " "	Jan. 12 " 14	2 47	E, W W, E	71 30 36·53 36·82	− 17 43·15 44·43	53·38 52·39	52·89	1·0	0·34	0·1156
18	1884 & 1908 Gr. 80	Jan. 12	3 36	W, E	70 56 44·29	+ 16 10·06	54·35	54·35	0·7	1·12	0·8781
19	1941 & 1985 Gr. 80 " " "	Jan. 12 " 14	8 18	W, E E, W	70 54 58·05 58·34	+ 17 54·72 54·99	52·77 53·33	53·05	1·0	0·18	0·0324
20	1990 & 2006 Gr. 80	Jan. 12	21 25	E, W	71 35 35·37	− 22 40·36	55·01	55·01	0·7	1·78	2·2179
21	2050 & 2060 Gr. 80 " " "	Jan. 12 " 14	9 13	W, E E, W	70 50 1·64 2·00	+ 22 49·92 49·89	51·56 51·89	51·73	1·0	1·50	2·2500
22	2084 & 2127 Gr. 80 " " "	Jan. 12 " 14	4 21	E, W W, E	71 20 31·00 31·38	− 7 37·27 38·37	53·73 53·01	53·37	1·0	0·14	0·0196
23	2144 & 2167 Gr. 80 " " "	Jan. 12 " 14	0 29	W, E E, W	71 34 21·52 21·91	− 21 27·63 28·45	53·89 53·46	53·68	1·0	0·45	0·2025
24	846 & 877 Gr. 80 " " "	Jan. 11 " 13	3 16	W, E E, W	71 16 8·43 8·47	− 3 13·92 16·43	54·51 52·04	53·28	1·0	0·05	0·0025
25	888 & 918 Gr. 80 " " "	Jan. 11 " 13	18 50	E, W W, E	71 32 26·83 26·87	− 19 34·83 33·64	52·00 53·23	52·62	1·0	0·61	0·3721
26	946 & 962 Gr. 80 " " "	Jan. 11 " 13	2 18	W, E E, W	71 13 5·87 5·91	− 0 11·48 12·83	54·39 53·06	53·73	1·0	0·50	0·2500
27	977 & 998 Gr. 80 " " "	Jan. 11 " 13	1 17	E, W W, E	71 1 31·53 31·57	+ 11 21·30 22·53	52·83 54·10	53·47	1·0	0·24	0·0576
28	1026 & 1037 Gr. 80 " " "	Jan. 11 " 13	4 15	W, E E, W	70 58 30·91 30·95	+ 14 21·75 21·68	52·66 52·63	52·65	0·6	0·58	0·2018
29	1037 & 1043 Gr. 80 " " "	Jan. 11 " 13	4 11	E, W W, E	71 2 41·32 41·36	+ 10 11·16 12·15	52·48 53·51	53·00	0·6	0·23	0·0317
30	1043 & 1053 Gr. 80 " " "	Jan. 11 " 13	4 27	W, E E, W	71 19 10·02 10·08	− 6 15·99 16·27	54·03 53·81	53·92	0·6	0·69	0·2857
31	1026 & 1053 Gr. 80 " " "	Jan. 11 " 13	4 31	W, E E, W	71 14 59·61 59·67	− 2 5·39 6·74	54·22 52·93	53·58	0·6	0·35	0·0735
32	1104 & 1139 Gr. 80 " " "	Jan. 11 " 13	1 54	W, E E, W	71 37 10·58 10·64	− 24 17·00 17·29	53·58 53·35	53·47	1·0	0·24	0·0576
33	1159 & 1168 Gr. 80 " " "	Jan. 11 " 13	6 7	E, W W, E	70 52 58·17 58·21	+ 19 54·54 55·72	52·71 53·93	53·32	1·0	0·09	0·0081
34	1184 & 1197 Gr. 80 " " "	Jan. 11 " 13	5 32	W, E E, W	71 10 5·18 5·24	+ 2 48·56 48·42	53·74 53·66	53·70	1·0	0·47	0·2209

192. Mal—*Co-latitude* 71° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
35	1206 & 1218 Gr. 80	Jan. 11	2 19	E, W	71 35 44·91	− 22 51·41	53·50				
	" " "	" 13		W, E	44·98	51·61	53·37	53·44	1·0	0·21	0·0441
36	1265 & 1272 Gr. 80	Jan. 11	6 41	W, E	71 26 43·17	− 13 51·88	51·29				
	" " "	" 13		E, W	43·25	50·96	52·29	51·79	1·0	1·44	2·0736
37	1285 & 1289 Gr. 80	Jan. 11	9 30	E, W	71 22 27·13	− 9 31·69	55·44				
	" " "	" 13		W, E	27·20	33·07	54·13	54·79	1·0	1·56	2·4336
38	1299 & 1313 Gr. 80	Jan. 11	13 19	W, E	71 12 15·64	+ 0 37·31	52·95				
	" " "	" 13		E, W	15·72	37·55	53·27	53·11	1·0	0·12	0·0144
39	1350 & 1383 Gr. 80	Jan. 11	2 55	W, E	71 2 4·29	+ 10 51·43	55·72				
	" " "	" 13		E, W	4·39	47·46	51·85	53·79	1·0	0·56	0·3136
40	1402 & 1405 Gr. 80	Jan. 11	9 2	E, W	71 28 52·91	− 16 1·07	51·84				
	" " "	" 13		W, E	53·02	0·22	52·80	52·32	1·0	0·91	0·8281
41	1416 & 1449 Gr. 80	Jan. 11	8 38	W, E	71 22 1·30	− 9 7·88	53·42	53·42	0·7	0·19	0·0253
42	1452 & 1467 Gr. 80	Jan. 11	14 40	E, W	71 34 47·56	− 21 54·15	53·41				
	" " "	" 13		W, E	47·70	54·47	53·23	53·32	1·0	0·09	0·0081
43	1480 & 1490 Gr. 80	Jan. 11	12 23	W, E	71 24 59·10	− 12 4·54	54·56				
	" " "	" 13		E, W	59·24	5·98	53·26	53·91	0·6	0·68	0·2774
44	1490 & 1493 Gr. 80	Jan. 11	12 19	E, W	71 21 24·59	− 8 30·39	54·20				
	" " "	" 13		W, E	24·73	31·28	53·45	53·83	0·6	0·60	0·2160
45	1493 & 1499 Gr. 80	Jan. 11	12 9	W, E	71 31 36·84	− 18 41·41	55·43				
	" " "	" 13		E, W	36·97	43·44	53·53	54·48	0·6	1·25	0·9375
46	1480 & 1499 Gr. 80	Jan. 11	12 13	W, E	71 35 11·34	− 22 16·09	55·25				
	" " "	" 13		E, W	11·48	18·08	53·40	54·33	0·6	1·10	0·7260
47	1504 & 1511 Gr. 80	Jan. 11	6 19	E, W	71 27 11·78	− 14 19·13	52·65				
	" " "	" 13		W, E	11·93	19·81	52·12	52·39	1·0	0·84	0·7056
48	1529 & 1533 Gr. 80	Jan. 11	3 30	W, E	71 5 53·53	+ 6 60·11	53·64				
	" " "	" 13		E, W	53·67	58·69	52·36	53·00	0·6	0·23	0·0317
49	1533 & 1536 Gr. 80	Jan. 11	3 9	E, W	71 27 6·84	− 14 12·95	53·89				
	" " "	" 13		W, E	6·98	14·19	52·79	53·34	0·6	0·11	0·0073
50	1536 & 1541 Gr. 80	Jan. 11	3 10	W, E	71 28 23·69	− 15 28·77	54·92				
	" " "	" 13		E, W	23·84	30·50	53·34	54·13	0·6	0·90	0·4860
51	1529 & 1541 Gr. 80	Jan. 11	3 32	W, E	71 7 10·38	+ 5 44·28	54·66				
	" " "	" 13		E, W	10·53	42·36	52·89	53·78	0·6	0·55	0·1815
52	1554 & 1572 Gr. 80	Jan. 11	6 56	E, W	71 19 20·49	− 6 26·31	54·18				
	" " "	" 13		W, E	20·66	27·57	53·09	53·64	0·7	0·41	0·1177

192. Mal—*Co-latitude* 71° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1890	° ′		° ′ ″	′ ″	″	″			
53	1572 & 1585 Gr. 80	Jan. 11	6 42	W, E	71 34 3·63	− 21 9·07	54·56				
	" " "	" 13		E, W	3·80	10·22	53·58	54·07	0·7	0·84	0·4939
								Σ P = 43·6		Σ Pvv = 25·1142	

Summary.

No. of pairs 53

No. of observations 102

Mean difference between observations taken E, W and those taken W, E = − 0″·44

Observed Co-latitude (weighted mean) 71° 12′ 53″·23 ± 0″·071

Correction for Height above Sea-level + 0″·02

Final Co-latitude 71° 12′ 53″·25

		°	′	″	″
Astronomical Latitude (A)	=	18	47	6·75	± 0·071
Geodetic Latitude (G)	=	18	47	16·97	
Deflection of plumb-line (A − G)	=		−	10·22	

193. Mandvi—*Co-latitude* 71° 22′ +

Latitude ... 18° 38′ — *Instrument*—Zenith Telescope

Longitude ... 73 35 — *Mean Height of Barometer* 26·04 in.

Height ... 4121 feet — *Mean Temperature* 62°·1

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
1	42 & 57 Gr. 80	Dec. 15	17 26	W, E	71 13 47·23	+ 8 23·78	11·0				
	„ „ „	„ 17		E, W	47·31	24·74	12·0	11·5	1·0	0·4	0·16
2	74 & 93 Gr. 80	Dec. 15	11 57	E, W	71 40 45·28	− 18 33·89	11·4				
	„ „ „	„ 17		W, E	45·35	33·18	12·2	11·8	0·7	0·1	0·01
3	93 & 120 Gr. 80	Dec. 15	11 38	W, E	71 21 36·12	+ 0 34·68	10·8				
	„ „ „	„ 17		E, W	36·19	35·79	12·0	11·4	0·7	0·5	0·18
4	146 & 170 Gr. 80	Dec. 15	4 14	W, E	71 23 37·72	− 1 24·90	12·8				
	„ „ „	„ 17		E, W	37·78	24·86	12·9	12·8	1·0	0·9	0·81
5	26 Dy. 75 & 199 Gr. 80	Dec. 15	11 56	E, W	71 3 58·79	+ 18 11·64	10·4				
	„ „ „ „	„ 17		W, E	58·83	11·92	10·7	10·5	1·0	1·4	1·96
6	248 & 264 Gr. 80	Dec. 17	1 26	W, E	71 40 54·41	− 18 42·32	12·1	12·1	0·5	0·2	0·02
7	264 & 273 Gr. 80	Dec. 17	1 27	E, W	71 41 10·60	− 18 58·66	11·9	11·9	0·5	0·0	0·00
8	275 Gr. 80 & 43 Dy. 75	Dec. 15	1 56	E, W	71 38 42·83	− 16 30·15	12·7				
	„ „ „ „	„ 17		W, E	42·86	29·97	12·9	12·8	1·0	0·9	0·81
9	325 & 340 Gr. 80	Dec. 15	3 41	W, E	71 32 25·66	− 10 13·37	12·3				
	„ „ „	„ 17		E, W	25·68	13·29	12·4	12·3	1·0	0·4	0·16
10	406 & 412 Gr. 80	Dec. 15	8 48	W, E	71 32 30·18	− 10 16·84	13·3				
	„ „ „	„ 17		E, W	30·19	17·45	12·7	13·0	1·0	1·1	1·21
11	418 & 444 Gr. 80	Dec. 15	1 57	E, W	71 1 57·73	+ 20 13·04	10·8				
	„ „ „	„ 17		W, E	57·73	13·74	11·5	11·1	1·0	0·8	0·64
12	467 & 475 Gr. 80	Dec. 15	0 56	W, E	71 36 14·51	− 14 2·48	12·0				
	„ „ „	„ 17		E, W	14·51	3·08	11·4	11·7	1·0	0·2	0·04

193. Mandvi—*Co-latitude* 71° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
13	69 Dy. 75 & 539 Gr. 80 ,, ,, ,, ,,	Dec. 15 ,, 17	6 21	E, W W, E	71 4 30·52 30·51	+ 17 42·30 41·44	12·8 11·9	12·3	0·7	0·4	0·11
14	539 & 562 Gr. 80 ,, ,, ,,	Dec. 15 ,, 17	6 13	W, E E, W	71 13 18·42 18·41	+ 8 52·55 53·60	11·0 12·0	11·5	0·7	0·4	0·11
15	597 & 610 Gr. 80	Dec. 13	20 45	W, E	71 2 16·05	+ 19 55·51	11·6	11·6	0·5	0·3	0·05
16	610 & 626 Gr. 80 ,, ,, ,,	Dec. 12 ,, 13	20 47	W, E E, W	71 4 21·93 21·90	+ 17 48·56 49·30	10·5 11·2	10·8	0·7	1·1	0·85
17	633 & 664 Gr. 80	Dec. 12	3 18	E, W	71 34 18·92	− 12 7·25	11·7	11·7	0·7	0·2	0·03
18	682 Gr. 80 & 407 Gr. 72 ,, ,, ,, ,,	Dec. 12 ,, 13	5 9	W, E E, W	71 5 2·28 2·27	+ 17 10·28 10·21	12·6 12·5	12·5	1·0	0·6	0·36
19	703 & 712 Gr. 80 ,, ,, ,,	Dec. 12 ,, 13	0 38	E, W W, E	71 41 7·19 7·19	− 18 54·99 55·25	12·2 11·9	12·0	1·0	0·1	0·01
20	727 & 754 Gr. 80 ,, ,, ,,	Dec. 12 ,, 13	4 4	W, E E, W	71 18 46·45 46·45	+ 3 24·97 25·15	11·4 11·6	11·5	1·0	0·4	0·16
21	792 Gr. 80 & 622 Gr. 64 ,, ,, ,, ,,	Dec. 12 ,, 13	4 52	W, E E, W	71 4 17·67 17·67	+ 17 54·57 54·47	12·2 12·1	12·1	1·0	0·2	0·04
22	823 Gr. 80 & 639 Gr. 64 ,, ,, ,, ,,	Dec. 12 ,, 13	3 6	W, E E, W	71 39 8·51 8·52	− 16 55·83 56·86	12·7 11·7	12·2	1·0	0·3	0·09
23	846 & 877 Gr. 80 ,, ,, ,,	Dec. 12 ,, 13	3 16	E, W W, E	71 16 31·04 31·05	+ 5 41·15 41·63	12·2 12·7	12·4	1·0	0·5	0·25
24	898 & 928 Gr. 80 ,, ,, ,,	Dec. 12 ,, 13	9 33	W, E E, W	71 1 53·13 53·15	+ 20 18·43 17·72	11·6 10·9	11·2	1·0	0·7	0·49
25	946 & 962 Gr. 80 ,, ,, ,,	Dec. 12 ,, 13	2 18	E, W W, E	71 13 14·41 14·42	+ 8 57·60 57·39	12·0 11·8	11·9	1·0	0·0	0·00
26	977 & 995 Gr. 80 ,, ,, ,,	Dec. 12 ,, 13	1 18	W, E E, W	71 1 1·10 1·12	+ 21 10·73 11·59	11·8 12·7	12·2	1·0	0·3	0·09
27	1026 & 1037 Gr. 80 ,, ,, ,,	Dec. 12 ,, 13	4 15	E, W W, E	70 58 23·58 23·61	+ 23 47·29 48·25	10·9 11·9	11·4	0·7	0·5	0·18

193. Mandvi—*Co-latitude* 71° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
28	1037 & 1043 Gr. 80 " " "	Dec. 12 " 13	4 11	W, E E, W	71 2 32·65 32·68	+ 19 38·34 39·69	11·0 12·4	11·7	0·7	0·2	0·03
29	1043 & 1053 Gr. 80 " " "	Dec. 12 " 13	4 27	E, W W, E	71 19 0·33 0·36	+ 3 12·37 12·20	12·7 12·6	12·6	0·7	0·7	0·34
30	1098 & 1139 Gr. 80 " " "	Dec. 12 " 13	2 11	W, E E, W	71 19 32·50 32·54	+ 2 39·62 38·80	12·1 11·3	11·7	1·0	0·2	0·04
31	1161 & 1173 Gr. 80 " " "	Dec. 12 " 13	10 28	E, W W, E	71 22 57·46 57·50	− 0 45·62 46·58	11·8 10·9	11·3	1·0	0·6	0·36
32	1184 & 1197 Gr. 80 " " "	Dec. 12 " 13	5 32	W, E E, W	71 9 28·06 28·11	+ 12 42·51 43·53	10·6 11·6	11·1	1·0	0·8	0·64
33	1206 & 1218 Gr. 80 " " "	Dec. 12 " 13	2 19	E, W W, E	71 35 3·29 3·35	− 12 50·34 50·65	12·9 12·7	12·8	1·0	0·9	0·81
34	136 Gr. 80 " "	Dec. 15 " 17	0 1	E, W W, E	71 23 28·05 28·11	− 1 14·61 15·69	13·4 12·4	12·9	1·0	1·0	1·00
35	220 Gr. 80	Dec. 17	0 3	E, W	71 18 45·99	+ 3 24·85	10·8	10·8	0·7	1·1	0·85
36	785 Gr. 80 " "	Dec. 12 " 13	0 2	E, W W, E	71 20 26·90 26·91	+ 1 43·40 46·53	10·3 13·4	11·8	1·0	0·1	0·01
37	1470 Gr. 80 " "	Dec. 14 " 16	0 5	W, E E, W	71 27 5·84 6·07	− 4 53·87 53·42	12·0 12·6	12·3	1·0	0·4	0·16
38	1265 & 1272 Gr. 80	Dec. 16	6 41	W, E	71 25 52·85	− 3 40·32	12·5	12·5	0·7	0·6	0·25
39	1282 & 1289 Gr. 80	Dec. 16	9 49	W, E	71 40 40·20	− 18 27·64	12·6	12·6	0·7	0·7	0·34
40	758 & 764 Gr. 72 " " "	Dec. 14 " 16	7 30	W, E E, W	71 27 52·23 52·38	− 5 41·10 41·49	11·1 10·9	11·0	1·0	0·9	0·81
41	1349 & 1365 Gr. 80 " " "	Dec. 14 " 16	1 17	E, W W, E	71 6 53·55 53·72	+ 15 18·49 18·83	12·0 12·5	12·2	1·0	0·3	0·09
42	1378 Gr. 80 & 801 Gr. 72 " " " "	Dec. 14 " 16	4 19	W, E E, W	71 21 59·85 60·03	+ 0 12·92 11·52	12·8 11·5	12·1	1·0	0·2	0·04
43	1402 & 1405 Gr. 80 " " "	Dec. 14 " 16	9 2	E, W W, E	71 27 33·05 33·24	− 5 21·05 21·71	12·0 11·5	11·7	1·0	0·2	0·04
44	1411 & 1434 Gr. 80 " " "	Dec. 14 " 16	0 7	W, E E, W	71 25 59·79 59·98	− 3 47·17 47·31	12·6 12·7	12·6	1·0	0·7	0·49
45	1450 & 1453 Gr. 80 " " "	Dec. 14 " 16	14 44	E, W W, E	71 33 10·24 10·45	− 10 58·07 57·49	12·2 13·0	12·6	1·0	0·7	0·49
46	1480 & 1490 Gr. 80 " " "	Dec. 14 " 16	12 23	E, W W, E	71 23 25·41 25·64	− 1 13·20 13·31	12·2 12·3	12·2	0·7	0·3	0·06

193. Mandvi—*Co-latitude* 71° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N P D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
47	1490 & 1493 Gr. 80 " " "	Dec. 14 " 16	12 19	W, E E, W	71 19 49·42 49·65	+ 2 22·47 21·98	11 9 11·6	11·7	0·7	0·2	0·03
48	1504 & 1511 Gr. 80 " " "	Dec. 14 " 16	6 18	E, W W, E	71 25 33·94 34·19	− 3 21 03 22 47	12·0 11 7	11 8	1·0	0·1	0·01
49	1524 & 1533 Gr. 80 " " "	Dec. 14 " 16	3 32	W, E E, W	71 2 47·11 47 36	+ 19 24·20 24 08	11·3 11 4	11·3	0·7	0·6	0·25
50	1533 & 1536 Gr. 80 " " "	Dec. 14 " 16	3 9	E, W W, E	71 25 25·05 25 31	− 3 13·44 13 02	11·6 12·3	11·9	0·7	0·0	0 00
51	1536 & 1541 Gr. 80 " " "	Dec. 14 " 16	3 10	W, E E, W	71 26 40·65 40 91	− 4 29 26 28 44	11·4 12·5	11·9	0·7	0 0	0 00
52	1554 & 1572 Gr. 80 " " "	Dec. 14 " 16	6 56	W, E E, W	71 17 32·41 32·68	+ 4 39·44 39 61	11·8 12 3	12 0	1 0	0·1	0·01
53	1584 & 1599 Gr. 80 " " "	Dec. 14 " 16	11 34	E, W W, E	71 6 30·48 30 77	+ 15 41·42 41·40	11·9 12 2	12·0	1 0	0 1	0·01
								ΣP = 46·4		ΣPvv = 15·98	

Summary.

No. of pairs 53
No. of observations 99

Mean difference between observations taken E, W and those taken W, E = + 0″·06

Observed Co-latitude (weighted mean) 71° 22′ 11″·93 ± 0″·055

Correction for Height above Sea-level + 0″·13

Final Co-latitude 71° 22′ 12″·06

		°	′	″	″
Astronomical Latitude (A)	=	18	37	47·94	± 0·055
Geodetic Latitude (G)	=	18	37	51·11	
Deflection of plumb-line (A−G)	=	.	−	3·17	

194. Mooltan—*Co-latitude* 59° 49′ +

Latitude	... 30° 11′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 71 29	*Mean Height of Barometer*	in. 29·48
Height	... 420 feet	*Mean Temperature*	61°·0

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	1385 & 1400 Gr. 80 " " "	Mar. 9 " 10	45 46	E, W W, E	59 42 4·02 3·97	+ 6 61·21 59·42	5·23 3·39	4·31	0·7	0·48	0·1613
2	1393 & 1400 Gr. 80 " " "	Mar. 9 " 10	45 47	E, W W, E	59 41 34·45 34·39	+ 7 30·50 30·07	4·95 4·46	4·70	0·7	0·87	0·5298
3	1405 & 1450 Gr. 80 " " "	Mar. 9 " 10	2 48	W, E E, W	59 37 56·65 56·57	+ 11 8·42 6·31	5·07 2·88	3·97	0·7	0·14	0·0137
4	1416 & 1450 Gr. 80 " " "	Mar. 9 " 10	2 57	W, E E, W	59 46 21·13 21·04	+ 2 44·81 42·15	5·94 3·19	4·56	0·7	0·73	0·3730
5	1417 & 1450 Gr. 80	Mar. 10	2 57	W, E	59 46 19·02	+ 2 44·54	3·56	3·56	0·5	0·27	0·0365
6	1405 & 1452 Gr. 80 " " "	Mar. 9 " 10	2 46	W, E E, W	59 40 3·15 3·06	+ 9 0·96 0·02	4·11 3·08	3·59	0·7	0·24	0·0403
7	1416 & 1452 Gr. 80 " " "	Mar. 9 " 10	2 55	W, E E, W	59 48 27·63 27·54	+ 0 37·34 35·86	4·97 3·40	4·18	0·7	0·35	0·0858
8	1417 & 1452 Gr. 80 " " "	Mar. 9 " 10	2 55	W, E E, W	59 48 25·60 25·51	+ 0 40·06 38·24	5·66 3·75	4·70	0·7	0·87	0·5298
9	1474 & 1490 Gr. 80 " " "	Mar. 9 " 10	0 55	E, W W, E	59 56 5·86 5·77	− 7 0·63 1·90	5·23 3·87	4·55	1·0	0·72	0·5184
10	1494 & 1501 Gr. 80 " " "	Mar. 9 " 10	18 13	W, E E, W	59 45 17·37 17·28	+ 3 45·52 46·16	2·89 3·44	3·16	0·7	0·67	0·3142
11	1501 & 1504 Gr. 80 " " "	Mar. 9 " 10	18 6	E, W W, E	59 38 10·64 10·55	+ 10 54·41 51·86	5·05 2·41	3·73	0·7	0·10	0·0070
12	1520 Gr. 80 " "	Mar. 9 " 10	0 6	W, E E, W	59 55 8·36 8·26	− 6 3·28 3·51	5·08 4·75	4·91	1·0	1·08	1·1664
13	1539 & 1554 Gr. 80	Mar. 10	4 43	W, E	59 38 46·51	+ 10 18·46	4·97	4·97	0·5	1·14	0·6498
14	1550 & 1554 Gr. 80	Mar. 10	4 36	W, E	59 45 40·88	+ 3 22·95	3·83	3·83	0·5	0·00	0·0000
15	1571 & 1577 Gr. 80 " " "	Mar. 9 " 10	6 43	W, E E, W	59 50 53·10 52·99	− 1 49·64 49·48	3·46 3·51	3·48	0·7	0·35	0·0858

194. Mooltan—*Co-latitude* 59° 49′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
16	1571 & 1580 Gr. 80	Mar. 9	6 26	W, E	60 8 14·67	− 19 12·20	2 47				
	" " "	" 10		E, W	14·57	11·29	3 28	2·87	0·7	0·96	0·6451
17	1646 & 1665 Gr. 80	Mar. 9	5 52	E, W	60 6 18·22	− 17 13 36	4 86				
	" " "	" 10		W, E	18·11	14·46	3·65	4·25	0·7	0·42	0·1235
18	1646 & 1666 Gr. 80	Mar. 9	5 55	E, W	60 8 50 08	− 19 46·93	3 15				
	" " "	" 10		W, E	49·97	46·59	3·38	3·26	0·7	0·57	0·2274
19	1665 & 1686 Gr. 80	Mar. 9	5 58	W, E	60 0 12·24	− 11 8·21	4·03				
	" " "	" 10		E, W	12·13	8·14	3·99	4 01	0·7	0·18	0·0227
20	1666 & 1686 Gr. 80	Mar. 9	6 1	W, E	60 2 44·11	− 13 41 78	2·33				
	" " "	" 10		E, W	44·00	40·26	3·74	3 03	0·7	0·80	0·4480
21	1689 & 1700 Gr. 80	Mar. 9	46 17	E, W	60 1 7·89	− 12 3·86	4·03	4·03	0·7	0·20	0·0280
22	1713 & 1717 Gr. 80	Mar. 9	2 13	W, E	59 41 56 30	+ 7 7·84	4·14				
	" " "	" 10		E, W	56·18	8 43	4·61	4·37	0·7	0 54	0·2041
23	1717 & 1720 Gr. 80	Mar. 9	2 5	E, W	59 50 11 86	− 1 8·08	3 78				
	" " "	" 10		W, E	11·75	6·64	5 11	4 44	0·7	0·61	0·2605
24	1014 & 1026 Gr. 80	Mar. 12	6 58	W, E	59 45 36·13	+ 3 27·44	3·57	3·57	0·5	0·26	0·0338
25	1014 & 1043 Gr. 80	Mar. 12	7 2	W, E	59 49 45·42	− 0 42·02	3·40	3·40	0·7	0·43	0·1294
26	1053 & 1060 Gr. 80	Mar. 11	16 7	W, E	59 39 5·52	+ 9 59·18	4·70				
	" " "	" 12		E, W	5·50	59·50	5·00	4·85	1·0	1·02	1·0404
27	1088 & 1103 Gr. 80	Mar. 11	48 0	E, W	59 54 35·29	− 5 31·25	4·04				
	" " "	" 12		W, E	35·27	29·99	5 28	4 66	1·0	0·83	0 6889
28	1110 & 1127 Gr. 80	Mar. 11	2 13	W, E	59 40 46 38	+ 8 17·45	3 83				
	" " "	" 12		E, W	46·35	17·23	3·58	3·70	0·7	0 13	0·0118
29	1110 & 1144 Gr. 80	Mar 11	2 5	W, E	59 33 13·16	+ 15 50 63	4 09				
	" " "	" 12		E, W	13·13	49 98	3·11	3·60	0·7	0·23	0 0373
30	1153 & 1156 Gr. 80	Mar. 11	29 29	E, W	59 55 30·67	− 6 28 62	2·05				
	" " "	" 12		W, E	30·64	26 56	4·08	3·06	0·7	0·77	0·4150
31	1153 & 1157 Gr. 80	Mar. 11	29 29	E, W	59 55 33·86	− 6 31·33	2·53				
	" " "	" 12		W, E	33·83	30 15	3·68	3·10	0 7	0·73	0·3730
32	1261 & 1266 Gr. 80	Mar. 13	6 55	E, W	59 56 35·63	− 7 32·51	3·12	3·12	0·7	0·71	0·3529
33	1271 & 1284 Gr. 80	Mar. 13	2 0	W, E	59 59 44·85	− 10 41·46	3·39	3·39	0·5	0·44	0·0968
34	1271 & 1298 Gr. 80	Mar. 13	2 3	W, E	59 56 0·26	− 6 57 59	2·67	2·67	0·5	1·16	0·6728
35	1271 & 1299 Gr. 80	Mar. 13	2 3	W, E	59 55 58 68	− 6 55·95	2·73	2·73	0 5	1·10	0·6050

194. Mooltan.—*Co-latitude* 59° 49′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1894	° ′		° ′ ″	′ ″	″	″			
36	1284 & 1287 Gr. 80	Mar. 13	1 50	E, W	59 49 54·53	− 0 51·22	3·31				
	„ „ „	„ 14		W, E	54·47	50·94	3·53	3·42	0·7	0·41	0·1177
37	1284 & 1289 Gr. 80	Mar. 13	1 56	E, W	59 55 58·19	− 6 52·84	5·35				
	„ „ „	„ 14		W, E	58·14	54·81	3·33	4·34	0·7	0·51	0·1821
38	1287 & 1298 Gr. 80	Mar. 13	1 54	W, E	59 46 9·95	+ 2 52·66	2·61	2·61	0·5	1·22	0·7442
39	1287 & 1299 Gr. 80	Mar. 13	1 54	W, E	59 46 8·36	+ 2 54·30	2·66	2·66	0·5	1·17	0·6845
40	1289 & 1298 Gr. 80	Mar. 13	2 0	W, E	59 52 13·61	− 3 8·97	4·64	4·64	0·5	0·81	0·3281
41	1289 & 1299 Gr. 80	Mar. 13	2 0	W, E	59 52 12·02	− 3 7·33	4·69	4·69	0·5	0·86	0·3698
42	1328 & 1343 Gr. 80	Mar. 13	3 20	E, W	59 38 24·70	+ 10 38·50	3·20	3·20	0·7	0·63	0·2778
43	1388 & 1401 Gr. 80	Mar. 13	32 46	W, E	59 55 7·60	− 6 3·52	4·08				
	„ „ „	„ 14		E, W	7·54	3·89	3·65	3·86	1·0	0·03	0·0009
44	1408 & 1413 Gr. 80	Mar. 13	13 4	E, W	59 32 12·84	+ 16 51·43	4·27	4·27	0·7	0·44	0·1355
45	1448 & 1477 Gr. 80	Mar. 13	23 9	W, E	60 3 12·71	− 14 9·82	2·89	2·89	0·7	0·94	0·6185
46	1504 & 1510 Gr. 80	Mar. 13	17 39	E, W	60 4 38·34	− 15 35·31	3·03	3·03	0·7	0·80	0·4480
47	1517 & 1538 Gr. 80	Mar. 13	24 29	W, E	60 0 41·86	− 11 38·38	3·48	3·48	0·7	0·35	0·0858
								Σ P = 32·2		Σ Pvv = 14·9208	

Summary.

No. of pairs 47
No. of observations 75

Mean difference between observations taken E,W and those taken W, E = − 0″·04

Observed Co-latitude (weighted mean) 59° 49′ 3″·83 ± 0″·067

Correction for Height above Sea-level + 0″·02

Final Co-latitude 59° 49′ 3″·85

		°	′	″	
Astronomical Latitude (A)	=	30	10	56·15	± 0·067
Geodetic Latitude (G)	=	30	10	58·70	
Deflection of plumb-line (A − G)	=		−	2·55	

195. Moulmein—*Co-latitude* 73° 29′ +

Latitude	... 16° 30′	*Instrument*—Zenith Telescope		
Longitude	... 97 40	*Mean Height of Barometer*	in. 29·98	
Height	.. 90 feet	*Mean Temperature*	75°·0	

Observer—Captain H. M. Cowie, R.E.

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1905	° ′		° ′ ″	′ ″	″	″			
1	57 & 67 Newcomb	Jan. 8	11 40	E, W	73 11 10·60	+ 18 45·03	55·63	55·63	0·7	1·40	1·3720
2	74 & 79 Newcomb " " "	Jan. 7 " 8	13 14	E, W W, E	73 38 58·43 58·61	− 9 2·96 2·39	55·47 56·22	55·85	1·0	1·18	1·3924
3	80 & 93 Newcomb " " "	Jan. 7 " 8	10 34	W, E E, W	73 47 23·45 23·63	− 17 27·86 28·10	55·59 55·44	55·52	1·0	1·51	2·2801
4	238 Gr. 80 & 97 Newc. " " " "	Jan. 7 " 8	24 14	E, W W, E	73 17 23·63 23·80	+ 12 32·30 32·88	55·93 56·68	56·31	0·7	0·72	0·3629
5	238 Gr. 80 & 102 Newc. " " " "	Jan. 7 " 8	23 49	E, W W, E	73 42 25·74 25·91	− 12 29·91 29·21	55·83 56·70	56·27	1·0	0·76	0·5776
6	105 & 107 Newcomb " " " " " "	Jan. 6 " 7 " 8	33 20	E, W W, E E, W	73 6 48·21 48·36 48·52	+ 23 7·33 6·84 7·90	55·54 55·20 56·42	55·59	0·8	1·44	1·6589
7	107 & 115 Newcomb " " " " " "	Jan. 6 " 7 " 8	33 23	W, E E, W W, E	73 3 25·10 25·24 25·39	+ 26 30·61 31·57 31·17	55·71 56·81 56·56	56·48	0·8	0·55	0·2420
8	121 Newc. & 308 Gr. 80 " " " "	Jan. 7 " 8	4 16	W, E E, W	73 54 41·32 41·48	− 24 42·79 43·09	58·53 58·39	58·46	1·0	1·43	2·0449
9	135 Newc. & 340 Gr. 80 " " " " " " " "	Jan. 6 " 7 " 8	2 7	E, W W, E E, W	73 3 23·18 23·34 23·49	+ 26 32·71 33·43 33·68	55·89 56·77 57·17	56·65	0·9	0·38	0·1300
10	145 Newc. & 376 Gr 80 " " " "	Jan. 6 " 7	19 35	W, E E, W	73 50 29·72 29·85	− 20 33·22 32·69	56·50 57·16	56·83	1·0	0·20	0·0400
11	159 & 171 Newcomb " " "	Jan. 7 " 8	10 26	W, E E, W	73 7 55·00 55·13	+ 22 1·67 1·92	56·67 57·05	56·86	0·7	0·17	0·0202
12	417 Gr. 80 & 180 Newc. " " " "	Jan. 6 " 8	1 36	E, W W, E	73 42 39·81 40·07	− 12 43·19 42·83	56·62 57·24	56·93	1·0	0·10	0·0100
13	180 Newc. & 432 Gr. 80 " " " " " " " "	Jan. 6 " 7 " 8	1 29	W, E E, W E, W	73 49 58·43 58·56 58·69	− 20 1·93 1·11 1·76	56·50 57·45 56·93	56·85	1·0	0·18	0·0324
14	189 Newc. & 471 Gr. 80	Jan. 6	12 30	E, W	73 47 5·67	− 17 8·41	57·26	57·26	1·0	0·23	0·0529

195. Moulmein—*Co-latitude* 73° 29′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1905	° ′		° ′ ″	′ ″	″	″			
15	203 & 219 Newcomb	Jan. 6	4 3	W, E	73 20 55·92	+ 9 0·18	56·10	56·10	0·5	0·93	0·4325
16	209 & 219 Newcomb	Jan. 6	4 6	W, E	73 17 34·03	+ 12 22·09	56·12	56·12	0·5	0·91	0·4141
17	221 & 234 Newcomb	Jan. 6	26 2	E, W	73 45 5·46	− 15 8·17	57·29	57·29	1·0	0·26	0·0676
18	607 Gr. 80 & 250 Newc. „ „ „ „	Jan. 7 „ 8	19 23	W, E E, W	73 51 36·10 36·18	− 21 38·85 39·03	57·25 57·15	57·20	1·0	0·17	0·0289
19	252 & 256 Newcomb „ „ „	Jan. 7 „ 8	4 48	E, W W, E	72 58 44·16 44·24	+ 31 12·51 13·48	56·67 57·72	57·20	0·8	0·17	0·0231
20	263 Newc. & 661 Gr. 80 „ „ „ „	Jan. 7 „ 8	9 23	W, E E, W	73 8 53·07 53·15	+ 21 4·14 4·56	57·21 57·71	57·46	0·8	0·43	0·1479
21	274 & 277 Newcomb „ „ „	Jan. 7 „ 8	0 58	E, W W, E	73 38 32·50 32·57	− 8 34·44 35·58	58·06 56·99	57·53	1·0	0·50	0·2500
22	274 & 278 Newcomb „ „ „	Jan. 7 „ 8	1 10	E, W W, E	73 26 48·98 49·05	+ 3 8·95 8·36	57·93 57·41	57·67	1·0	0·64	0·4096
23	281 & 287 Newcomb „ „ „	Jan. 7 „ 8	2 10	W, E E, W	73 11 39·14 39·20	+ 18 18·40 18·25	57·54 57·45	57·50	1·0	0·47	0·2209
24	304 & 306 Newcomb „ „ „	Jan. 7 „ 8	2 18	E, W W, E	73 36 58·99 59·04	− 7 1·47 0·83	57·52 58·21	57·87	1·0	0·84	0·7056
25	803 & 835 Gr. 80 „ „ „	Jan. 7 „ 8	3 28	W, E E, W	73 10 23·73 23·77	+ 19 35·32 34·64	59·05 58·41	58·73	1·0	1·70	2·8900
26	322 & 327 Newcomb	Jan. 8	21 48	W, E	73 25 13·85	+ 4 44·33	58·18	58·18	0·7	1·15	0·9258
27	329 & 336 Newcomb „ „ „	Jan. 7 „ 8	29 36	E, W W, E	73 41 18·98 19·00	− 11 20·89 21·23	58·09 57·77	57·93	1·0	0·90	0·8100
								Σ P =	23·9	Σ Pvv =	17·5423

Summary.

No. of pairs 27

No. of observations 52

Mean difference between observations taken E, W and those taken W, E = − 0″·04

Observed Co-latitude (weighted mean) 73° 29′ 57″·03 ± 0″·113

Correction for Height above Sea-level 0″·00

Final Co-latitude 73° 29′ 57″·03

		°	′	″	
Astronomical Latitude (A)	=	16	30	2·97	± 0·113
Geodetic Latitude (G)	=	16	29	54·62	
Deflection of plumb-line (A − G)	=		+	8·35	

196. Nagarkhana—*Co-latitude* 67° 37′ +

Latitude	... 22° 23′		*Instrument*—Zenith Telescope	
Longitude	.. 91 51		*Mean Height of Barometer*	in 29·75
Height	... 290 feet		*Mean Temperature*	61°·1

Observer—Captain H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1905	° ′		° ′ ″	′ ″	″	″			
1	189 & 195 Newcomb	Feb. 2	18 27	E, W	67 50 50·80	− 13 47 92	2 88				
	” ” ”	” 3		W, E	50·85	48·23	2·62	2·75	1 0	0·16	0·0256
2	203 Newc & 517 Gr. 80	Feb. 2	1 51	W, E	67 27 39·40	+ 9 23 37	2 77				
	” ” ” ”	” 3		E, W	39·44	24·11	3·55	3·16	1·0	0·25	0 0625
3	209 Newc. & 517 Gr. 80	Feb. 2	1 48	W, E	67 24 17·43	+ 12 45·32	2·75				
	” ” ” ”	” 3		E, W	17 47	45·66	3·13	2·94	1 0	0·03	0·0009
4	219 & 232 Newcomb	Feb. 1	9 41	E, W	67 42 6·67	− 5 3·58	3 09				
	” ” ”	” 2		W, E	6·70	3·38	3 32	3 21	0·7	0 30	0 0630
5	219 & 244 Newcomb	Feb. 1	9 30	E, W	67 53 41·02	− 16 38 33	2·69				
	” ” ”	” 2		W, E	41·06	38 22	2·84	2·77	0·7	0·14	0·0137
6	248 & 255 Newcomb	Feb. 1	17 1	W, E	67 16 14·01	+ 20 48 81	2 82				
	” ” ”	” 2		E, W	14·04	48·94	2·98	2·90	1·0	0·01	0·0001
7	262 & 263 Newcomb	Feb. 1	3 27	E, W	67 12 20 57	+ 24 42·49	3·06				
	” ” ”	” 2		W, E	20·60	42·34	2 94	3·00	0·7	0·09	0 0057
8	681 Gr. 80 & 277 Newc.	Feb. 2	4 54	E, W	67 46 46 91	− 9 43·43	3·48	3·48	0 5	0·57	0·1625
9	681 Gr. 80 & 278 Newc.	Feb. 2	4 42	E, W	67 35 3 35	+ 1 59·07	2·42	2·42	0·5	0·49	0·1201
10	288 Newc. & 750 Gr. 80	Feb. 1	6 4	W, E	67 37 37·58	− 0 34·12	3·46				
	” ” ” ”	” 2		E, W	37·59	34·37	3·22	3·34	0·7	0·43	0·1294
11	742 & 750 Gr. 80	Feb. 1	6 21	W, E	67 55 17·46	− 18 13·34	4·12				
	” ” ”	” 2		E, W	17·48	13·38	4·10	4·11	0·7	1·20	1·0080
12	776 Gr. 80 & 308 Newc.	Feb. 1	15 16	E, W	67 56 36·57	− 19 34·62	1·95				
	” ” ” ”	” 2		W, E	36·57	33·49	3·08	2·52	1·0	0·39	0·1521
13	811 Gr. 80 & 313 Newc.	Feb. 3	21 4	E, W	67 22 34·35	+ 14 28·32	2·67	2·67	1·0	0·24	0·0576
14	316 Newc. & 836 Gr. 80	Feb. 3	1 21	W, E	67 12 17·05	+ 24 46·28	3·33	3·33	0·7	0·42	0·1235
15	329 & 338 Newcomb	Feb. 3	23 12	E, W	67 17 20·81	+ 19 42·86	3·61	3·61	0·7	0·70	0·3430
16	329 & 350 Newcomb	Feb. 3	23 8	E, W	67 14 8·67	+ 22 54·42	3·09	3·09	0·7	0·18	0·0227

196. Nagarkhana—*Co-latitude* 67° 37′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1905	° ′		° ′ ″	′ ″	″	″			
17	359 & 369 Newcomb	Feb. 3	27 53	W, E	68 5 44·80	− 28 42·45	2·35	2·35	0·7	0·56	0·2195
18	373 & 383 Newcomb " " "	Feb. 1 " 2	32 0	E, W W, E	67 42 53·92 53·91	− 5 51·51 50·99	2·41 2·92	2·67	0·7	0·24	0·0403
19	1038 & 1051 Gr. 80 " " "	Feb. 2 " 3	37 29	W, E E, W	67 27 10·51 10·48	+ 9 53·21 52·25	3·72 2·73	3·23	1·0	0·32	0·1024
20	1038 Gr. 80 & 406 Newc. " " " "	Feb. 2 " 3	37 0	W, E E, W	67 56 34·33 34·31	− 19 30·73 32·06	3·60 2·25	2·93	0·7	0·02	0·0003
21	413 & 418 Newcomb " " "	Feb. 2 " 3	27 1	E, W W, E	67 41 8·39 8·36	− 4 5·81 6·14	2·58 2·22	2·40	1·0	0·51	0·2601
22	1116 Gr. 80 & 426 Newc. " " " "	Feb. 2 " 3	17 17	W, E E, W	67 48 10·46 10·43	− 11 7·57 7·61	2·89 2·82	2·86	1·0	0·05	0·0025
23	430 & 440 Newcomb " " "	Feb. 2 " 3	12 3	E, W W, E	67 58 21·71 21·69	− 21 19·39 18·93	2·33 2·76	2·54	1·0	0·37	0·1369
24	1197 Gr. 80 & 454 Newc. " " " "	Feb. 2 " 3	19 50	W, E E, W	67 28 20·07 20·04	+ 8 42·26 42·20	2·33 2·24	2·29	1·0	0·62	0·3844
								Σ P = 19·7		Σ Pvv = 3·4368	

Summary.

No. of pairs 24
No. of observations 41

Mean difference between observations taken E, W and those taken W, E = − 0″·11

Observed Co-latitude (weighted mean) 67° 37′ 2″·91 ± 0″·059

Correction for Height above Sea-level + 0″·01

Final Co-latitude 67° 37′ 2″·92

		°	′	″	
Astronomical Latitude (A)	=	22	22	57·08	± 0·059
Geodetic Latitude (G)	=	22	22	56·38	
Deflection of plumb-line (A − G)	=		+	0·70	

197. Naharmau—*Co-latitude* 66° 29′ +

Latitude	.. 23° 30′	*Instrument*—Zenith Telescope	
Longitude	.. 78 52	*Mean Height of Barometer*	in. 28·28
Height	... 1940 feet	*Mean Temperature*	68°·0

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
1	217 & 224 Newcomb	Feb. 16	23 47	E, W	66 7 23·74	+ 22 23·13	46·87				
	" " "	" 17		W, E	23·78	23·09	46·87	46·87	0·7	0·08	0·0045
2	224 & 230 Newcomb	Feb. 16	23 42	W, E	66 12 53·32	+ 16 53·95	47·27				
	" " "	" 17		E, W	53·36	53·22	46·58				
	" " "	" 18		W, E	53·40	53·37	46·77				
	" " "	" 19		E, W	53·44	53·51	46·95				
	" " "	" 20		W, E	53·48	53·22	46·70	46·84	0·9	0·05	0·0023
3	245 & 251 Newcomb	Feb. 16	37 19	E, W	66 28 49·88	+ 0 56·84	46·72				
	" " "	" 17		W, E	49·90	56·88	46·78				
	" " "	" 18		E, W	49·92	56·56	46·48				
	" " "	" 19		W, E	49·95	56·85	46·80				
	" " "	" 20		E, W	49·98	56·34	46·32	46·65	1·4	0·14	0·0274
4	263 Newc. & 677 Gr. 80	Feb. 16	2 21	W, E	66 7 2·30	+ 22 45·13	47·43				
	" " " "	" 17		E, W	2·33	44·59	46·92				
	" " " "	" 18		W, E	2·37	44·17	46·54				
	" " " "	" 19		E, W	2·40	44·59	46·99				
	" " " "	" 20		W, E	2·44	44·12	46·56				
	" " " "	" 21		E, W	2·48	44·62	47·10	46·92	1·5	0·13	0·0254
5	732 & 735 Gr. 80	Feb. 16	30 10	E, W	66 52 48·50	− 23 1·80	46·70				
	" " "	" 17		W, E	48·51	0·70	47·81				
	" " "	" 18		E, W	48·53	1·58	46·95				
	" " "	" 19		W, E	48·54	0·90	47·64				
	" " "	" 20		E, W	48·55	2·02	46·53				
	" " "	" 21		W, E	48·57	1·03	47·54	47·20	1·5	0·41	0·2522
6	311 & 316 Newcomb	Feb. 15	1 44	W, E	66 49 31·53	− 19 44·51	47·02				
	" " "	" 16		E, W	31·54	44·77	46·77				
	" " "	" 17		E, W	31·55	44·23	47·32				
	" " "	" 19		E, W	31·57	44·73	46·84				
	" " "	" 20		W, E	31·58	44·17	47·41	47·10	1·4	0·31	0·1345
7	329 & 341 Newcomb	Feb. 18	22 5	E, W	66 10 23·22	+ 19 24·16	47·38				
	" " "	" 19		W, E	23·23	23·39	46·62				
	" " "	" 20		E, W	23·23	23·37	46·60	46·81	1·2	0·02	0·0005
8	364 & 369 Newcomb	Feb. 15	26 13	W, E	66 26 16·58	+ 3 31·03	47·61				
	" " "	" 16		E, W	16·57	30·67	47·24				
	" " "	" 17		W, E	16·55	30·67	47·22				
	" " "	" 18		E, W	16·55	30·40	46·95				
	" " "	" 19		W, E	16·54	30·56	47·10				
	" " "	" 20		E, W	16·53	30·75	47·28	47·23	1·0	0·44	0·1936

197. Naharmau—*Co-latitude* 66° 29′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	Pvv
							by each observation	Mean			
		1903	° ′		° ′ ″	′ ″	″	″			
9	374 & 382 Newcomb	Feb. 15	15 52	E, W	66 44 50·69	− 15 4·32	46·37				
	,, ,, ,,	,, 16		W, E	50·68	3·59	47·09				
	,, ,, ,,	,, 17		E, W	50·67	4·43	46·24				
	,, ,, ,,	,, 18		W, E	50·66	3·30	47·36				
	,, ,, ,,	,, 19		E, W	50·65	4·21	46·44				
	,, ,, ,,	,, 20		W, E	50·65	4·13	46·52	46·67	1·5	0·12	0·0216
10	388 & 391 Newcomb	Feb. 15	13 47	W, E	66 34 32·27	− 4 45·00	47·27				
	,, ,, ,,	,, 16		E, W	32·25	45·43	46·82				
	,, ,, ,,	,, 17		W, E	32·24	45·66	46·58				
	,, ,, ,,	,, 19		W, E	32·22	45·05	47·17				
	,, ,, ,,	,, 20		E, W	32·21	44·71	47·50				
	,, ,, ,,	,, 21		E, W	32·20	44·89	47·31	47·11	1·5	0·32	0·1536
11	1048 Gr. 80 & 405 Newc.	Feb. 15	0 58	E, W	66 30 50·76	− 1 3·91	46·85				
	,, ,, ,, ,,	,, 16		W, E	50·74	2·99	47·75				
	,, ,, ,, ,,	,, 17		E, W	50·72	3·84	46·88				
	,, ,, ,, ,,	,, 18		W, E	50·70	2·60	48·10				
	,, ,, ,, ,,	,, 19		E, W	50·68	3·67	47·01				
	,, ,, ,, ,,	,, 20		W, E	50·66	3·73	46·93	47·25	1·0	0·46	0·2116
12	1048 Gr. 80 & 412 Newc.	Feb. 15	0 57	E, W	66 29 59·61	− 0 12·68	46·93				
	,, ,, ,, ,,	,, 16		W, E	59·59	12·05	47·54				
	,, ,, ,, ,,	,, 17		E, W	59·57	13·08	46·49				
	,, ,, ,, ,,	,, 18		W, E	59·55	12·49	47·06				
	,, ,, ,, ,,	,, 19		E, W	59·53	12·60	46·93				
	,, ,, ,, ,,	,, 20		W, E	59·51	12·49	47·02	47·00	1·0	0·21	0·0441
13	1287 & 1311 Gr. 80	Feb. 15	5 13	E, W	66 53 46·50	− 23 61·00	45·50				
	,, ,, ,,	,, 16		W, E	46·46	59·46	47·00				
	,, ,, ,,	,, 17		W, E	46·43	59·38	47·05				
	,, ,, ,,	,, 18		E, W	46·39	60·70	45·69				
	,, ,, ,,	,, 19		E, W	46·35	60·47	45·88				
	,, ,, ,,	,, 20		W, E	46·31	60·25	46·06	46·20	1·0	0·59	0·3481
14	1311 Gr. 80 & 496 Newc.	Feb. 15	5 11	W, E	66 55 30·54	− 25 44·28	46·26				
	,, ,, ,, ,,	,, 16		E, W	30·50	44·53	45·97				
	,, ,, ,, ,,	,, 17		E, W	30·46	44·13	46·33				
	,, ,, ,, ,,	,, 18		W, E	30·43	45·05	45·38				
	,, ,, ,, ,,	,, 19		W, E	30·39	44·18	46·21				
	,, ,, ,, ,,	,, 20		E, W	30·34	44·65	45·69	45·97	1·0	0·82	0·6724
15	515 & 521 Newcomb	Feb. 15	1 54	E, W	66 14 33·37	+ 15 13·88	47·25				
	,, ,, ,,	,, 16		W, E	33·32	13·92	47·24				
	,, ,, ,,	,, 17		W, E	33·27	14·55	47·82				
	,, ,, ,,	,, 18		E, W	33·24	13·92	47·16				
	,, ,, ,,	,, 19		E, W	33·19	13·27	46·46				
	,, ,, ,,	,, 20		W, E	33·14	14·20	47·34	47·21	1·5	0·42	0·2646
16	529 & 543 Newcomb	Feb. 15	14 26	W, E	66 5 12·32	+ 24 34·58	46·90				
	,, ,, ,,	,, 16		E, W	12·27	34·91	47·18				
	,, ,, ,,	,, 18		W, E	12·18	35·09	47·27				
	,, ,, ,,	,, 19		E, W	12·13	34·51	46·64				
	,, ,, ,,	,, 20		E, W	12·08	35·06	47·14				
	,, ,, ,,	,, 21		W, E	12·03	34·53	46·56	46·95	1·5	0·16	0·0384
17	556 & 558 Newcomb	Feb. 15	5 18	E, W	66 11 27·47	+ 18 19·79	47·26				
	,, ,, ,,	,, 16		W, E	27·42	19·50	46·92				
	,, ,, ,,	,, 17		W, E	27·37	19·08	46·45				
	,, ,, ,,	,, 18		E, W	27·34	19·46	46·80				
	,, ,, ,,	,, 19		W, E	27·29	19·32	46·61				
	,, ,, ,,	,, 20		E, W	27·24	18·99	46·23	46·71	1·0	0·08	0·0064

197. Naharmau—*Co-latitude* 66° 29′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
18	556 & 565 Newcomb	Feb. 15	5 6	E, W	66 23 51·59	+ 5 56·02	47·61				
	" " "	" 17		W, E	51·49	54·84	46·33				
	" " "	" 18		E, W	51·45	55·52	46·97				
	" " "	" 19		W, E	51·40	55·51	46·91				
	" " "	" 20		E, W	51·35	54·96	46·31	46·79	0·9	0·00	0·0000
19	577 & 584 Newcomb	Feb. 15	1 12	W, E	66 22 3·36	+ 7 43·25	46·61				
	" " "	" 16		E, W	3·32	43·61	46·93				
	" " "	" 17		E, W	3·27	43·12	46·39				
	" " "	" 18		W, E	3·22	43·43	46·65				
	" " "	" 19		E, W	3·18	43·31	46·49				
	" " "	" 20		W, E	3·13	43·31	46·44	46·59	1·5	0·20	0·0600
20	587 & 589 Newcomb	Feb 15	20 27	E, W	66 49 59·61	− 20 13·74	45·87				
	" " "	" 16		W, E	59·57	12·93	46·64				
	" " "	" 17		W, E	59·53	12·65	46·88				
	" " "	" 18		E, W	59·50	13·57	45·93				
	" " "	" 19		W, E	59·46	12·87	46·59				
	" " "	" 20		E, W	59·41	13·21	46·20	46·35	1·5	0·44	0·2904
21	595 & 605 Newcomb	Feb. 15	11 32	W, E	66 44 16·46	− 14 30·31	46·15				
	" " "	" 16		E, W	16·42	29·89	46·53				
	" " "	" 17		E, W	16·37	30·30	46·07				
	" " "	" 18		W, E	16·34	29·63	46·71				
	" " "	" 19		E, W	16·30	29·60	46·70				
	" " "	" 20		W, E	16·25	30·16	46·09	46·38	1·5	0·41	0·2522
22	607 & 619 Newcomb	Feb. 15	13 15	E, W	66 25 22·97	+ 4 23·19	46·16				
	" " "	" 16		W, E	22·93	23·98	46·91				
	" " "	" 17		W, E	22·89	24·17	47·06				
	" " "	" 18		E, W	22·84	23·16	46·00				
	" " "	" 19		W, E	22·80	23·71	46·51				
	" " "	" 20		E, W	22·75	23·65	46·40	46·51	1·5	0·28	0·1176
								ΣP = 27·5		ΣPvv = 3·1214	

Summary.

No. of pairs 22

No. of observations 121

Mean difference between observations taken E, W and those taken W, E = − 0″·25

Observed Co-latitude (weighted mean) 66° 29′ 46″·79 ± 0″·049

Correction for Height above Sea-level + 0″·07

Final Co-latitude 66° 29′ 46″·86

		°	′	″	″
Astronomical Latitude (A)	=	23	30	13·14	± 0·049
Geodetic Latitude (G)	=	23	30	18·15	
Deflection of plumb-line (A − G)	=		−	5·01	

198. Nialamari—*Co-latitude* 72° 58′ +

Latitude	... 17° 2′	*Maximum recorded Height of Barometer*		= 28 ·950 in.
Longitude	... 79 46	*Minimum* ,, ,, ,,		= 28 ·760
Height	... 1144 feet	*Maximum* ,,	*Reading of Thermometer*	= 85°·0
Instrument—Zenith Sector No. 2		*Minimum* ,, ,, ,,		= 72 ·0

Observer—J. Eccles, M.A.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
1	807 Gr. 72	Mar. 15	N	E, W	7 29 54·7	80 28 29·2	34·5				
	,, ,,	,, 17	S	W, E	54·9	29·2	34·3	...	34·4	0·9	0·81
2	812 Gr. 72	Mar. 15	N	W, E	1 39 47·4	71 18 47·0	34·4				
	,, ,,	,, 16	,,	E, W	46·7	47·0	33·7				
	,, ,,	,, 17	S	E, W	47·7	46·9	34·6				
	,, ,,	,, 19	,,	W, E	48·0	46·8	34·8	34·4	...	0·2	0·04
3	833 Gr. 72	Mar. 15	N	E, W	7 25 50·2	65 32 45·1	35·3				
	,, ,,	,, 17	S	W, E	49·7	44·9	34·6	35·0	...	0·4	0·16
4	837 Gr. 72	Mar. 16	N	W, E	3 47 35·2	69 10 59·5	34·7				
	,, ,,	,, 19	S	E, W	35·5	59·3	34·8	34·8	...	0·2	0·04
5	850 Gr. 72	Mar. 16	N	E, W	3 22 27·6	69 36 7·1	34·7	34·7	...	0·1	0·01
6	855 Gr. 72	Mar. 15	N	W, E	4 50 33·2	68 8 0·6	33·8				
	,, ,,	,, 17	S	E, W	33·4	0·5	33·9	33·9	...	0·7	0·49
7	873 Gr. 72	Mar. 16	N	W, E	4 58 33·3	77 57 7·2	33·9				
	,, ,,	,, 19	S	E, W	33·1	7·1	34·0	...	34·0	0·5	0·25
8	878 Gr. 72	Mar. 15	N	E, W	4 44 18·5	77 42 52·6	34·1				
	,, ,,	,, 17	S	W, E	18·6	52·6	34·0	...	34·1	0·6	0·36
9	888 Gr. 72	Mar. 16	N	E, W	5 54 39·5	78 53 13·4	33·9				
	,, ,,	,, 19	S	W, E	40·4	13·3	32·9	...	33·4	0·1	0·01
10	894 Gr. 72	Mar. 15	N	W, E	1 28 24·7	71 30 9·4	34·1				
	,, ,,	,, 17	S	E, W	24·6	9·3	33·9	34·0	...	0·6	0·36
11	895 Gr. 72	Mar. 16	N	W, E	4 42 53·6	68 15 39·7	33·3				
	,, ,,	,, 19	S	E, W	55·6	39·5	35·1	34·2	...	0·4	0·16
12	901 Gr. 72	Mar. 15	N	E, W	1 9 2·6	71 49 32·9	35·5				
	,, ,,	,, 16	,,	E, W	1·6	32·9	34·5				
	,, ,,	,, 17	S	W, E	2·3	32·8	35·1				
	,, ,,	,, 19	,,	W, E	2·4	32·7	35·1	35·1	...	0·5	0·25
13	918 Gr. 72	Mar. 15	N	W, E	6 25 57·3	66 32 38·0	35·3				
	,, ,,	,, 17	S	E, W	56·9	37·8	34·7	35·0	...	0·4	0·16
14	919 Gr. 72	Mar. 16	N	W, E	5 14 4·6	78 12 38·2	33·6				
	,, ,,	,, 19	S	E, W	4·7	38·1	33·4	...	33·5	0·0	0·00

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

198. Nialamari—*Co-latitude* 72° 58′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
15	923 Gr. 72	Mar. 15	N	E, W	0 5 25·2	73 3 57·9	32·7				
	" "	" 16	"	E, W	25·4	57·9	32·5				
	" "	" 17	S	W, E	24·9	57·8	32·9				
	" "	" 19	"	W, E	24·4	57·7	33·3	...	32·9	0·6	0·36
16	930 Gr. 72	Mar. 15	N	W, E	6 37 42·8	79 36 16·7	33·9				
	" "	" 16	"	W, E	43·4	16·7	33·3				
	" "	" 17	S	E, W	43·6	16·7	33·1				
	" "	" 19	"	E, W	43·0	16·6	33·6	.	33·5	0·0	0·00
17	939 Gr. 72	Mar. 15	N	E, W	7 15 37·5	65 42 57·5	35·0				
	" "	" 16	"	E, W	36·8	57·4	34·2				
	" "	" 17	S	W, E	38·0	57·3	35·3				
	" "	" 19	"	W, E	37·1	57·1	34·2	34·7	...	0·1	0·01
18	944 Gr. 72	Mar. 16	N	W, E	9 30 16·5	63 28 17·2	33·7				
	" "	" 19	S	E, W	17·4	16·9	34·3	34·0		0·6	0·36
19	948 Gr. 72	Mar. 15	N	W, E	4 3 6·1	77 1 39·0	32·9				
	" "	" 17	S	E, W	5·8	38·9	33·1	...	33·0	0·5	0·25
20	950 Gr. 72	Mar. 16	N	E, W	8 26 57·6	81 25 30·7	33·1				
	" "	" 19	S	W, E	57·9	30·6	32·7	...	32·9	0·6	0·36
21	952 Gr. 72	Mar. 15	N	E, W	5 27 33·8	67 31 0·7	34·5				
	" "	" 17	S	W, E	34·2	0·5	34·7	34·6	...	0·0	0·00
22	955 Gr. 72	Mar. 16	N	W, E	0 16 42·5	72 41 51·4	33·9				
	" "	" 20	S	E, W	43·0	51·2	34·2	34·1	...	0·5	0·25
23	958 Gr. 72	Mar. 15	N	W, E	4 30 57·8	77 29 31·4	33·6				
	" "	" 17	S	E, W	57·8	31·3	33·5	.	33·6	0·1	0·01
24	967 Gr. 72	Mar. 16	N	E, W	1 16 1·3	71 42 32·3	33·6				
	" "	" 20	S	W, E	2·6	32·0	34·6	34·1	...	0·5	0·25
25	970 Gr. 72	Mar. 15	N	E, W	2 44 38·3	75 43 11·6	33·3				
	" "	" 17	S	W, E	37·8	11·5	33·7	..	33·5	0·0	0·00
26	980 Gr. 72	Mar. 15	N	W, E	1 29 25·6	74 27 58·9	33·3				
	" "	" 16	"	W, E	25·8	58·8	33·0				
	" "	" 17	S	E, W	26·3	58·8	32·5				
	" "	" 19	"	E, W	25·5	58·7	33·2				
	" "	" 20	"	E, W.	25·7	58·6	32·9				
	" "	" 21	N	W, E	25·0	58·6	33·6	...	33·1	0·4	0·16
27	989 Gr. 72	Mar. 16	N	E, W	2 6 54·2	75 5 28·3	34·1				
	" "	" 19	S	W, E	53·2	28·2	35·0				
	" "	" 21	N	E, W	53·6	28·1	34·5	...	34·5	1·0	1·00
28	996 Gr. 72	Mar. 15	N	E, W	2 19 8·1	75 17 41·1	33·0				
	" "	" 17	S	W, E	8·5	41·0	32·5	..	32·8	0·7	0·49
29	997 Gr. 72	Mar. 16	N	W, E	7 8 53·6	80 7 27·2	33·6				
	" "	" 19	S	E, W	53·1	27·2	34·1				
	" "	" 20	"	E, W	53·3	27·1	33·8				
	" "	" 21	N	W, E	52·6	27·1	34·5	...	34·0	0·5	0·25

198. Nialamari—*Co-latitude* 72° 58′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″			
30	1012 Gr. 72	Mar. 16	N	E, W	6 44 39·4	66 13 55·6	35·0				
	" "	" 19	S	W, E	40·1	55·3	35·4				
	" "	" 20	"	W, E	39·8	55·2	35·0				
	" "	" 21	N	E, W	40·9	55·1	36·0	35·4	...	0·8	0·64
31	1014 Gr. 72	Mar. 15	N	W, E	2 14 41·7	75 13 15·3	33·6				
	" "	" 17	S	E, W	41·5	15·2	33·7	...	33·7	0·2	0·04
32	1015 Gr. 72	Mar. 16	N	W, E	5 53 36·0	78 52 9·1	33·1				
	" "	" 20	S	E, W	35·7	9·0	33·3	...	33·2	0·3	0·09
33	1036 Gr. 72	Mar. 20	S	W, E	9 5 23·8	82 3 57·2	33·4				
	" "	" 21	N	E, W	22·7	57·2	34·5	...	34·0	0·5	0·25
34	1039 Gr. 72	Mar. 16	N	E, W	8 14 2·7	64 44 31·8	34·5				
	" "	" 18	S	E, W	3·2	31·6	34·8				
	" "	" 19	"	W, E	3·0	31·5	34·5				
	" "	" 20	"	E, W	4·2	31·4	35·6				
	" "	" 21	N	W, E	4·3	31·3	35·6				
	" "	" 22	"	W, E	3·1	31·2	34·3	34·9	...	0·3	0·09
35	1046 Gr. 72	Mar. 18	S	W, E	4 6 23·6	68 52 10·8	34·4				
	" "	" 22	N	E, W	24·4	10·4	34·8	34·6	...	0·0	0·00
36	1047 Gr. 72	Mar. 13	N	W, E	8 21 27·9	81 20 1·5	33·6				
	" "	" 19	S	E, W	27·2	1·5	34·3	...	34·0	0·5	0·25
37	1048 Gr. 72	Mar. 15	N	E, W	0 59 22·8	73 57 54·8	32·0				
	" "	" 17	S	W, E	22·1	54·7	32·6				
	" "	" 20	"	W, E	22·2	54·5	32·3				
	" "	" 21	N	E, W	21·0	54·5	33·5	...	32·6	0·9	0·81
38	1056 Gr. 72	Mar. 15	N	W, E	11 32 13·0	84 30 46·0	33·0				
	" "	" 17	S	E, W	13·2	46·0	32·8	...	32·9	0·6	0·36
39	1057 Gr. 72	Mar. 16	N	E, W	10 23 17·4	83 21 51·5	34·1				
	" "	" 19	S	W, E	17·7	51·4	33·7	...	33·9	0·4	0·16
40	1060 Gr. 72	Mar. 20	S	E, W	5 53 6·0	78 51 39·7	33·7				
	" "	" 21	N	W, E	5·8	39·7	33·9	...	33·8	0·3	0·09
41	1061 Gr. 72	Mar. 15	N	E, W	0 2 27·8	72 56 6·6	34·4				
	" "	" 17	S	W, E	28·0	6·5	34·5				
	" "	" 18	"	E, W	28·3	6·4	34·7				
	" "	" 22	N	W, E	28·7	6·2	34·9	34·6	...	0·0	0·00
42	1066 Gr. 72	Mar. 15	N	W, E	1 59 44·9	70 58 50·1	35·0				
	" "	" 17	S	E, W	44·4	50·0	34·4				
	" "	" 18	"	W, E	44·6	49·9	34·5				
	" "	" 20	"	W, E	44·2	49·8	34·0				
	" "	" 21	N	E, W	44·6	49·7	34·3	34·4	...	0·2	0·04
43	1074 Gr. 72	Mar. 15	N	E, W	11 22 10·1	61 36 24·7	34·8				
	" "	" 16	"	W, E	10·2	24·6	34·8				
	" "	" 17	S	W, E	10·5	24·5	35·0				
	" "	" 18	"	E, W	10·9	24·4	35·3				
	" "	" 19	"	E, W	10·7	24·2	34·9	35·0	...	0·4	0·16
44	1083 Gr. 72	Mar. 16	N	E, W	11 39 50·3	84 38 23·6	33·3	...	33·3	0·2	0·04

198. Nialamari—*Co-latitude* 72° 58′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
45	1086 Gr. 72	Mar. 20	S	E, W	9 52 28·1	82 51 1·6	33·5				
	" "	" 21	N	W, E	27·4	1·6	34·2	.	33·9	0·4	0·16
46	1090 Gr. 72	Mar. 15	N	W, E	1 49 59·2	74 48 32·7	33·5				
	" "	" 16	"	W, E	59·8	32·6	32·8				
	" "	" 17	S	E, W	59·7	32·6	32·9				
	" "	" 18	"	E, W	59·8	32·5	32·7				
	" "	" 19	"	E, W	60·0	32·5	32·5				
	" "	" 22	N	W, E	59·1	32·3	33·2	...	32·9	0·6	0·36
47	1106 Gr. 72	Mar. 16	N	E, W	9 47 33·6	82 46 6·6	33·0				
	" "	" 18	S	W, E	33·6	6·6	33·0				
	" "	" 22	N	E, W	32·7	6·6	33·9	...	33·3	0·2	0·04
48	1110 Gr. 72	Mar. 15	N	E, W	7 40 34·6	80 39 7·9	33·3				
	" "	" 17	S	W, E	34·5	7·9	33·4				
	" "	" 18	"	E, W	34·6	7·9	33·3				
	" "	" 20	"	W, E	34·4	7·8	33·4				
	" "	" 21	N	E, W	34·0	7·8	33·8				
	" "	" 22	"	W, E	33·8	7·8	34·0	...	33·5	0·0	0·00
49	1115 Gr. 72	Mar. 15	N	W, E	0 24 5·5	72 34 28·8	34·3				
	" "	" 17	S	E, W	4·1	28·7	32·8				
	" "	" 18	"	W, E	5·2	28·7	33·9				
	" "	" 22	N	E, W	5·3	28·4	33·7	33·7	.	0·9	0·81
50	1120 Gr. 72	Mar. 16	N	W, E	9 27 47·2	63 30 46·7	33·9				
	" "	" 20	S	E, W	49·1	46·2	35·3				
	" "	" 21	N	W, E	49·1	46·1	35·2	34·8	...	0·2	0·04
51	1129 Gr. 72	Mar. 15	N	E, W	7 32 12·1	65 26 21·4	33·5				
	" "	" 17	S	W, E	12·9	21·2	34·1	33·8	...	0·8	0·64
52	1137 Gr. 72	Mar. 15	N	W, E	1 22 51·0	71 35 44·6	35·6				
	" "	" 17	S	E, W	50·0	44·4	34·4				
	" "	" 20	"	W, E	50·2	44·2	34·4				
	" "	" 21	N	E, W	51·7	44·1	35·8	35·1	...	0·5	0·25
53	1140 Gr. 72	Mar. 18	S	E, W	9 26 12·0	63 32 22·2	34·2				
	" "	" 22	N	W, E	12·3	21·7	34·0	34·1	...	0·5	0·25
54	1152 Gr. 72	Mar. 18	S	W, E	8 9 18·2	64 49 15·8	34·0				
	" "	" 20	"	E, W	19·2	15·6	34·8				
	" "	" 21	N	W, E	19·6	15·5	35·1				
	" "	" 22	"	E, W	19·4	15·3	34·7	34·7	..	0·1	0·01
55	1164 Gr. 72	Mar. 18	S	E, W	0 40 32·3	72 18 3·0	35·3				
	" "	" 20	"	W, E	31·5	2·8	34·3				
	" "	" 21	N	E, W	32·7	2·8	35·5				
	" "	" 22	"	W, E	33·5	2·7	36·2	35·3	...	0·7	0·49
56	1171 Gr. 72	Mar. 18	S	W, E	6 10 42·1	79 9 16·3	34·2				
	" "	" 20	"	E, W	41·7	16·2	34·5				
	" "	" 21	N	W, E	41·7	16·2	34·5				
	" "	" 22	"	E, W	41·8	16·2	34·4	...	34·4	0·9	0·81
57	1176 Gr. 72	Mar. 18	S	E, W	4 27 38·8	77 26 12·6	33·8				
	" "	" 20	"	W, E	38·6	12·5	33·9				
	" "	" 21	N	E, W	38·4	12·5	34·1				
	" "	" 22	"	W, E	38·0	12·4	34·4	...	34·1	0·6	0·36

198. Nialamari—*Co-latitude* 72° 58′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
58	1188 Gr. 72	Mar. 18	S	W, E	4 49 22·6	68 9 12·5	35·1				
	,, ,,	,, 20	,,	E, W	22·6	12·3	34·9				
	,, ,,	,, 21	N	W, E	23·3	12·2	35·5				
	,, ,,	,, 22	,,	E, W	23·2	12·1	35·3	35·2	...	0·6	0·36
59	1203 Gr. 72	Mar. 18	S	E, W	5 28 11·8	78 26 44·9	33·1				
	,, ,,	,, 20	,,	W, E	11·9	44·8	32·9				
	,, ,,	,, 21	N	E, W	11·4	44·8	33·4				
	,, ,,	,, 22	,,	W, E	11·8	44·8	33·0	...	33·1	0·4	0·16
60	1208 Gr. 72	Mar. 18	S	W, E	4 43 24·2	68 15 10·3	34·5				
	,, ,,	,, 20	,,	E, W	24·8	10·2	35·0				
	,, ,,	,, 21	N	W, E	24·9	10·1	35·0				
	,, ,,	,, 22	,,	E, W	25·0	10·0	35·0	34·9	...	0·3	0·09
61	1233 Gr. 72	Mar. 18	S	E, W	2 39 15·8	75 37 48·0	32·2				
	,, ,,	,, 20	,,	W, E	15·2	47·9	32·7				
	,, ,,	,, 21	N	E, W	15·2	47·9	32·7				
	,, ,,	,, 22	,,	W, E	15·5	47·9	32·4	...	32·5	1·0	1·00
62	1252 Gr. 72	Mar. 18	S	W, E	3 29 29·1	69 29 5·1	34·2				
	,, ,,	,, 22	N	E, W	29·6	4·8	34·4	34·3	...	0·3	0·09
63	1254 Gr. 72	Mar. 20	S	E, W	6 1 57·7	66 56 37·4	35·1				
	,, ,,	,, 21	N	W, E	56·8	37·3	34·1	34·6	...	0·0	0·00
64	1261 Gr. 72	Mar. 20	S	W, E	0 59 3·4	71 59 29·9	33·3				
	,, ,,	,, 21	N	E, W	4·4	29·9	34·3	33·8	...	0·8	0·64
65	1265 Gr. 72	Mar. 18	S	E, W	0 40 38·4	73 39 11·7	33·3				
	,, ,,	,, 22	N	W, E	37·7	11·5	33·8	...	33·6	0·1	0·01
66	1275 Gr. 72	Mar. 18	S	W, E	1 55 41·3	71 2 52·5	33·8				
	,, ,,	,, 20	,,	E, W	41·7	52·3	34·0				
	,, ,,	,, 21	N	W, E	42·9	52·3	35·2				
	,, ,,	,, 22	,,	E, W	42·9	52·2	35·1	34·5	...	0·1	0·01
67	1297 Gr. 72	Mar. 18	S	E, W	3 32 44·9	76 31 18·4	33·5				
	,, ,,	,, 20	,,	W, E	44·3	18·3	34·0				
	,, ,,	,, 21	N	E, W	44·5	18·3	33·8				
	,, ,,	,, 22	,,	W, E	45·2	18·2	33·0	...	33·6	0·1	0·01
68	1312 Gr. 72	Mar. 18	S	W, E	0 12 38·4	73 11 10·3	31·9				
	,, ,,	,, 20	,,	E, W	36·9	10·2	33·3				
	,, ,,	,, 21	N	W, E	36·4	10·2	33·8				
	,, ,,	,, 22	,,	E, W	36·9	10·1	33·2	...	33·1	0·4	0·16
69	1316 Gr. 72	Mar. 20	S	W, E	2 42 0·8	70 16 33·3	34·1				
	,, ,,	,, 21	N	E, W	0·7	33·3	34·0	34·1	...	0·5	0·25

198. Nialamari—*Co-latitude* 72° 58′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
70	1327 Gr. 72	Mar. 20	S	E, W	2 49 17·4	75 47 50·7	33·3				
	„ „	„ 21	N	W, E	16·2	50·7	34·5	.	33·9	0·4	0·16
71	1344 Gr. 72	Mar. 20	S	W, E	2 32 8·8	70 26 26·5	35·3				
	„ „	„ 21	N	E, W	9·2	26·4	35·6	35·5	..	0·9	0·81
72	1851 Gr. 72	Mar. 20	S	E, W	0 11 27·7	73 10 0·3	32·6				
	„ „	„ 21	N	W, E	26·8	0·3	33·5	..	33·1	0·4	0·16
								Σ vv by N. Stars = 8·21			
								Σ vv by S. Stars = 9·79			

Summary.

No. of North Stars 35 No. of South Stars 37

No. of observations 211

	°	′	″	″
Co-latitude by North Stars	72	58	34·57	± 0·056
„ „ South „	72	58	33·50	± 0·058
Mean Co-latitude	72	58	34·04	± 0·040
Correction for Height above Sea-level		+	0·03	

Final Co-latitude 72° 58′ 34″·07

		°	′	″	″
Astronomical Latitude (A)	=	17	1	25·93	± 0·040
Geodetic Latitude (G)	=	17	1	33·63	
Deflection of plumb-line (A−G)	=		−	7·70	

199. Nitali—*Co-latitude* 71° 42′ +

Latitude	... 18° 17′	*Instrument*—Zenith Telescope	
Longitude	... 76 19	*Mean Height of Barometer*	in. 27·73
Height	... 2289 feet	*Mean Temperature*	71°·0

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	803 Gr. 80 & 622 Gr. 64	Feb. 17	5 13	W, E	71 26 6·60	+ 16 50·60	57·2	57·2	0·7	0·0	0·00
2	823 Gr. 80 & 639 Gr. 64	Feb. 17	3 6	E, W	71 39 8·99	+ 3 47·54	56·5	56·5	0·7	0·7	0·34
3	835 & 846 Gr. 80 „ „ „	Feb. 17 „ 20	2 25	W, E E, W	72 7 47·41 47·44	− 24 50·27 49·88	57·1 57·6	57·3	1·0	0·1	0·01
4	856 & 874 Gr. 80 „ „ „	Feb. 17 „ 20	15 27	E, W W, E	71 48 52·05 52·07	− 5 53·50 53·84	58·5 58·2	58·3	0·7	1·1	0·85
5	874 Gr. 80 & 678 Gr. 64 „ „ „ „	Feb. 17 „ 20	15 8	W, E E, W	71 27 37·88 37·89	+ 15 20·32 19·19	58·2 57·1	57·6	0·7	0·4	0·11
6	692 Gr. 64 & 916 Gr. 80 „ „ „ „	Feb. 17 „ 20	0 20	E, W W, E	71 48 22·29 22·30	− 5 25·13 24·52	57·2 57·8	57·5	1·0	0·3	0·09
7	930 & 953 Gr. 80 „ „ „	Feb. 17 „ 20	7 59	E, W W, E	72 8 54·41 54·41	− 25 58·93 57·55	55·5 56·9	56·2	1·0	1·0	1·00
8	962 & 995 Gr. 80 „ „ „	Feb. 17 „ 20	1 54	W, E E, W	71 37 20·69 20·68	+ 5 36·53 35·98	57·2 56·7	56·9	1·0	0·3	0·09
9	1021 & 1037 Gr. 80 „ „ „	Feb. 17 „ 20	3 49	E, W W, E	71 24 32·10 32·09	+ 18 24·39 24·31	56·5 56·4	56·4	1·0	0·8	0·64
10	1043 & 1053 Gr. 80 „ „ „	Feb. 17 „ 20	4 27	W, E E, W	71 19 0·99 0·96	+ 23 56·88 56·31	57·9 57·3	57·6	1·0	0·4	0·16
11	604 Gr. 72 & 1070 Gr. 80 „ „ „	Feb. 17 „ 20	5 22	E, W W, E	72 2 51·93 51·91	− 19 54·84 54·31	57·1 57·6	57·3	1·0	0·1	0·01
12	1104 & 1139 Gr. 80 „ „ „	Feb. 17 „ 20	1 54	W, E E, W	71 36 48·66 48·63	+ 6 8·02 8·38	56·7 57·0	56·8	1·0	0·4	0·16
13	1161 & 1173 Gr. 80 „ „ „	Feb. 17 „ 20	10 28	W, E E, W	71 22 58·45 58·41	+ 19 57·57 58·44	56·0 56·8	56·4	1·0	0·8	0·64
14	1175 Gr. 80 & 664 Gr. 72 „ „ „ „	Feb. 17 „ 20	15 47	E, W W, E	71 41 20·77 20·73	+ 1 36·58 37·23	57·3 58·0	57·6	1·0	0·4	0·16
15	1184 & 1208 Gr. 80 „ „ „	Feb. 17 „ 20	4 45	W, E E, W	71 56 35·69 35·65	− 13 38·88 39·44	56·8 56·2	56·5	1·0	0·7	0·49

199. Nitali—*Co-latitude* 71° 42′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = p	v	pvv
							by each observation	Mean			
		1893	° ′		° ′ ″	′ ″	″	″			
16	1218 Gr. 80 & 716 Gr. 72	Feb. 17	2 17	E, W	71 37 31·31	+ 5 25·64	56·9				
	,, ,, ,, ,,	,, 20		W, E	31·26	25·52	56·8	56·8	1·0	0·4	0·16
17	1265 & 1272 Gr. 80	Feb. 17	6 41	W, E	71 25 53·55	+ 17 2·67	56·2				
	,, ,, ,,	,, 20		E, W	53·49	3·02	56·5	56·3	1·0	0·9	0·81
18	1285 & 1289 Gr. 80	Feb. 17	9 30	E, W	71 21 35·05	+ 21 22·27	57·3				
	,, ,, ,,	,, 20		W, E	34·99	22·54	57·5	57·4	1·0	0·2	0·04
19	937 Gr. 64 & 1309 Gr. 80	Feb. 17	16 21	W, E	71 30 48·28	+ 12 7·76	56·0				
	,, ,, ,, ,,	,, 20		E, W	48·22	8·47	56·7	56·3	1·0	0·9	0·81
20	1311 & 1327 Gr. 80	Feb. 17	0 26	E, W	71 39 16·55	+ 3 40·32	56·9				
	,, ,, ,,	,, 20		W, E	16·48	40·44	56·9	56·9	1·0	0·3	0·09
21	1349 & 1368 Gr. 80	Feb. 17	1 43	W, E	71 32 28·43	+ 10 28·59	57·0				
	,, ,, ,,	,, 20		E, W	28·36	28·98	57·3	57·1	1·0	0·1	0·01
22	1383 Gr. 80 & 801 Gr. 72	Feb. 17	3 47	E, W	71 53 29·62	− 10 32·93	56·7				
	,, ,, ,, ,,	,, 20		W, E	29·56	32·94	56·6	56·6	1·0	0·6	0·36
23	1402 & 1405 Gr. 80	Feb. 15	9 2	E, W	71 27 35·58	+ 15 21·95	57·5				
	,, ,, ,,	,, 16		W, E	35·57	22·25	57·8	57·6	1·0	0·4	0·16
24	1411 & 1418 Gr. 80	Feb. 15	0 39	W, E	71 57 45·52	− 14 47·84	57·7				
	,, ,, ,,	,, 16		E, W	45·50	47·35	58·1	57·9	1·0	0·7	0·49
25	1416 & 1449 Gr. 80	Feb. 15	8 38	E, W	71 20 38·93	+ 22 18·96	57·9				
	,, ,, ,,	,, 16		W, E	36·88	20·32	57·2	57·5	1·0	0·3	0·09
26	1452 & 1467 Gr. 80	Feb. 15	14 40	W, E	71 33 21·08	+ 9 35·07	56·1				
	,, ,, ,,	,, 16		E, W	21·06	35·78	56·8	56·4	1·0	0·8	0·64
27	1474 & 1477 Gr. 80	Feb. 15	11 10	W, E	72 1 6·38	− 18 9·81	56·6				
	,, ,, ,,	,, 16		E, W	6·36	9·50	56·9	56·7	1·0	0·5	0·25
28	1480 & 1489 Gr. 80	Feb. 15	12 23	E, W	71 23 28·19	+ 19 28·48	56·7				
	,, ,, ,,	,, 16		W, E	28·18	30·22	58·3	57·5	0·7	0·3	0·06
29	1489 & 1493 Gr. 80	Feb. 15	12 19	W, E	71 19 52·39	+ 23 4·33	56·7				
	,, ,, ,,	,, 16		E, W	52·38	5·03	57·4	57·0	0·7	0·2	0·03
30	1504 & 1511 Gr. 80	Feb. 15	6 19	E, W	71 25 37·35	+ 17 20·24	57·6				
	,, ,, ,,	,, 16		W, E	37·33	19·42	56·7	57·1	1·0	0·1	0·01
31	1517 & 1520 Gr. 80	Feb. 15	12 18	W, E	72 11 52·45	− 28 55·39	57·1				
	,, ,, ,,	,, 16		E, W	52·44	55·67	56·8	56·9	1·0	0·3	0·09
32	1536 & 1541 Gr. 80	Feb. 15	3 10	E, W	71 26 44·45	+ 16 13·53	58·0				
	,, ,, ,,	,, 16		W, E	44·44	14·32	58·8	58·4	1·0	1·2	1·44
33	1547 Gr. 80	Feb. 16	0 8	E, W	71 50 29·04	− 7 32·31	56·7	56·7	1·0	0·5	0·25
34	1555 & 1578 Gr. 80	Feb. 15	6 14	E, W	71 35 6·46	+ 7 50·39	56·8				
	,, ,, ,,	,, 16		W, E	6·45	50·57	57·0	56·9	1·0	0·3	0·09

199. Nitali—*Co-latitude* 71° 42′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean φ	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
35	1585 & 1596 Gr. 80 „ „ „	Feb. 15 „ 16	7 23	W, E E, W	72 14 7·43 7·42	− 31 9·85 10·32	57·6 57·1	57·3	1·0	0·1	0·01
36	1603 & 1617 Gr. 80 „ „ „	Feb. 15 „ 16	3 35	E, W W, E	71 54 22·16 22·16	− 11 23·84 24·08	58·3 58·1	58·2	1·0	1·0	1·00
37	1621 & 1628 Gr. 80 „ „ „	Feb. 15 „ 16	8 33	W, E E, W	72 1 30·85 30·85	− 18 33·92 32·63	56·9 58·2	57·5	1·0	0·3	0·09
38	1646 Gr. 80 & 957 Gr. 72 „ „ „ „	Feb. 15 „ 16	17 49	E, W W, E	72 2 30·51 30·50	− 19 33·48 33·90	57·0 56·6	56·8	1·0	0·4	0·16
39	1674 & 1681 Gr. 80 „ „ „	Feb. 15 „ 16	2 26	W, E E, W	72 3 8·59 8·59	− 20 10·85 10·20	57·7 58·4	58·0	1·0	0·8	0·64
40	1713 Gr. 80 & 1011 Gr. 72 „ „ „ „	Feb. 15 „ 16	14 12	E, W W, E	71 39 50·77 50·77	+ 3 6·45 4·90	57·2 55·7	56·4	1·0	0·8	0·64
41	1732 & 1746 Gr. 80 „ „ „	Feb. 15 „ 16	7 6	E, W W, E	71 47 8·17 8·17	− 4 11·57 10·92	56·6 57·2	56·9	1·0	0·3	0·09
42	1762 & 1793 Gr. 80 „ „ „	Feb. 15 „ 16	2 22	W, E E, W	71 37 3·39 3·40	+ 5 53·61 53·19	57·0 56·6	56·8	1·0	0·4	0·16
43	1798 & 1802 Gr. 80 „ „ „	Feb. 15 „ 16	15 33	E, W W, E	71 51 47·86 47·88	− 8 50·39 49·95	57·5 57·9	57·7	0·7	0·5	0·18
44	1802 & 1812 Gr. 80 „ „ „	Feb. 15 „ 16	15 51	W, E E, W	72 9 54·97 55·00	− 26 57·24 57·09	57·7 57·9	57·8	0·7	0·6	0·25
45	1816 & 1827 Gr. 80 „ „ „	Feb. 15 „ 16	0 59	E, W W, E	71 58 49·01 49·03	− 15 51·85 51·90	57·2 57·1	57·1	1·0	0·1	0·01
46	1831 & 1850 Gr. 80 „ „ „	Feb. 15 „ 16	3 30	W, E E, W	71 32 54·24 54·26	+ 10 3·10 1·94	57·3 56·2	56·7	1·0	0·5	0·25
47	1862 & 1874 Gr. 80	Feb. 18	2 17	E, W	71 28 28·67	+ 14 28·27	56·9	56·9	0·7	0·3	0·06
48	1965 & 1970 Gr. 80 „ „ „	Feb. 18 „ 19	0 39	E, W W, E	71 40 49·81 49·84	+ 2 7·88 7·63	57·7 57·5	57·6	1·0	0·4	0·16
49	1514 Gr. 64 & 2008 Gr. 80 „ „ „ „	Feb. 18 „ 19	9 56	W, E E, W	71 48 23·62 23·65	− 5 25·38 26·15	58·2 57·5	57·8	1·0	0·6	0·36
50	2006 & 2020 Gr. 80 „ „ „	Feb. 18 „ 19	20 56	E, W W, E	72 2 27·19 27·23	− 19 29·29 29·31	57·9 57·9	57·9	0·7	0·7	0·34
51	2020 & 2027 Gr. 80 „ „ „	Feb. 18 „ 19	20 51	W, E E, W	71 57 5·91 5·95	− 14 9·71 8·62	56·2 57·3	56·7	0·7	0·5	0·18
52	2035 & 2047 Gr. 80 „ „ „	Feb. 18 „ 19	21 6	E, W W, E	71 59 41·91 41·95	− 16 45·38 44·59	56·5 57·4	56·9	0·7	0·3	0·06
53	2035 & 2048 Gr. 80 „ „ „	Feb. 18 „ 19	21 6	E, W W, E	72 0 47·60 47·64	− 17 50·10 49·97	57·5 57·7	57·6	0·7	0·4	0·11

199. Nitali—*Co-latitude* 71° 42′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
54	2084 & 2127 Gr. 80	Feb. 18	4 21	W, E	71 18 35·46	+ 24 21·93	57·4				
	„ „ „	„ 19		E, W	35·53	22·35	57·9	57·6	1·0	0·4	0·16
55	2144 & 2167 Gr. 80	Feb. 18	0 29	E, W	71 32 31·30	+ 10 26·25	57·5				
	„ „ „	„ 19		W, E	31·37	25·89	57·3	57·4	1·0	0·2	0·04
56	2200 & 2207 Gr. 80	Feb. 18	7 30	W, E	71 54 10·37	− 11 11·46	58·9				
	„ „ „	„ 19		E, W	10·43	11·70	58·7	58·8	1·0	1·6	2·56
57	2214 & 2227 Gr. 80	Feb. 18	1 29	E, W	71 44 10·09	− 1 13·29	56·8				
	„ „ „	„ 19		W, E	10·16	12·83	57·3	57·0	0·7	0·2	0·03
58	2227 & 2239 Gr. 80	Feb. 18	1 27	W, E	71 45 6·94	− 2 9·03	57·9				
	„ „ „	„ 19		E, W	7·01	9·61	57·4	57·6	0·7	0·4	0·11
59	2242 & 2250 Gr. 80	Feb. 18	20 16	E, W	71 29 24·97	+ 13 31·45	56·4				
	„ „ „	„ 19		W, E	25·04	32·08	57·1	56·7	1·0	0·5	0·25
60	2269 & 2273 Gr. 80	Feb. 18	9 11	W, E	72 12 13·30	− 29 15·08	58·2				
	„ „ „	„ 19		E, W	13·37	14·92	58·4	58·3	1·0	1·1	1·21
61	2281 & 2303 Gr. 80	Feb. 18	1 4	E, W	71 31 24·48	+ 11 32·87	57·3				
	„ „ „	„ 19		W, E	24·55	33·02	57·6	57·4	1·0	0·2	0·04
								Σ P = 56·5		Σ P v v = 19·78	

Summary.

No. of pairs 61

No. of observations 118

Mean difference between observations taken E, W and those taken W, E = + 0″·07

Observed Co-latitude (weighted mean) 71° 42′ 57″·19 ± 0″·051

Correction for Height above Sea-level + 0″·07

Final Co-latitude 71° 42′ 57″·26

		°	′	″	″
Astronomical Latitude (A)	=	18	17	2·74	± 0·051
Geodetic Latitude (G)	=	18	17	7·16	
Deflection of plumb-line (A − G)	=		−	4·42	

200. Ongole—*Co-latitude* 74° 30′ +

Latitude ... 15° 30′ *Instrument*—Zenith Telescope

Longitude ... 80 5 *Mean Height of Barometer* 29·70 in.

Height ... 250 feet *Mean Temperature* 77°·1

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
1	1231 & 1232 Gr. 80	Mar. 6	15 22	E, W	74 56 40·16	− 26 33·45	6·7				
	" " "	" 11		W, E	40·07	33·87	6·2				
	" " "	" 16		E, W	39·98	34·04	5·9				
	" " "	" 17		W, E	39·96	33·43	6·5	6·3	1·3	0·8	0·83
2	1281 & 1285 Gr. 80	Mar. 6	6 16	W, E	74 35 35·54	− 5 27·01	8·5				
	" " "	" 11		E, W	35·42	28·41	7·0				
	" " "	" 16		W, E	35·31	27·68	7·6				
	" " "	" 17		E, W	35·29	28·15	7·1	7·6	1·3	0·5	0·33
3	1313 & 1323 Gr. 80	Mar. 6	9 35	E, W	74 55 6·71	− 24 58·94	7·8				
	" " "	" 12		W, E	6·58	59·37	7·2				
	" " "	" 16		E, W	6·49	58·26	8·2				
	" " "	" 17		W, E	6·47	58·67	7·8	7·7	1·3	0·6	0·47
4	764 Gr. 72 & 1349 Gr. 80	Mar. 6	4 34	W, E	74 23 51·02	+ 6 15·33	6·4				
	" " " "	" 12		E, W	50·85	17·00	7·9				
	" " " "	" 16		W, E	50·74	16·58	7·3				
	" " " "	" 17		E, W	50·71	16·24	7·0	7·1	1·3	0·0	0·00
5	1359 & 1371 Gr. 80	Mar. 6	12 48	E, W	74 41 33·59	− 11 26·44	7·2				
	" " "	" 12		W, E	33·43	26·72	6·7				
	" " "	" 16		E, W	33·32	26·30	7·0				
	" " "	" 17		W, E	33·29	25·87	7·4	7·1	1·3	0·0	0·00
6	1383 & 1402 Gr. 80	Mar. 6	6 12	W, E	74 17 26·19	+ 12 41·47	7·7				
	" " "	" 12		E, W	26·00	40·66	6·6				
	" " "	" 16		W, E	25·88	42·13	8·0				
	" " "	" 17		E, W	25·85	40·83	6·7	7·3	1·3	0·2	0·05
7	1405 Gr. 80 & 818 Gr. 72	Mar. 6	12 33	E, W	74 59 10·71	− 29 4·42	6·3				
	" " " "	" 11		W, E	10·58	4·61	6·0				
	" " " "	" 16		E, W	10·44	4·61	5·8				
	" " " "	" 17		W, E	10·41	4·33	6·1	6·1	1·3	1·0	1·30
8	1436 & 1449 Gr. 80	Mar. 6	5 24	E, W	74 34 39·74	− 4 31·89	7·9				
	" " "	" 11		W, E	39·58	30·63	9·0				
	" " "	" 16		E, W	39·42	32·03	7·4				
	" " "	" 17		W, E	39·39	32·17	7·2	7·9	1·3	0·8	0·83
9	1466 & 1470 Gr. 80	Mar. 6	2 45	W, E	74 11 13·87	+ 18 53·60	7·5				
	" " "	" 11		E, W	13·70	53·75	7·5				
	" " "	" 16		W, E	13·52	53·85	7·4				
	" " "	" 17		E, W	13·48	53·09	6·6	7·2	0·9	0·1	0·01
10	1470 & 1476 Gr. 80	Mar. 6	3 1	E, W	74 28 5·69	+ 2 2·44	8·1				
	" " "	" 11		W, E	5·52	2·13	7·7				
	" " "	" 16		E, W	5·35	2·62	7·9				
	" " "	" 17		W, E	5·31	1·78	7·1	7·7	0·9	0·6	0·32

200. Ongole—*Co-latitude* 74° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
11	1493 & 1511 Gr. 80	Mar. 6	9 16	E, W	74 22 45·72	+ 7 21·55	7·3				
	” ” ”	” 11		W, E	45·54	20·87	6·4				
	” ” ”	” 16		E, W	45·36	22·41	7·8				
	” ” ”	” 17		W, E	45·32	21·42	6·7	7·1	0·9	0·0	0·00
12	1511 & 1517 Gr. 80	Mar. 6	9 41	W, E	74 47 44·31	− 17 37·37	6·9				
	” ” ”	” 11		E, W	44·14	37·72	6·4				
	” ” ”	” 16		W, E	43·97	36·21	7·7				
	” ” ”	” 17		E, W	43·94	37·82	6·1	6·8	0·9	0·3	0·08
13	1543 & 1577 Gr. 80	Mar. 6	21 24	W, E	74 30 32·77	− 0 24·94	7·8				
	” ” ”	” 11		E, W	32·59	25·00	7·6				
	” ” ”	” 16		W, E	32·41	24·43	8·0				
	” ” ”	” 17		E, W	32·37	25·59	6·8	7·6	1·3	0·5	0·33
14	1582 & 1583 Gr. 80	Mar. 6	1 2	E, W	74 6 16·57	+ 23 51·20	7·8				
	” ” ”	” 11		W, E	16·37	51·08	7·5				
	” ” ”	” 17		W, E	16·13	50·58	6·7	7·3	1·2	0·2	0·05
15	1590 & 1595 Gr. 80	Mar. 6	10 38	W, E	74 13 32·03	+ 16 36·07	8·1				
	” ” ”	” 11		E, W	31·84	35·98	7·8				
	” ” ”	” 16		W, E	31·64	37·01	8·7				
	” ” ”	” 17		E, W	31·60	35·63	7·2	8·0	1·3	0·9	1·05
16	1617 & 1628 Gr. 80	Mar. 6	6 7	E, W	74 25 56·46	+ 4 10·62	7·1				
	” ” ”	” 11		W, E	56·27	11·43	7·7				
	” ” ”	” 16		E, W	56·07	11·78	7·9				
	” ” ”	” 17		W, E	56·03	12·22	8·3	7·8	1·3	0·7	0·64
17	1632 & 1648 Gr. 80	Mar. 6	2 10	W, E	74 52 17·32	− 22 10·69	6·6				
	” ” ”	” 12		E, W	17·10	9·13	8·0				
	” ” ”	” 16		W, E	16·95	9·72	7·2				
	” ” ”	” 17		E, W	16·91	8·86	8·1	7·5	1·3	0·4	0·21
18	5490 Gr. 80 & 967 Gr. 72	Mar. 6	2 54	E, W	74 36 34·37	− 6 27·89	6·5				
	” ” ” ”	” 11		W, E	34·18	27·04	7·1				
	” ” ” ”	” 17		W, E	33·96	29·35	4·6	6·1	1·2	1·0	1·20
19	1668 & 1685 Gr. 80	Mar. 6	8 17	W, E	74 37 36·04	− 7 28·08	8·0				
	” ” ”	” 12		E, W	35·81	28·66	7·2				
	” ” ”	” 16		W, E	35·66	28·84	6·8				
	” ” ”	” 17		E, W	35·62	26·91	8·7	7·7	1·3	0·6	0·47
20	1703 & 1714 Gr. 80	Mar. 6	1 0	E, W	74 18 19·28	+ 11 46·78	6·1				
	” ” ”	” 11		W, E	19·08	48·07	7·2				
	” ” ”	” 17		W, E	18·84	47·16	6·0	6·4	1·2	0·7	0·59
21	1717 & 1727 Gr. 80	Mar. 6	12 31	W, E	74 25 25·69	+ 4 41·07	6·8				
	” ” ”	” 12		E, W	25·47	41·77	7·2				
	” ” ”	” 16		W, E	25·31	39·76	5·1				
	” ” ”	” 17		E, W	25·28	42·33	7·6	6·7	1·3	0·4	0·21
22	1730 & 1732 Gr. 80	Mar. 6	4 11	E, W	74 42 25·62	− 12 18·94	6·7				
	” ” ”	” 12		W, E	25·41	19·06	6·4				
	” ” ”	” 16		E, W	25·27	17·22	8·1	7·0	1·2	0·1	0·01
23	1746 & 1759 Gr. 80	Mar. 6	9 20	W, E	73 59 31·44	+ 30 35·32	6·8				
	” ” ”	” 12		E, W	31·20	36·29	7·5				
	” ” ”	” 16		W, E	31·04	35·17	6·2				
	” ” ”	” 17		E, W	31·00	36·41	7·4	7·0	1·3	0·1	0·01

200. Ongole—*Co-latitude* 74° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
24	1043 Gr. 72 & 1799 Gr. 80	Mar. 6	16 27	E, W	74 18 4·75	+ 12 2·73	7·5				
	„ „ „ „	„ 11		W, E	4·57	2·94	7·5				
	„ „ „ „	„ 16		E, W	4·39	2·55	6·9				
	„ „ „ „	„ 17		W, E	4·35	2·42	6·8	7·2	1·3	0·1	0·01
25	1810 & 1827 Gr. 80	Mar. 7	3 57	E, W	74 55 53·87	− 25 46·67	7·2				
	„ „ „	„ 8		W, E	53·84	46·43	7·4				
	„ „ „	„ 13		E, W	53·65	46·20	7·5				
	„ „ „	„ 18		W, E	53·47	46·17	7·3	7·4	1·3	0·3	0·12
26	1844 & 1850 Gr. 80	Mar. 7	6 37	W, E	74 39 13·23	− 9 5·80	7·4				
	„ „ „	„ 8		E, W	13·20	6·23	7·0				
	„ „ „	„ 13		W, E	13·00	5·57	7·4				
	„ „ „	„ 18		E, W	12·82	5·31	7·5	7·3	0·9	0·2	0·04
27	1850 & 1861 Gr. 80	Mar. 7	6 34	E, W	74 35 48·57	− 5 41·20	7·4				
	„ „ „	„ 8		W, E	48·53	41·57	7·0				
	„ „ „	„ 13		E, W	48·34	41·67	6·7				
	„ „ „	„ 18		W, E	48·16	41·07	7·1	7·1	0·9	0·0	0·00
28	1865 & 1874 Gr. 80	Mar. 7	0 32	W, E	74 17 3·68	+ 13 2·91	6·6				
	„ „ „	„ 8		E, W	3·65	2·66	6·3				
	„ „ „	„ 13		W, E	3·45	3·54	7·0				
	„ „ „	„ 18		E, W	3·25	4·10	7·4	6·8	1·3	0·3	0·12
29	1879 & 1898 Gr. 80	Mar. 8	11 7	W, E	74 37 54·64	− 7 47·36	7·3				
	„ „ „	„ 9		E, W	54·60	48·03	6·6				
	„ „ „	„ 13		E, W	54·46	47·65	6·8				
	„ „ „	„ 18		W, E	54·29	46·89	7·4	7·0	1·3	0·1	0·01
30	1926 & 1935 Gr. 80	Mar. 8	11 23	E, W	74 41 25·65	− 11 18·81	6·8				
	„ „ „	„ 13		W, E	25·49	19·17	6·3				
	„ „ „	„ 18		E, W	25·32	18·58	6·7	6·6	1·2	0·5	0·30
31	1939 & 1960 Gr. 80	Mar. 7	24 14	E, W	74 36 55·74	− 6 48·85	6·9				
	„ „ „	„ 8		W, E	55·72	48·93	6·8				
	„ „ „	„ 13		E, W	55·58	48·02	7·6				
	„ „ „	„ 18		W, E	55·45	48·41	7·0	7·1	1·3	0·0	0·00
32	1970 & 1994 Gr. 80	Mar. 7	2 34	W, E	74 52 48·02	− 22 40·56	7·5				
	„ „ „	„ 9		E, W	47·96	40·78	7·2				
	„ „ „	„ 13		W, E	47·84	40·80	7·0				
	„ „ „	„ 18		E, W	47·69	40·32	7·4	7·3	0·9	0·2	0·04
33	1994 Gr. 80 & 1525 Gr. 64	Mar. 13	2 35	E, W	74 52 27·05	− 22 20·31	6·7				
	„ „ „ „	„ 18		W, E	26·91	19·11	7·8	7·2	0·7	0·1	0·01
34	1525 Gr. 64 & 2009 Gr. 80	Mar. 13	2 21	W, E	74 38 44·43	− 8 38·04	6·4				
	„ „ „ „	„ 18		E, W	44·28	37·19	7·1	6·7	0·7	0·4	0·11
35	2009 & 2024 Gr. 80	Mar. 8	2 30	W, E	74 29 53·45	+ 0 13·15	6·6				
	„ „ „	„ 9		E, W	53·42	13·56	7·0				
	„ „ „	„ 13		E, W	53·29	13·68	7·0				
	„ „ „	„ 18		W, E	53·14	13·63	6·8	6·9	0·9	0·2	0·04
36	2039 & 2060 Gr. 80	Mar. 7	5 52	W, E	74 8 11·08	+ 21 56·59	7·7				
	„ „ „	„ 8		E, W	11·05	56·35	7·4				
	„ „ „	„ 13		W, E	10·90	56·60	7·5				
	„ „ „	„ 18		E, W	10·75	56·97	7·7	7·6	1·3	0·5	0·33

200. Ongole—*Co-latitude* 74° 30′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1891	° ′		° ′ ″	′ ″	″	″			
37	1243 Gr. 72 & 2107 Gr. 80	Mar. 7	22 24	E, W	74 39 47·02	− 9 41·31	5·7				
	" " " "	" 8		W, E	47·01	38·92	8·1				
	" " " "	" 13		E, W	46·97	41·28	5·7				
	" " " "	" 18		W, E	46·83	40·47	6·4	6·5	0·9	0·6	0·32
38	2107 & 2114 Gr. 80	Mar. 7	22 32	W, E	74 47 23·29	− 17 16·51	6·8				
	" " "	" 8		E, W	23·27	15·70	7·6				
	" " "	" 13		W, E	23·24	16·65	6·6				
	" " "	" 18		E, W	23·11	16·24	6·9	7·0	0·9	0·1	0·01
39	2129 & 2143 Gr. 80	Mar. 8	11 5	W, E	74 49 59·69	− 19 52·84	6·8				
	" " "	" 13		E, W	59·59	52·31	7·3				
	" " "	" 18		W, E	59·50	52·52	7·0	7·0	1·2	0·1	0·01
40	2173 Gr. 80 & 1280 Gr. 72	Mar. 13	12 59	W, E	74 57 12·29	− 27 4·72	7·6				
	" " " "	" 18		E, W	12·16	5·73	6·4	7·0	1·0	0·1	0·01
41	2207 & 2214 Gr. 80	Mar. 8	4 34	W, E	74 49 15·83	− 19 9·00	6·8				
	" " "	" 9		E, W	15·82	9·10	6·7				
	" " "	" 13		E, W	15·76	8·70	7·1				
	" " "	" 18		W, E	15·69	7·49	8·2	7·2	1·3	0·1	0·01
42	2225 & 2266 Gr. 80	Mar. 8	1 42	E, W	74 48 26·36	− 18 17·62	8·7				
	" " "	" 9		W, E	26·15	16·99	9·2				
	" " "	" 13		W, E	25·31	16·48	8·8				
	" " "	" 18		E, W	24·27	16·95	7·3	8·5	1·3	1·4	2·55
43	2293 Gr. 80 & 1352 Gr. 72	Mar. 8	23 11	W, E	74 54 56·70	− 24 50·64	6·1				
	" " " "	" 18		E, W	56·64	50·32	6·3	6·2	1·0	0·9	0·81
44	2327 & 2354 Gr. 80	Mar. 9	24 54	W, E	74 4 58·79	+ 25 7·77	6·6				
	" " "	" 13		W, E	58·75	7·71	6·5				
	" " "	" 18		E, W	58·70	7·04	5·7	6·3	1·2	0·8	0·77
45	2357 & 2387 Gr. 80	Mar. 13	13 39	E, W	74 10 25·55	+ 19 41·83	7·4				
	" " "	" 18		W, E	25·50	41·42	6·9	7·2	1·0	0·1	0·01
46	1994 Gr. 80 & 1524 Gr. 64	Mar. 7	2 35	E, W	74 53 30·07	− 23 23·57	6·5				
	" " " "	" 8		W, E	30·04	21·96	8·1	7·3	0·7	0·2	0·03
47	1524 Gr. 64 & 2009 Gr. 80	Mar. 7	2 20	W, E	74 39 47·45	− 9 41·35	6·1				
	" " " "	" 8		E, W	47·42	41·01	6·4	6·3	0·7	0·8	0·45
								Σ P =	53·1	Σ Pvv =	15·10

Summary.

No. of pairs 47
No. of observations 167

Mean difference between observations taken E, W and those taken W, E = − 0″·03

Observed Co-latitude (weighted mean) 74° 30′ 7″·12 ± 0″·053

Correction for Height above Sea-level + 0″·01

Final Co-latitude 74° 30′ 7″·13

		°	′	″	″
Astronomical Latitude (A)	=	15	29	52·87	± 0·053
Geodetic Latitude (G)	=	15	29	56·85	
Deflection of plumb-line (A−G)	=		−	3″·98	

201. Oria—*Co-latitude* 65° 22′ +

Latitude ... 24° 38′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 72 48 *Mean Height of Barometer* 25·59 in.

Height ... 4200 feet *Mean Temperature* 68°·1

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	1418 & 1407 Gr. 80	Mar. 25	0 16	W, E	65 22 34·48	− 0 21·89	12·59				
	" " "	" 28		E, W	34·30	21·79	12·51				
	" " "	" 29		E, W	34·25	21·11	13·14				
	" " "	Apr. 1		W, E	34·07	20·21	13·86	13·02	0·9	0·87	0·6812
2	1419 & 1407 Gr. 80	Mar. 25	0 16	W, E	65 22 32·30	− 0 19·70	12·60				
	" " "	" 28		E, W	32·13	19·99	12·14				
	" " "	" 29		E, W	32·07	18·88	13·19				
	" " "	Apr. 1		W, E	31·90	18·64	13·26	12·80	0·9	0·65	0·3803
3	1473 & 1461 Gr. 80	Mar. 25	4 37	W, E	65 27 32·87	− 5 21·35	11·52				
	" " "	" 28		E, W	32·67	20·86	11·81				
	" " "	" 29		E, W	32·61	20·41	12·20				
	" " "	Apr. 1		W, E	32·41	20·53	11·88	11·85	1·3	0·30	0·1170
4	1474 & 1468 Gr. 80	Mar. 25	4 36	W, E	65 26 36·74	− 4 25·93	10·81				
	" " "	" 28		E, W	36·54	24·19	12·35				
	" " "	" 29		E, W	36·48	23·45	13·03				
	" " "	Apr. 1		W, E	36·28	23·86	12·42	12·15	1·3	0·00	0·0000
5	1488 & 1498 Gr. 80	Mar. 25	8 35	W, E	65 41 42·33	− 19 30·59	11·74				
	" " "	" 28		E, W	42·12	30·42	11·70				
	" " "	" 29		E, W	42·05	30·37	11·68				
	" " "	Apr. 1		W, E	41·85	30·40	11·45	11·64	1·3	0·51	0·3381
6	1505 & 1500 Gr. 80	Mar. 25	8 25	W, E	65 35 9·71	− 12 58·83	10·88				
	" " "	" 28		E, W	9·50	57·68	11·82				
	" " "	" 29		E, W	9·42	57·81	11·61				
	" " "	Apr. 1		W, E	9·21	57·75	11·46	11·44	1·3	0·71	0·6553
7	883 Gr. 72 & 1522 Gr. 80	Mar. 25	13 54	W, E	65 0 35·37	+ 21 37·77	13·14				
	" " " "	" 28		E, W	35·15	37·40	12·55				
	" " " "	" 29		E, W	35·07	37·47	12·54				
	" " " "	Apr. 1		W, E	34·85	39·37	14·22	13·11	1·3	0·96	1·1981
8	1538 & 1543 Gr. 80	Mar. 25	30 11	E, W	65 43 15·29	− 21 4·01	11·28				
	" " "	" 28		W, E	15·10	3·81	11·29				
	" " "	" 29		W, E	15·04	3·23	11·81				
	" " "	Apr. 1		E, W	14·85	2·98	11·87	11·56	1·3	0·59	0·4525

201. Oria—*Co-latitude* 65° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = p	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
9	1554 & 1571 Gr. 80	Mar. 25	1 6	W, E	65 27 34·38	− 5 23·27	11·11				
	" " "	" 28		E, W	34·13	22·61	11·52				
	" " "	" 29		E, W	34·04	21·83	12·21				
	" " "	Apr. 1		W, E	33·79	20·34	13·45	12·07	1·3	0·08	0·0083
10	1585 & 1606 Gr. 80	Mar. 25	0 27	E, W	65 17 26·70	+ 4 44·50	11·20				
	" " "	" 28		W, E	26·43	45·72	12·15				
	" " "	" 29		W, E	26·34	46·31	12·65				
	" " "	Apr. 1		E, W	26·08	46·99	13·07	12·27	1·3	0·12	0·0187
11	1621 & 1638 Gr. 80	Mar. 25	2 2	W, E	65 30 42·89	− 8 31·87	11·02				
	" " "	" 28		E, W	42·62	30·21	12·41				
	" " "	" 29		E, W	42·52	29·62	12·90				
	" " "	Apr. 1		W, E	42·25	30·55	11·70	12·01	1·3	0·14	0·0255
12	1662 & 1648 Gr. 80	Mar. 25	7 22	W, E	65 21 30·05	+ 0 41·55	11·60				
	" " "	" 28		E, W	29·75	41·73	11·48				
	" " "	" 29		E, W	29·66	43·15	12·81				
	" " "	Apr. 1		W, E	29·37	43·45	12·82	12·18	1·3	0·03	0·0012
13	1679 & 1685 Gr. 80	Mar. 25	17 21	W, E	65 34 16·28	− 12 3·65	12·63				
	" " "	" 28		E, W	16·00	3·84	12·16				
	" " "	" 29		E, W	15·90	3·53	12·37				
	" " "	Apr. 1		W, E	16·12	3·24	12·88	12·51	1·3	0·36	0·1685
14	984 Gr. 72 & 1708 Gr. 80	Mar. 25	9 50	E, W	65 29 11·99	− 6 61·00	10·99				
	" " " "	" 28		W, E	11·69	59·98	11·71				
	" " " "	" 29		W, E	11·59	60·14	11·45				
	" " " "	Apr. 1		E, W	11·30	58·67	12·63	11·69	0·9	0·46	0·1904
15	1713 & 1714 Gr. 80	Mar. 25	7 56	W, E	65 23 32·41	− 1 20·55	11·86				
	" " "	" 28		E, W	32·10	19·87	12·23				
	" " "	" 29		E, W	32·00	20·35	11·65				
	" " "	Apr. 1		W, E	31·68	20·62	11·06	11·70	1·3	0·45	0·2633
16	1425 & 1432 Gr. 80	Mar. 25	0 10	W, E	65 31 40·56	− 9 27·94	12·62				
	" " "	" 28		E, W	40·38	27·18	13·20				
	" " "	" 29		E, W	40·32	28·26	12·06				
	" " "	Apr. 1		W, E	40·13	26·73	13·40	12·82	0·9	0·67	0·4040
17	1432 Gr. 80 & 839 Gr. 72	Mar. 25	0 11	W, E	65 33 12·79	− 11 0·95	11·84				
	" " " "	" 28		E, W	12·61	0·77	11·84				
	" " " "	" 29		E, W	12·55	0·19	12·36				
	" " " "	Apr. 1		W, E	12·36	0·40	11·96	12·00	0·9	0·15	0·0203
18	1425 Gr. 80	Mar. 25	0 8	W, E	65 29 56·13	− 7 44·16	11·97				
	" "	" 28		E, W	55·95	42·99	12·96				
	" "	" 29		E, W	55·89	44·88	11·01				
	" "	Apr. 1		W, E	55·71	43·23	12·48	12·10	0·9	0·05	0·0023
19	1432 Gr. 80	Mar. 25	0 11	E, W	65 33 24·99	− 11 12·45	12·54				
	" "	" 28		W, E	24·81	12·47	12·34				
	" "	" 29		W, E	24·75	12·07	12·68				
	" "	Apr. 1		E, W	24·56	11·63	12·93	12·62	0·9	0·47	0·1988
20	839 Gr. 72	Mar. 25	0 11	W, E	65 33 0·59	− 10 49·08	11·51				
	" "	" 28		E, W	0·41	48·41	12·00				
	" "	" 29		E, W	0·35	47·86	12·49				
	" "	Apr. 1		W, E	0·16	47·96	12·20	12·05	0·9	0·10	0·0090

201. Oria—*Co-latitude* 65° 22′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1893	° ′		° ′ ″	′ ″	″	″			
21	984 & 989 Gr. 72	Mar. 25	9 44	E, W	65 23 5·01	− 0 53·62	11·39				
	" " "	" 28		W, E	4·71	52·83	11·88				
	" " "	" 29		W, E	4·61	53·14	11·47				
	" " "	Apr. 1		E, W	4·31	51·02	13·29	12·01	0·9	0·14	0·0176
								ΣP = 23·7		ΣPvv = 5·1504	

Summary.

No. of pairs 21

No. of observations 84

Mean difference between observations taken E, W and those taken W, E = + 0″·08

Observed Co-latitude (weighted mean) 65° 22′ 12″·15 ± 0″·070

Correction for Height above Sea-level + 0″·17

Corrected Co-latitude 65° 22′ 12″·32 ± 0″·070

***For final Co-latitude and deduction of** (A−G) **see** page (391).*

201. Oria—*Co-latitude* 65° 22′ +

Latitude ... 24° 38′	*Maximum recorded Height of Barometer*		= 25 ·66 in.
Longitude ... 72 48	*Minimum* ,, ,, ,,		= 25 ·50
Height ... 4200 feet	*Maximum* ,, *Reading of Thermometer*		= 71°·5
Instrument—Zenith Sector No. 1	*Minimum* ,, ,, ,,		= 62 ·9

Observer—Captain S. G. Burrard, R.E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean by North Star	Seconds of Co-latitude: Mean by South Star	Seconds of Co-lat. corrected for error of Limb*	v	$v\,v$
		1893			° ′ ″	° ′ ″	″	″	″	″		
1	1411 Gr. 80 " "	Mar. 26 " 30	N S	E, W W, E	5 57 13·77 13·63	71 19 25·11 24·93	11·34 11·30	...	11·32	12·39	0·09	0·0081
2	1436 Gr. 80 " "	Mar. 26 " 30	N S	W, E E, W	3 49 30·24 28·38	69 11 40·41 40·21	10·17 11·83	...	11·00	11·69	0·61	0·3721
3	1449 Gr. 80 " "	Mar. 27 " 31	N S	E, W W, E	14 36 12·46 14·13	79 58 22·91 22·81	10·45 8·68	..	9·57	12·20	0·10	0·0100
4	1452 Gr. 80 " "	Mar. 26 " 30	N S	E, W W, E	8 28 38·72 37·90	56 53 35·24 34·89	13·96 12 79	13·38	...	11·86	0·32	0·1024
5	1465 Gr. 80 " "	Mar. 27 " 31	N S	W, E E, W	2 46 32·97 33·72	68 8 45·22 44·98	12·25 11·26	...	11·76	12·26	0·04	0·0016
6	1476 Gr. 80 " "	Mar. 26 " 30	N S	W, E E, W	12 7 40·65 40·77	77 29 51·23 51·11	10·58 10·34	...	10·46	12·64	0·34	0·1156
7	1482 Gr. 80 " "	Mar. 27 " 31	N S	E, W W, E	8 52 57·07 57·43	74 15 8·63 8·46	11·56 11·03	..	11·30	12·90	0 60	0·3600
8	1494 Gr. 80 " "	Mar. 26 " 30	N S	E, W W, E	12 35 45·24 44·93	77 57 55·33 55·20	10·09 10·27	...	10·18	12·45	0·15	0·0225
9	1499 Gr. 80 " "	Mar. 27 " 31	N S	W, E E, W	6 0 59·10 60·41	59 21 13·89 13·53	12·99 13·94	13·47	...	12·39	0·21	0·0441
10	1511 Gr. 80 " "	Mar. 26 " 30	N S	W, E E, W	0 14 41·21 41·87	65 7 30·49 30·19	11·70 12·06	11·88	...	11·84	0·34	0·1156
11	1520 Gr. 80 " "	Mar. 27 " 31	N S	E, W W, E	5 27 22·42 22·22	59 54 51·50 51·13	13·92 13·35	13·64	...	12·66	0·48	0·2304
12	1524 Gr. 80 " "	Mar. 26 " 30	N S	E, W W, E	2 9 3·71 4·00	67 31 16·26 15·98	12·55 11·98	...	12·27	12·66	0·36	0·1296

* See Appendix 3.

201. Oria—*Co-latitude* 65° 22′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	Seconds of Co-lat. corrected for error of Limb	v	$v v$
		1893			° ′ ″	° ′ ″	″	″	″	″		
13	1539 Gr. 80 „ „	Mar. 27 „ 31	N S	W, E E, W	10 26 48·20 50·39	54 55 24·54 24·09	12·74 14·48	13·61	...	11·73	0·45	0·2025
14	1545 Gr. 80 „ „	Mar. 26 „ 30	N S	W, E E, W	12 37 38·61 39·34	52 44 35·71 35·23	14·32 14·57	14·45	...	12·18	0·00	0·0000
15	1546 Gr. 80 „ „	Mar. 26 „ 30	N S	W, E E, W	12 37 40·81 40·45	52 44 34·81 34·33	15·62 14·78	15·20	...	12·93	0·75	0·5625
16	1554 Gr. 80 „ „	Mar. 27 „ 31	N S	E, W W, E	1 0 39·79 40·15	64 21 33·27 32·93	13·06 13·08	13·07	...	12·89	0·71	0·5041
17	1573 Gr. 80 „ „	Mar. 27 „ 31	N S	W, E E, W	14 26 38·37 36·79	79 48 46·79 46·68	8·42 9·89	...	9·16	11·76	0·54	0·2916
18	1577 Gr. 80 „ „	Mar. 27 „ 30	N S	E, W W, E	12 14 41·09 40·86	53 7 33·72 33·20	14·81 14·06	14·44	...	12·24	0·06	0·0036
19	931 Gr. 72 „ „	Mar. 26 „ 30	N S	W, E E, W	10 57 13·46 15·87	54 24 59·63 59·12	13·09 14·99	14·04	...	12·07	0·11	0·0121
20	1606 Gr. 80 „ „	Mar. 27 „ 31	N S	E, W W, E	0 21 46·78 44·56	65 43 58·24 57·88	11·46 13·32	...	12·39	12·45	0·15	0·0225
21	1616 Gr. 80 „ „	Mar. 26 „ 30	N S	E, W W, E	15 30 7·92 7·82	49 52 7·61 7·02	15·53 14·84	15·19	...	12·40	0·22	0·0484
22	1717 Gr. 80 „ „	Mar. 27 „ 31	N S	W, E E, W	3 27 9·34 11·51	61 55 2·82 2·33	12·16 13·84	13·00	...	12·38	0·20	0·0400
23	1621 Gr. 80 „ „	Mar. 27 „ 31	N S	W, E E, W	1 52 51·50 53·47	63 29 19·75 19·35	11·25 12·82	12·04	...	11·70	0·48	0·2304
24	1629 Gr. 80 „ „	Mar. 26 „ 30	N S	W, E E, W	16 56 14·35 15·50	48 26 1·04 0·42	15·39 15·92	15·66	...	12·61	0·43	0·1849
25	1636 Gr. 80 „ „	Mar. 27 „ 31	N S	E, W W, E	16 4 27·68 26·74	81 26 36·76 36·66	9·08 9·92	...	9·50	12·39	0·09	0·0081
26	1648 Gr. 80 „ „	Mar. 26 „ 30	N S	E, W W, E	7 20 47·05 46·35	72 42 58·28 58·03	11·23 11·68	...	11·46	12·78	0·48	0·2304
27	962 Gr. 72 „ „	Mar. 27 „ 31	N S	W, E E, W	10 44 54·28 52·20	76 7 3·61 3·41	9·33 11·21	...	10·37	12·20	0·10	0·0100

201. Oria—*Co-latitude* 65° 22′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean by North Star	Seconds of Co-latitude: Mean by South Star	Seconds of Co-lat. corrected for error of Limb	v	$v\,v$
		1893			° ′ ″	° ′ ″	″	″	″	″		
28	1662 Gr. 80	Mar. 26	N	W, E	7 22 10·77	58 0 1·62	12·39					
	„ „	„ 30	S	E, W	12·97	1·10	14·07	13·23	...	11·90	0·28	0·0784
29	1672 Gr. 80	Mar. 27	N	E, W	4 37 0·97	69 59 12·22	11·25					
	„ „	„ 31	S	W, E	0·20	11·91	11·71	.	11·48	12·31	0·01	0·0001
30	1679 Gr. 80	Mar. 26	N	E, W	17 8 39·23	48 13 35·57	14·80					
	„ „	„ 30	S	W, E	40·24	34·89	15·13	14·97		11·89	0·29	0·0841
31	984 Gr. 72	Mar. 27	N	W, E	9 42 41·51	55 39 30·70	12·21					
	„ „	„ 31	S	E, W	44·71	30·12	14·83	13·52	...	11·77	0·41	0·1681
32	1690 Gr. 80	Mar. 26	N	W, E	12 37 35·82	52 44 38·48	14·30					
	„ „	„ 30	S	E, W	36·11	37·86	13·97	14·14	..	11·87	0·31	0·0961
33	1708 Gr. 80	Mar. 27	N	E, W	17 7 40·79	82 29 48·94	8·15					
	„ „	„ 31	S	W, E	40·30	48·86	8·56	...	8·36	11·44	0·86	0·7396
									Σ vv by N. Stars = 2·7077			
									Σ vv by S. Stars = 2·3218			

Summary.

No. of North Stars 18 No. of South Stars 15

No. of observations 66

	°	′	″	″
Co-latitude by North Stars	65	22	12·18	± 0·063
„ „ South „	65	22	12·30	± 0·070
Mean Co-latitude	65	22	12·24	
Correction for Height above Sea-level		+	0·17	
Corrected Co-latitude by Sector Method	65	22	12·41	± 0·047
Corrected Co-latitude by Talcott Method, p. (388)	65	22	12·32	± 0·070

Final Co-latitude 65° 22′ 12″·37

		°	′	″	″
Astronomical Latitude (A)	=	24	37	47·63	± 0·042
Geodetic Latitude (G)	=	24	37	50·96	
Deflection of plumb-line (A − G)	=		−	3·33	

202. Parampudi—*Co-latitude* 72° 47′ +

Latitude	...	17° 13′	*Instrument*—Zenith Telescope	
Longitude	...	81 15	*Mean Height of Barometer*	in. 29·20
Height	...	684 feet	*Mean Temperature*	77°·0

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	1099 & 1116 Gr. 80 " " "	Mar. 5 " 6	12 49	E, W W, E	72 15 11·20 11·19	+ 32 14·00 15·30	25·20 26·49	25·85	1·0	1·49	2·2201
2	1139 & 1155 Gr. 80 " " "	Mar. 5 " 6	0 38	W, E E, W	72 52 45·41 45·40	− 5 18·38 16·85	27·03 28·55	27·79	1·0	0·45	0·2025
3	1168 & 1181 Gr. 80 " " "	Mar. 5 " 6	4 26	E, W W, E	72 33 2·19 2·18	+ 14 25·43 25·52	27·62 27·70	27·66	0·7	0·32	0·0717
4	1181 & 1184 Gr. 80 " " "	Mar. 5 " 6	4 17	W, E E, W	72 23 57·56 57·55	+ 23 30·21 29·50	27·77 27·05	27·41	0·7	0·07	0·0034
5	1256 & 1272 Gr. 80 " " "	Mar. 5 " 6	5 9	W, E E, W	72 58 17·96 17·95	− 10 50·78 49·61	27·18 28·34	27·76	0·7	0·42	0·1235
6	1266 & 1272 Gr. 80 " " "	Mar. 5 " 6	5 38	W, E E, W	72 29 8·93 8·91	+ 18 17·64 19·14	26·57 28·05	27·31	0·7	0·03	0·0006
7	1296 & 1311 Gr. 80	Mar. 5	1 2	E, W	73 6 28·06	− 19 0·60	27·46	27·46	0·7	0·12	0·0101
8	1327 & 1350 Gr. 80 " " "	Mar. 5 " 6	1 21	W, E E, W	72 34 42·10 42·07	+ 12 45·90 46·24	28·00 28·31	28·16	1·0	0·82	0·6724
9	1365 & 1368 Gr. 80 " " "	Mar. 5 " 6	0 26	E, W W, E	72 49 33·81 33·79	− 2 5·53 6·78	28·28 27·01	27·65	0·7	0·31	0·0673
10	1368 & 1395 Gr. 80 " " "	Mar. 5 " 6	0 37	W, E E, W	72 38 31·10 31·07	+ 8 56·63 55·86	27·73 26·93	27·33	0·7	0·01	0·0001
11	1402 & 1407 Gr. 80 " " "	Mar. 5 " 6	7 25	E, W W, E	73 3 55·63 55·60	− 16 27·88 27·63	27·75 27·97	27·86	1·0	0·52	0·2704
12	1428 & 1436 Gr. 80	Mar. 5	3 7	W, E	72 19 5·77	+ 28 21·45	27·22	27·22	0·7	0·12	0·0101
13	1451 & 1474 Gr. 80 " " "	Mar. 5 " 6	11 33	E, W W, E	72 23 21·52 21·48	+ 24 4·08 7·43	25·57 28·91	27·24	0·7	0·10	0·0070
14	1474 & 1480 Gr. 80	Mar. 6	11 28	E, W	72 18 41·12	+ 28 46·40	27·52	27·52	0·5	0·18	0·0162
15	1493 & 1508 Gr. 80 " " "	Mar. 5 " 6	10 59	E, W W, E	72 39 56·08 56·05	+ 7 31·09 31·15	27·17 27·20	27·19	1·0	0·15	0·0225

202. Parampudi—*Co-latitude* 72° 47′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
16	1522 & 1524 Gr. 80	Mar. 5	5 42	W, E	73 12 56·86	− 25 28·65	28·21	28·21	0·5	0·87	0·3785
17	1522 & 1529 Gr. 80	Mar. 5	5 40	W, E	73 14 22·36	− 26 54·24	28·12	28·12	0·5	0·78	0·3042
18	1571 & 1572 Gr. 80	Mar. 5	5 50	W, E	72 23 53·60	+ 23 32·83	26·43	26·43	0·7	0·91	0·5797
19	1584 & 1595 Gr. 80	Mar. 5	9 33	E, W	73 8 51·93	− 21 23·69	28·24	28·24	0·7	0·90	0·5670
20	1617 & 1632 Gr. 80	Mar. 5	4 22	W, E	72 41 20·75	+ 6 6·65	27·40	27·40	0·7	0·06	0·0025
21	1650 & 1666 Gr. 80	Mar. 5	6 43	E, W	72 46 11·68	+ 1 14·94	26·62	26·62	0·5	0·72	0·2592
22	1650 & 1668 Gr. 80	Mar. 5	6 34	E, W	72 55 25·93	− 7 58·51	27·42	27·42	0·5	0·08	0·0032
23	1705 & 1724 Gr. 80 " " "	Mar. 4 " 5	6 57	E, W W, E	73 12 14·72 14·73	− 24 46·72 46·80	28·00 27·93	27·97	1·0	0·63	0·3969
24	1727 & 1728 Gr. 80 " " "	Mar. 4 " 5	14 6	W, E E, W	72 51 31·47 31·45	− 4 4·45 3·86	27·02 27·59	27·31	1·0	0·03	0·0009
25	1733 & 1759 Gr. 80 " " "	Mar. 4 " 5	10 56	E, W W, E	72 23 58·80 58·78	+ 23 27·52 27·79	26·32 26·57	26·45	1·0	0·89	0·7921
26	1777 & 1799 Gr. 80 " " "	Mar. 3 " 4	14 48	E, W W, E	72 40 26·48 26·46	+ 7 2·75 0·73	29·23 27·19	28·21	0·7	0·87	0·5298
27	1799 & 1812 Gr. 80 " " "	Mar. 3 " 4	15 5	W, E E, W	72 56 41·24 41·22	− 9 12·63 13·46	28·61 27·76	28·19	0·7	0·85	0·5058
28	1827 & 1831 Gr. 80 " " "	Mar. 3 " 4	2 2	E, W W, E	73 1 42·49 42·47	− 14 15·19 14·71	27·30 27·76	27·53	1·0	0·19	0·0361
29	1857 & 1898 Gr. 80	Mar. 4	9 41	E, W	73 12 40·23	− 25 11·53	28·70	28·70	0·5	1·36	0·9248
30	1882 & 1898 Gr. 80	Mar. 4	9 38	E, W	73 10 12·49	− 22 44·88	27·61	27·61	0·5	0·27	0·0365
31	1908 & 1929 Gr. 80 " " "	Mar. 3 " 4	1 27	E, W W, E	73 4 10·47 10·45	− 16 43·88 42·99	26·59 27·46	27·03	1·0	0·31	0·0961
32	1939 & 1969 Gr. 80 " " "	Mar. 3 " 4	22 26	W, E E, W	72 49 26·09 26·09	− 1 58·91 58·24	27·18 27·85	27·52	1·0	0·18	0·0324
33	1977 & 1994 Gr. 80 " " "	Mar. 3 " 4	4 34	W, E E, W	72 54 44·52 44·51	− 7 17·31 17·38	27·21 27·13	27·17	0·7	0·17	0·0202
34	1994 & 2008 Gr. 80 " " "	Mar. 3 " 4	4 39	E, W W, E	72 49 28·30 28·30	− 2 1·64 1·30	26·66 27·00	26·83	0·7	0·51	0·1821
35	2008 & 2009 Gr. 80 " " "	Mar. 3 " 4	4 25	W, E E, W	72 35 45·60 45·60	+ 11 41·15 41·04	26·75 26·64	26·70	0·7	0·64	0·2867
36	2009 & 1977 Gr. 80 " " "	Mar. 3 " 4	4 20	E, W W, E	72 41 1·82 1·81	+ 6 25·51 24·97	27·33 26·78	27·06	0·7	0·28	0·0549

202. Parampudi—*Co-latitude* 72° 47′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1894	° ′		° ′ ″	′ ″	″	″			
37	2017 & 2029 Gr. 80	Mar. 3	13 42	E, W	72 20 20·11	+ 27 6·61	26·72				
	,, ,, ,,	,, 4		W, E	20·09	6·88	26·97	26·85	1·0	0·49	0·2401
38	2045 & 2047 Gr. 80	Mar. 3	22 2	W, E	72 56 28·39	− 9 1·13	27·26				
	,, ,, ,,	,, 4		E, W	28·39	1·27	27·12	27·19	0·7	0·15	0·0158
39	2045 & 2048 Gr. 80	Mar. 3	22 1	W, E	72 57 34·07	− 10 6·24	27·83				
	,, ,, ,,	,, 4		E, W	34·06	6·47	27·59	27·71	0·7	0·37	0·0958
40	2050 & 2068 Gr. 80	Mar. 3	11 12	E, W	72 46 56·13	+ 0 30·04	26·17				
	,, ,, ,,	,, 4		W, E	56·12	30·14	26·26	26·22	1·0	1·12	1·2544
41	2084 & 2124 Gr. 80	Mar. 4	3 4	E, W	72 35 11·07	+ 12 16·30	27·37	27·37	0·7	0·03	0·0006
42	2144 & 2150 Gr. 80	Mar. 3	0 50	E, W	72 51 1·58	− 3 34·16	27·42				
	,, ,, ,,	,, 4		W, E	1·58	34·60	26·98	27·20	0·7	0·14	0·0137
43	2150 & 2167 Gr. 80	Mar. 3	1 18	W, E	72 22 42·48	+ 24 44·52	27·00				
	,, ,, ,,	,, 4		E, W	42·48	43·37	25·85	26·43	0·7	0·91	0·5797
								Σ P = 32·6		Σ Pvv = 11·8876	

Summary.

No. of pairs 43

No. of observations 73

Mean difference between observations taken E, W and those taken W, E = + 0″·02

Observed Co-latitude (weighted mean) 72° 47′ 27″·34 ± 0″·063

Correction for Height above Sea-level. + 0″·03

Final Co-latitude 72° 47′ 27″·37

		°	′	″	″
Astronomical Latitude (A)	=	17	12	32·68	± 0·063
Geodetic Latitude (G)	=	17	12	38·28	
Deflection of plumb-line (A − G)	=		−	5·65	

203. Pathaidi—*Co-latitude* 68° 11′ +

Latitude	... 21° 49′	*Instrument*—Zenith Telescope	
Longitude	... 82 19	*Mean Height of Barometer*	in. 29·08
Height	... 879 feet	*Mean Temperature*	67°·8

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	1218 & 1223 Gr. 80	Mar. 7	5 28	E, W	68 26 45·95	− 15 28·68	17·27				
	" " "	" 8		W, E	45·92	28·79	17·13				
	1223 & 1233 Gr. 80	" 7	5 21	W, E	19 37·07	8 19·49	17·58				
	" " "	" 8		E, W	37·04	20·04	17·00	17·25	1·5	0·34	0·1734
2	1250 & 1271 Gr. 80	Mar. 7	5 39	E, W	67 38 34·44	+ 32 43·28	17·72				
	" " "	" 8		W, E	34·40	41·69	16·09	16·91	1·0	0·00	0·0000
3	1282 & 1309 Gr. 80	Mar. 7	13 10	W, E	68 20 59·14	− 9 42·31	16·83				
	" " "	" 8		E, W	59·11	41·43	17·68				
	1285 & 1309 Gr. 80	" 7	12 51	W, E	1 52·45	+ 9 24·61	17·06				
	" " "	" 8		E, W	52·41	25·01	17·42	17·25	1·5	0·34	0·1734
4	1311 & 1323 Gr. 80	Mar. 7	3 22	E, W	68 43 55·27	− 32 39·65	15·62				
	" " "	" 8		W, E	55·24	39·01	16·23	15·93	1·0	0·98	0·9604
5	1367 & 1395 Gr. 80	Mar. 7	3 43	W, E	68 20 43·95	− 9 26·90	17·05				
	" " "	" 8		E, W	43·91	27·66	16·25	16·65	1·0	0·26	0·0676
6	1436 & 1465 Gr. 80	Mar. 7	0 32	E, W	68 41 54·55	− 30 37·65	16·90				
	" " "	" 8		W, E	54·51	38·36	16·15	16·53	1·0	0·38	0·1444
7	1483 & 1486 Gr. 80	Mar. 7	6 30	W, E	67 47 9·74	+ 24 6·63	16·37				
	" " "	" 8		E, W	9·68	6·95	16·63	16·50	1·0	0·41	0·1681
8	1498 & 1508 Gr. 80	Mar. 7	6 18	W, E	68 0 7·53	+ 11 9·32	16·85				
	" " "	" 8		E, W	7·46	11·03	18·49	17·67	1·0	0·76	0·5776
9	1511 & 1547 Gr. 80	Mar. 8	3 22	W, E	68 30 55·95	− 19 39·84	16·11				
	1547 & 1554 Gr. 80	" 8	3 45	E, W	8 1·96	+ 3 15·24	17·20	16 66	1·0	0·25	0·0625
10	1567 & 1573 Gr. 80	Mar. 7	11 59	W, E	67 52 39·85	+ 18 37·19	16·74				
	" " "	" 8		E, W	39·48	36·55	16·03	16·39	1·0	0·52	0·2704
11	1622 & 1629 Gr. 80	Mar. 7	19 19	E, W	67 46 40·01	+ 24 37·37	17·38				
	" " "	" 8		W, E	39·99	36·55	16·54	16·96	1·0	0·05	0·0025

203. Pathaidi—*Co-latitude* 68° 11′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
12	1652 & 1662 Gr. 80	Mar. 7	9 46	E, W	67 47 38·58	+ 23 36·78	15·36				
	" " "	" 8		W, E	38·51	38·27	16·78	16·07	1·0	0·84	0·7056
13	1665 & 1672 Gr. 80	Mar. 7	2 1	W, E	68 0 54·84	+ 10 21·83	16·67				
	" " "	" 8		E, W	54·77	23·22	17·99				
	1666 & 1672 Gr. 80	" 8	1 58	E, W	3 26·65	7 50·45	17·10	17·25	1·5	0·34	0·1734
14	1668 & 1673 Gr. 80	Mar. 7	1 38	W, E	68 1 36·68	+ 9 40·04	16·72				
	" " "	" 8		E, W	36·60	40·49	17·09	16·91	1·0	0·00	0·0000
15	1708 & 1709 Gr. 80	Mar. 7	14 42	E, W	67 50 51·32	+ 20 26·06	17·38				
	" " "	" 8		W, E	51·26	24·21	15·47	16·43	1·0	0·48	0·2304
16	1799 & 1810 Gr. 80	Mar. 7	10 30	W, E	68 25 8·64	− 13 52·24	16·40	16·40	0·5	0·51	0·1301
17	1713 & 1732 Gr. 80	Mar. 7	10 43	W, E	68 13 10·58	− 1 54·12	16·46				
	" " "	" 8		E, W	10·50	53·56	16·94	16·70	1·0	0·21	0·0441
18	1751 & 1777 Gr. 80	Mar. 7	19 14	E, W	68 16 24·51	− 5 7·77	16·74				
	" " "	" 8		W, E	24·44	7·19	17·25				
	1751 & 1798 Gr. 80	" 7	19 12	E, W	14 32·78	3 16·16	16·62				
	" " "	" 8		W, E	32·71	15·59	17·12	16·94	1·5	0·03	0·0014
19	1411 & 1418 Gr. 80	Mar. 7	3 7	E, W	68 14 41·14	− 3 23·05	18·09	18·09	0·5	1·18	0·6962
20	1580 & 1584 Gr. 80	Mar. 7	14 30	E, W	68 13 49·82	− 2 31·35	18·47				
	" " "	" 8		W, E	49·77	32·55	17·22				
	1577 & 1584 Gr. 80	" 7	14 47	E, W	67 56 27·25	+ 14 50·76	18·01				
	" " "	" 8		W, E	27·19	49·56	16·75	17·62	1·5	0·71	0·7562
21	2410 & 2414 Gr. 80	Mar. 10	5 18	E, W	68 15 16·75	− 3 59·29	17·46	17·46	0·5	0·55	0·1513
22	2431 & 2437 Gr. 80	Mar. 10	5 8	W, E	68 31 31·78	− 20 13·93	17·85	17·85	0·5	0·94	0·4418
23	2451 & 2475 Gr. 80	Mar. 9	5 12	W, E	68 49 26·07	− 38 9·61	16·46				
	" " "	" 10		E, W	26·08	9·29	16·79	16·63	1·0	0·28	0·0784
24	2482 & 2510 Gr. 80	Mar. 9	4 56	W, E	67 45 53·28	+ 25 23·59	16·87				
	" " "	" 10		E, W	53·28	22·95	16·23				
	2482 & 2521 Gr. 80	" 10	5 8	E, W	57 33·31	13 43·91	17·22	16·77	1·5	0·14	0·0294
25	2525 & 2544 Gr. 80	Mar. 9	25 0	E, W	68 26 50·00	− 15 32·43	17·57				
	" " "	" 10		W, E	50·02	32·56	17·46				
	2531 & 2544 Gr. 80	" 10	25 8	W, E	34 53·86	23 36·98	16·88	17·30	1·5	0·39	0·2282

203. Pathaidi—*Co-latitude* 68° 11′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
26	2631 & 2656 Gr. 80	Mar. 9	11 42	W, E	67 58 58·61	+ 12 17·98	16·59				
	" " "	" 10		E, W	58·64	18·67	17 31	16·95	1·0	0·04	0·0016
27	2641 & 2710 Gr. 80	Mar. 9	11 50	W, E	68 38 6·37	− 26 50·17	16·20				
	" " "	" 10		E, W	6·41	49·71	16 70	16 45	1·0	0·46	0·2116
									Σ P = 28·5	Σ Pvv = 6·4900	

Summary.

No. of pairs 27
No. of observations 61

Mean difference between observations taken E,W and those taken W, E = + 0″·39

Observed Co-latitude (weighted mean) 68° 11′ 16″·91 ± 0″·063

Correction for Height above Sea-level + 0″·03

Final Co-latitude 68° 11′ 16″·94

		°	′	″	″
Astronomical Latitude (A)	=	21	48	43·06	± 0·063
Geodetic Latitude (G)	=	21	48	45·96	
Deflection of plumb-line (A−G)	=		−	2·90	

204. Patna—*Co-latitude* 68° 12′ +

Latitude ... 21° 47′ *Instrument*—Zenith Telescope

Longitude ... 87 14 *Mean Height of Barometer* 29·77 in.

Height ... 80 feet *Mean Temperature* 75°·4

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed *	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	861 & 869 Gr. 80	Mar. 3	10 41	E, W	68 6 0·02	+ 6 43·51	43·53				
	" " "	" 4		W, E	0·03	43·07	43·10	43·32	0·7	0·60	0·2520
2	869 & 915 Gr. 80	Mar. 3	10 27	W, E	68 19 36·34	− 6 53·47	42·87				
	" " "	" 4		E, W	36·34	53·41	42·93	42·90	0·7	0·18	0·0227
3	943 & 953 Gr. 80	Mar. 3	4 26	E, W	68 35 25·39	− 22 42·66	42·73				
	" " "	" 4		W, E	25·40	42·05	43·35				
	" " "	" 6		W, E	25·43	41·21	44·22				
	" " "	" 7		E, W	25·44	42·36	43·08	43·35	0·5	0·63	0·1985
4	953 & 977 Gr. 80	Mar. 3	4 5	W, E	68 14 1·34	− 1 19·51	41·83				
	" " "	" 4		E, W	1·35	18·25	43·10				
	" " "	" 6		E, W	1·37	17·12	44·25				
	" " "	" 7		W, E	1·37	19·20	42·17	42·84	0·5	0·12	0·0072
5	977 & 1010 Gr. 80	Mar. 3	4 8	E, W	68 11 0·21	+ 1 41·93	42·14				
	" " "	" 4		W, E	0·22	42·59	42·81				
	" " "	" 6		W, E	0·22	43·38	43·60				
	" " "	" 7		E, W	0·23	41·71	41·94	42·62	0·5	0·10	0·0050
6	943 & 1010 Gr. 80	Mar. 3	4 29	E, W	68 32 24·26	− 19 41·23	43·03				
	" " "	" 4		W, E	24·27	41·23	43·04				
	" " "	" 6		W, E	24·29	40·77	43·52				
	" " "	" 7		E, W	24·30	42·03	42·27	42·97	0·5	0·25	0·0313
7	1053 & 1058 Gr. 80	Mar. 3	7 40	W, E	68 6 59·92	+ 5 42·94	42·86				
	" " "	" 4		E, W	59·92	41·99	41·91				
	" " "	" 6		E, W	59·93	42·57	42·50				
	" " "	" 7		W, E	59·93	42·88	42·81	42·52	1·3	0·20	0·0520
8	1184 & 1221 Gr. 80	Mar. 3	8 33	W, E	68 8 32·20	+ 4 10·98	43·18				
	" " "	" 4		E, W	32·18	10·01	42·19				
	" " "	" 6		W, E	32·15	10·34	42·49				
	" " "	" 7		E, W	32·13	10·44	42·57	42·61	1·3	0·11	0·0157
9	1233 & 1240 Gr. 80	Mar. 3	5 53	E, W	67 47 57·16	+ 24 45·65	42·81				
	" " "	" 4		W, E	57·14	45·60	42·74				
	" " "	" 6		E, W	57·09	44·50	41·59				
	" " "	" 7		W, E	57·07	45·09	42·16	42·32	1·3	0·40	0·2080
10	1272 & 1284 Gr. 80	Mar. 3	10 4	W, E	68 4 29·11	+ 8 14·16	43·27				
	" " "	" 4		E, W	29·09	13·57	42·66				
	" " "	" 6		W, E	29·04	13·70	42·74				
	" " "	" 7		E, W	29·01	12·55	41·56	42·56	1·3	0·16	0·0333

204. Patna—*Co-latitude* 68° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
11	1343 & 1368 Gr. 80	Mar. 3	5 9	W, E	68 7 16·58	+ 5 26·73	43·31				
	” ” ”	” 4		E, W	16·55	26·59	43·14				
	” ” ”	” 6		W, E	16·48	26·19	42·67				
	” ” ”	” 7		E, W	16·45	26·15	42·60	42·93	1·3	0·21	0·0573
12	1390 & 1395 Gr. 80	Mar. 3	3 56	W, E	68 7 8·19	+ 5 34·68	42·87				
	” ” ”	” 4		E, W	8·15	34·86	43·01				
	” ” ”	” 6		W, E	8·08	34·18	42·26				
	” ” ”	” 7		E, W	8·04	33·58	41·62	42·44	1·3	0·28	0·1019
13	1428 & 1473 Gr. 80	Mar. 3	7 18	E, W	68 9 54·59	+ 2 48·74	43·33				
	” ” ”	” 4		W, E	54·55	48·02	42·57				
	” ” ”	” 6		E, W	54·46	48·81	43·27				
	” ” ”	” 7		W, E	54·42	49·91	44·33	43·38	1·3	0·66	0·5663
14	1476 & 1490 Gr. 80	Mar. 3	9 15	W, E	68 16 53·69	− 4 11·29	42·40				
	” ” ”	” 4		E, W	53·65	11·12	42·53				
	” ” ”	” 6		W, E	53·55	12·76	40·79	42·07	0·8	0·65	0·3380
15	1490 & 1494 Gr. 80	Mar. 3	0 29	E, W	68 30 57·47	− 18 14·17	43·30				
	” ” ”	” 4		W, E	57·42	15·15	42·27				
	” ” ”	” 6		E, W	57·33	15·31	42·02				
	” ” ”	” 7		W, E	57·28	14·27	43·01	42·65	0·9	0·07	0·0044
16	1507 & 1522 Gr. 80	Mar. 3	10 47	E, W	68 8 31·39	+ 4 10·22	41·61				
	” ” ”	” 4		W, E	31·35	10·91	42·26				
	” ” ”	” 6		E, W	31·25	10·87	42·12				
	” ” ”	” 7		W, E	31·20	11·43	42·63	42·16	1·3	0·56	0·4077
17	1529 & 1536 Gr. 80	Mar. 3	0 22	W, E	67 57 1·06	+ 15 42·84	43·90				
	” ” ”	” 4		E, W	1·01	41·52	42·53				
	” ” ”	” 6		W, E	0·91	42·26	43·17				
	” ” ”	” 7		E, W	0·86	43·03	43·89	43·37	1·3	0·65	0·5493
18	1547 & 1554 Gr. 80	Mar. 3	3 45	E, W	68 7 45·18	+ 4 57·97	43·15				
	” ” ”	” 4		W, E	45·13	57·46	42·59				
	” ” ”	” 6		E, W	45·02	57·56	42·58				
	” ” ”	” 7		W, E	44·97	58·71	43·68	43·00	1·3	0·28	0·1019
19	1567 & 1573 Gr. 80	Mar. 3	11 58	W, E	67 52 22·23	+ 20 19·96	42·19				
	” ” ”	” 4		E, W	22·18	20·49	42·67	42·43	1·0	0·29	0·0841
20	1583 & 1595 Gr. 80	Mar. 3	4 45	E, W	68 22 19·81	− 9 36·28	43·53				
	” ” ”	” 4		W, E	19·76	35·79	43·97	43·75	1·0	1·03	1·0609
21	1599 & 1632 Gr. 80	Mar. 3	8 46	W, E	68 19 15·66	− 6 32·52	43·14				
	” ” ”	” 4		E, W	15·61	32·90	42·71	42·93	1·0	0·21	0·0441
22	1637 & 1650 Gr. 80	Mar. 3	10 58	E, W	68 32 50·78	− 20 7·93	42·85				
	” ” ”	” 4		W, E	50·73	7·64	43·09	42·97	1·0	0·25	0·0625
23	1668 & 1672 Gr. 80	Mar. 3	1 49	W, E	68 12 22·01	+ 0 21·48	43·49				
	” ” ”	” 4		E, W	21·96	21·51	43·47	43·48	1·0	0·76	0·5776
24	1685 & 1686 Gr. 80	Mar. 3	14 27	E, W	68 30 24·69	− 17 42·30	42·39				
	” ” ”	” 4		W, E	24·64	41·80	42·84	42·62	1·0	0·10	0·0100
25	1691 & 1701 Gr. 80	Mar. 3	11 19	W, E	68 25 0·07	− 12 17·46	42·61				
	” ” ”	” 4		E, W	0·02	16·48	43·54	43·08	0·7	0·36	0·0907

204. Patna—*Co-latitude* 68° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
26	1701 & 1705 Gr. 80 " " "	Mar. 3 " 4	11 32	E, W W, E	68 38 31·89 31·84	− 25 49·06 47·90	42·83 43·94	43·39	0·7	0·67	0·3142
27	1708 & 1709 Gr. 80 " " "	Mar. 3 " 4	14 41	W, E E, W	67 50 32·11 32·05	+ 22 10·25 9·75	42·36 41·80	42·08	0·7	0·64	0·2867
28	1709 & 1729 Gr. 80 " " "	Mar. 3 " 4	14 58	E, W W, E	68 7 35·03 34·98	+ 5 7·55 7·61	42·58 42·59	42·59	0·7	0·13	0·0118
29	1825 & 1842 Gr. 80 " " "	Mar. 3 " 8	22 0	W, E E, W	68 16 27·26 27·00	− 3 44·53 45·11	42·73 41·89	42·31	0·7	0·41	0·1177
30	1842 & 1843 Gr. 80 " " "	Mar. 3 " 8	22 14	E, W W, E	68 2 43·37 43·11	+ 9 58·95 59·69	42·32 42·80	42·56	0·7	0·16	0·0179
31	1862 & 1884 Gr. 80 " " "	Mar. 3 " 5	0 57	E, W W, E	68 17 12·73 12·62	− 4 30·74 30·51	41·99 42·11	42·05	1·0	0·67	0·4489
32	1892 & 1911 Gr. 80 " " "	Mar. 3 " 5	19 23	W, E E, W	68 9 43·25 43·16	+ 2 60·91 59·69	44·16 42·85	43·51	1·0	0·79	0·6241
33	1929 & 1954 Gr. 80 " " "	Mar. 3 " 5	3 24	E, W W, E	68 16 3·03 2·92	− 3 20·89 20·41	42·14 42·51	42·33	0·7	0·39	0·1065
34	1954 & 1965 Gr. 80 " " "	Mar. 3 " 5	3 6	W, E E, W	67 58 35·50 35·40	+ 14 6·88 6·52	42·38 41·92	42·15	0·7	0·57	0·2274
35	2017 & 2019 Gr. 80 " " "	Mar. 3 " 5	17 28	E, W W, E	68 36 2·59 2·52	− 23 20·47 18·74	42·12 43·78	42·95	1·0	0·23	0·0529
36	2048 & 2104 Gr. 80 " " "	Mar. 3 " 8	17 26	W, E E, W	68 23 56·97 56·76	− 11 14·59 14·18	42·38 42·58	42·48	1·0	0·24	0·0576
37	2124 & 2127 Gr. 80 " " "	Mar. 3 " 8	1 17	E, W W, E	68 16 9·04 8·85	− 3 26·63 26·48	42·41 42·37	42·39	1·0	0·33	0·1089
38	2150 & 2173 Gr. 80 " " "	Mar. 3 " 8	5 51	W, E E, W	67 51 47·46 47·29	+ 20 55·14 55·49	42·60 42·78	42·69	1·0	0·03	0·0009
39	2225 & 2248 Gr. 80 " " "	Mar. 2 " 8	8 40	W, E E, W	67 51 49·61 49·46	+ 20 53·24 52·69	42·85 42·15	42·50	1·0	0·22	0·0484
40	2256 & 2268 Gr. 80 " " "	Mar. 2 " 8	8 1	E, W W, E	67 50 0·34 0·24	+ 22 40·70 41·95	41·04 42·19	41·62	1·0	1·10	1·2100
41	2231 & 2325 Gr. 80 " " "	Mar. 2 " 8	4 1	W, E E, W	68 36 23·32 23·29	− 23 39·96 41·52	43·36 41·77	42·57	1·0	0·15	0·0225
42	2364 & 2370 Gr. 80	Mar. 2	8 32	E, W	68 33 0·98	− 20 17·45	43·53	43·53	0·7	0·81	0·4593
43	2387 & 2398 Gr. 80 " " "	Mar. 2 " 8	19 30	W, E E, W	68 19 14·56 14·60	− 6 30·36 32·40	44·20 42·20	43·20	1·0	0·48	0·2304
44	2410 & 2414 Gr. 80 " " "	Mar. 2 " 8	5 18	E, W W, E	68 15 7·19 7·19	− 2 24·92 24·24	42·27 42·95	42·61	0·7	0·11	0·0085

204. Patna—*Co-latitude* 68° 12′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1899	° ′		° ′ ″	′ ″	″	″			
45	2414 & 2437 Gr. 80	Mar. 2	5 5	W, E	68 28 15·78	− 15 33·71	42·07				
	" " "	" 8		E, W	15·83	34·32	41·51	41·79	0·7	0·93	0·6054
46	2475 & 2482 Gr. 80	Mar. 2	5 36	E, W	68 25 30·53	− 12 47·64	42·89				
	" " "	" 8		W, E	30·60	47·69	42·91	42·90	1·0	0·18	0·0324
47	2534 & 2555 Gr. 80	Mar. 2	7 34	W, E	68 10 21·39	+ 2 21·12	42·51				
	" " "	" 8		E, W	21·52	20·75	42·27	42·39	1·0	0·33	0·1089
48	2576 & 2608 Gr. 80	Mar. 2	10 2	W, E	68 15 36·32	− 2 53·05	43·27				
	" " "	" 8		E, W	36·52	54·18	42·34	42·81	1·0	0·09	0·0081
								Σ P = 44·8		Σ Pvv = 9·9918	

Summary.

No. of pairs 48
No. of observations 126

Mean difference between observations taken E, W and those taken W, E = − 0″·66

Observed Co-latitude (weighted mean) 68° 12′ 42″·72 ± 0″·047

Correction for Height above Sea-level 0″·00

Final Co-latitude 68° 12′ 42″·72

		°	′	″	″
Astronomical Latitude (A)	=	21	47	17·28	± 0·047
Geodetic Latitude (G)	=	21	47	20·83	
Deflection of plumb-line (A−G)	=		−	3·55	

205. Phallut—*Co-latitude* 62° 47′ +

Latitude	... 27° 13′	*Instrument*—Zenith Telescope	
Longitude	... 88 3	*Mean Height of Barometer*	in. 19·45
Height	... 11815 feet	*Mean Temperature*	29°·9

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P.	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	430 & 432 Newcomb	Mar. 15	16 51	E, W	63 10 16·03	− 22 20·74	55·29	55·29	0·7	0·09	0·0057
2	437 & 445 Newcomb	Mar. 15	14 18	E, W	62 24 8·24	+ 23 47·28	55·52	55·52	0·7	0·32	0·0717
3	458 & 461 Newcomb	Mar. 15	11 42	W, E	62 13 5·56	+ 34 49·37	54·93	54·93	0·7	0·27	0·0510
4	462 & 473 Newcomb	Mar. 15	27 54	E, W	62 26 3·48	+ 21 52·11	55·59	55·59	0·7	0·39	0·1065
5	476 & 485 Newcomb	Mar. 15	0 27	W, E	62 26 56·63	+ 20 58·85	55·48	55·48	0·7	0·28	0·0549
6	488 & 493 Newcomb	Mar. 15	31 26	E, W	62 28 42·86	+ 19 12·23	55·09	55·09	0·7	0·11	0·0085
7	496 & 505 Newcomb	Mar. 15	0 38	W, E	62 21 40·52	+ 26 14·66	55·18	55·18	0·4	0·02	0·0002
8	505 & 517 Newcomb	Mar. 15	0 32	E, W	62 27 29·84	+ 20 25·66	55·50	55·50	0·4	0·30	0·0360
9	559 & 576 Newcomb	Mar. 14	20 23	E, W	62 50 31·16	− 2 36·40	54·76	54·76	0·7	0·44	0·1355
10	583 & 587 Newcomb	Mar. 15	16 17	E, W	62 39 40·14	+ 8 14·73	54·87	54·87	0·7	0·33	0·0762
11	589 & 604 Newcomb " " "	Mar. 14 " 15	24 42	E, W W, E	62 34 39·40 39·32	+ 13 16·63 15·98	56·03 55·30	55·67	1·0	0·47	0·2209
12	610 & 626 Newcomb " " "	Mar. 14 " 15	32 30	E, W W, E	62 59 32·82 32·74	− 11 38·63 37·66	54·19 55·08	54·64	1·0	0·56	0·3136
								ΣP =	8·4	ΣPvv =	1·0807

Summary.

No. of pairs	12
No. of observations	14

Mean difference between observations taken E, W and those taken W, E = + 0″·01

Observed Co-latitude (weighted mean) 62° 47′ 55″·20 ± 0″·073

Correction for Height above Sea-level + 0″·50

Final Co-latitude 62° 47′ 55″·70

		°	′	″	
Astronomical Latitude (A)	=	27	12	4·30	± 0·073
Geodetic Latitude (G)	=	27	12	40·86	
Deflection of plumb-line (A−G)	=		−	36·56	

206. Pirmulo—*Co-latitude* 72° 6′ +

Latitude	... 17° 53′	*Instrument*—Zenith Telescope	
Longitude	... 78 38	*Mean Height of Barometer*	in. 28·11
Height	... 2093 feet	*Mean Temperature*	63°·6

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	342 & 353 Gr. 80	Jan. 3	9 54	E, W	71 44 48·13	+ 22 13·10	61·23				
	" " "	" 4		W, E	48·16	13·37	61·53	61·38	0·7	0·21	0·0309
2	353 & 369 Gr. 80	Jan. 3	10 5	W, E	71 55 44·15	+ 11 16·67	60·82				
	" " "	" 4		E, W	44·18	17·53	61·71	61·27	0·7	0·32	0·0717
3	373 & 374 Gr. 80	Jan. 3	1 5	E, W	71 41 17·50	+ 25 43·96	61·46				
	" " "	" 4		W, E	17·53	43·52	61·05	61·26	1·0	0·33	0·1089
4	390 & 411 Gr. 80	Jan. 3	6 6	W, E	71 54 19·26	+ 12 42·11	61·37				
	" " "	" 4		E, W	19·29	43·33	62·62	62·00	1·0	0·41	0·1681
5	418 & 431 Gr. 80	Jan. 3	0 27	E, W	72 32 7·03	− 25 5·43	61·60				
	" " "	" 4		W, E	7·05	4·93	62·12	61·86	0·7	0·27	0·0510
6	431 & 432 Gr. 80	Jan. 3	0 9	W, E	72 14 48·17	− 7 47·10	61·07				
	" " "	" 4		E, W	48·19	46·09	62·10	61·59	0·7	0·00	0·0000
7	438 & 449 Gr. 80	Jan. 3	21 4	E, W	71 49 19·55	+ 17 40·84	60·39				
	" " "	" 4		W, E	19·56	40·26	59·83	60·11	0·7	1·48	1·5333
8	449 & 460 Gr. 80	Jan. 3	20 40	W, E	72 13 35·70	− 6 35·18	60·52				
	" " "	" 4		E, W	35·72	35·38	60·34	60·43	0·7	1·16	0·9419
9	467 & 475 Gr. 80	Jan. 3	0 56	E, W	71 35 58·52	+ 31 3·51	62·03				
	" " "	" 4		W, E	58·53	2·72	61·25	61·64	1·0	0·05	0·0025
10	531 & 539 Gr. 80	Jan. 3	4 56	E, W	72 29 30·71	− 22 27·33	63·38				
	" " "	" 4		W, E	30·72	28·91	61·81	62·60	0·7	1·01	0·7141
11	539 & 553 Gr. 80	Jan. 3	5 8	W, E	72 16 51·41	− 9 48·71	62·70				
	" " "	" 4		E, W	51·42	48·68	62·74	62·72	0·7	1·13	0·8938
12	562 & 589 Gr. 80	Jan. 3	7 5	E, W	72 5 45·85	+ 1 15·49	61·34				
	" " "	" 4		W, E	45·87	15·32	61·19	61·27	1·0	0·32	0·1024
13	590 & 620 Gr. 80	Jan. 3	5 47	W, E	72 2 16·46	+ 4 46·19	62·65				
	" " "	" 4		E, W	16·47	45·59	62·06	62·36	1·0	0·77	0·5929
14	626 & 648 Gr. 80	Jan. 3	19 49	E, W	72 2 24·33	+ 4 37·90	62·23				
	" " "	" 4		W, E	24·33	37·23	61·56	61·90	1·0	0·31	0·0961
15	664 & 677 Gr. 80	Jan. 3	3 12	W, E	71 40 17·23	+ 26 44·10	61·33				
	" " "	" 4		E, W	17·24	43·99	61·23	61·28	1·0	0·31	0·0961

206. Pirmulo—*Co-latitude* 72° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1893-94	° ′		° ′ ″	′ ″	″	″			
16	682 & 700 Gr. 80 ,, ,, ,,	Jan. 3 ,, 4	4 9	E, W W, E	72 4 57·26 57·28	+ 2 5·52 4·83	62·78 62·11	62·45	1·0	0·86	0·7396
17	712 & 734 Gr. 80 ,, ,, ,,	Jan. 3 ,, 4	1 19	W, E E, W	72 22 37·93 37·94	− 15 35·91 34·46	62·02 63·48	62·75	1·0	1·16	1·3456
18	740 & 754 Gr. 80 ,, ,, ,,	Jan. 3 ,, 4	5 14	E, W W, E	72 28 19·67 19·68	− 21 17·54 17·92	62·13 61·76	61·95	0·7	0·36	0·0907
19	749 & 754 Gr. 80 ,, ,, ,,	Jan. 3 ,, 4	5 23	E, W W, E	72 37 35·43 35·45	− 30 32·10 34·59	63·33 60·86	62·10	0·7	0·51	0·1821
20	796 & 800 Gr. 80	Jan. 3	15 20	E, W	72 19 56·33	− 12 55·06	61·27	61·27	0·5	0·32	0·0512
21	798 & 800 Gr. 80	Jan. 3	15 22	E, W	72 21 54·71	− 14 53·70	61·01	61·01	0·5	0·58	0·1682
22	828 & 837 Gr. 80 ,, ,, ,,	Jan. 4 ,, 3	22 57	W, E E, W	71 51 3·48 3·47	+ 15 57·02 57·74	60·50 61·21	60·86	0·7	0·73	0·3730
23	828 & 840 Gr. 80	Jan. 4	23 9	W, E	72 3 50·69	+ 3 9·42	60·11	60·11	0·5	1·48	1·0952
24	856 & 861 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 3	14 55	E, W W, E	72 20 53·47 53·52	− 13 52·21 51·40	61·26 62·12	61·69	1·0	0·10	0·0100
25	886 & 888 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 3	18 54	W, E E, W	71 36 56·64 56·68	+ 30 4·94 4·94	61·58 61·62	61·60	0·7	0·01	0·0001
26	887 & 888 Gr. 80	Jan. 3	18 53	E, W	71 35 54·28	+ 31 6·65	60·93	60·93	0·5	0·66	0·2178
27	916 & 943 Gr. 80	Jan. 2	0 47	E, W	72 15 11·13	− 8 8·98	62·15	62·15	0·7	0·56	0·2195
28	946 & 992 Gr. 80	Dec. 31	3 28	E, W	72 23 12·81	− 16 9·71	63·10	63·10	0·7	1·51	1·5961
29	994 & 1001 Gr. 80	Jan. 2	10 6	E, W	72 30 39·21	− 23 37·04	62·17	62·17	0·7	0·58	0·2355
30	1025 & 1037 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 2	2 41	E, W W, E	72 32 13·94 14·00	− 25 11·97 12·22	61·97 61·78	61·88	1·0	0·29	0·0841
31	1053 & 1057 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 2	4 9	W, E E, W	71 36 47·33 47·43	+ 30 14·51 14·08	61·84 61·51	61·68	1·0	0·09	0·0081
32	1062 & 1082 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 2	5 8	E, W W, E	72 33 48·28 48·32	− 26 46·07 46·34	62·21 61·98	62·10	1·0	0·51	0·2601
33	1099 & 1116 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 2	12 49	W, E E, W	72 15 10·72 10·80	− 8 9·00 9·65	61·72 61·15	61·44	1·0	0·15	0·0225
34	1168 & 1181 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 2	4 26	W, E E, W	72 33 1·56 1·67	− 25 59·55 60·47	62·01 61·20	61·61	0·7	0·02	0·0003
35	1181 & 1184 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 2	4 17	E, W W, E	72 23 56·98 57·99	− 16 55·02 57·83	61·96 59·56	60·76	0·7	0·83	0·4822

206. Pirmulo—*Co-latitude* 72° 6′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
36	1232 & 1261 Gr. 80	Jan. 5	18 39	E, W	71 40 38·72	+ 26 22·54	61·26				
	" " "	" 6		W, E	38·76	21·81	60·57	60·92	1·0	0·67	0·4489
37	1266 & 1272 Gr. 80	Jan. 5	5 38	W, E	72 29 8·46	− 22 6·75	61·71				
	" " "	" 6		E, W	8·51	7·70	60·81	61·26	1·0	0·33	0·1089
38	1282 & 1289 Gr. 80	Jan. 5	9 49	E, W	71 40 48·02	+ 26 12·94	60·96				
	" " "	" 6		W, E	48·06	13·05	61·11	61·04	1·0	0·55	0·3025
39	1300 & 1313 Gr. 80	Jan. 5	12 51	W, E	71 39 17·81	+ 27 43·02	60·83				
	" " "	" 6		E, W	17·86	41·70	59·56	60·20	1·0	1·39	1·9321
40	1327 & 1350 Gr. 80	Jan. 5	1 21	E, W	72 34 41·44	− 27 40·16	61·28				
	" " "	" 6		W, E	41·50	39·62	61·88	61·58	1·0	0·01	0·0001
41	1365 & 1395 Gr. 80	Jan. 5	0 11	E, W	72 12 57·43	− 5 56·68	60·75				
	" " "	" 6		W, E	57·49	56·05	61·44	61·10	0·7	0·49	0·1681
42	1368 & 1395 Gr. 80	Jan. 5	0 37	E, W	72 38 30·31	− 31 29·07	61·24				
	" " "	" 6		W, E	30·37	29·08	61·29	61·27	0·7	0·32	0·0717
43	1411 & 1413 Gr. 80	Jan. 5	0 38	W, E	71 57 56·19	+ 9 6·02	62·21				
	" " "	" 6		E, W	56·25	6·37	62·62	62·42	1·0	0·83	0·6889
44	1418 & 1449 Gr. 80	Jan. 5	7 26	E, W	72 32 46·91	− 25 44·23	62·68				
	" " "	" 6		W, E	46·99	44·06	62·93	62·81	1·0	1·22	1·4884
45	1451 & 1474 Gr. 80	Jan. 5	11 33	W, E	72 23 20·33	− 16 18·49	61·84				
	" " "	" 6		E, W	20·40	19·23	61·17	61·51	0·7	0·08	0·0045
46	1474 & 1480 Gr. 80	Jan. 5	11 28	E, W	72 18 40·05	− 11 38·07	61·98				
	" " "	" 6		W, E	40·12	39·25	60·87	61·43	0·7	0·16	0·0179
47	1490 & 1517 Gr. 80	Jan. 5	12 44	W, E	71 45 5·03	+ 21 55·70	60·73				
	" " "	" 6		E, W	5·11	56·16	61·27	61·00	0·7	0·59	0·2437
48	1517 & 1520 Gr 80	Jan. 5	12 17	E, W	72 12 5·77	− 5 5·37	60·40				
	" " "	" 6		W, E	5·86	4·90	60·96	60·68	0·7	0·91	0·5797
								ΣP = 39·1		ΣPvv = 18·6410	

Summary.

No. of pairs 48

No. of observations 89

Mean difference between observations taken E, W and those taken W, E = + 0″·28

Observed Co-latitude (weighted mean) 72° 7′ 1″·59 ± 0″·068

Correction for Height above Sea-level + 0″·09

Final Co-latitude 72° 7′ 1″·68

		°	′	″	″
Astronomical Latitude (A)	=	17	52	58·32	± 0·068
Geodetic Latitude (G)	=	17	53	2·81	
Deflection of plumb-line (A−G)	=		−	4·49	

207. Prome—*Co-latitude* 71° 10′ +

Latitude ... 18° 49′ *Instrument*—Zenith Telescope

Longitude ... 95 15 *Mean Height of Barometer* in. 29·89

Height ... 100 feet *Mean Temperature* 71°·2

Observer—Captain H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1905	° ′		° ′ ″	′ ″	″	″			
1	108 & 118 Newcomb	Jan. 14	10 14	E, W	71 6 6·82	+ 4 33·45	40·27				
	" " "	" 15		W, E	7·00	34·06	41·06				
	" " "	" 16		E, W	7·17	33·46	40·63	40·76	1·2	0·62	0·4613
2	130 & 134 Newcomb	Jan. 14	16 7	W, E	71 34 42·76	− 24 2·18	40·58				
	" " "	" 15		E, W	42·93	2·38	40·55				
	" " "	" 16		W, E	43·09	2·04	41·05	40·69	1·2	0·69	0·5713
3	171 & 175 Newcomb	Jan. 14	8 48	E, W	71 29 32·24	− 18 51·69	40·55				
	" " "	" 15		W, E	32·37	51·05	41·32				
	" " "	" 16		E, W	32·52	52·49	40·03	40·81	1·0	0·57	0·3249
4	217 & 221 Newcomb	Jan. 15	28 44	W, E	71 3 25·48	+ 7 15·24	40·72				
	" " "	" 16		E, W	25·58	15·45	41·03	40·88	1·0	0·50	0·2500
5	221 & 230 Newcomb	Jan. 15	28 38	E, W	71 8 56·08	+ 1 44·42	40·50				
	" " "	" 16		W, E	56·17	44·92	41·09	40·80	1·0	0·58	0·3364
6	244 & 255 Newcomb	Jan. 15	12 57	W, E	71 20 14·87	− 9 32·53	42·34				
	" " "	" 16		E, W	14·96	32·93	42·03	42·19	0·7	0·81	0·4593
7	258 & 268 Newcomb	Jan. 14	10 3	E, W	71 18 6·42	− 7 25·67	40·75				
	" " "	" 15		W, E	6·50	25·16	41·34	41·05	0·7	0·33	0·0762
8	274 & 296 Newcomb	Jan. 13	3 41	E, W	70 54 53·73	+ 15 48·12	41·85				
	" " "	" 14		W, E	53·80	46·90	40·70				
	" " "	" 15		E, W	53·87	47·77	41·64	41·23	1·0	0·15	0·0225
9	283 & 296 Newcomb	Jan. 13	3 42	E, W	70 53 55·80	+ 16 44·88	40·68				
	" " "	" 14		W, E	55·88	45·19	41·07				
	" " "	" 15		E, W	55·94	45·02	41·56	41·10	1·0	0·28	0·0784
10	299 & 314 Newcomb	Jan. 13	22 11	W, E	71 14 50·86	− 4 9·91	40·95				
	" " "	" 14		E, W	50·91	9·46	41·45	41·20	0·5	0·18	0·0162
11	299 & 319 Newcomb	Jan. 13	22 16	W, E	71 9 47·20	+ 0 54·16	41·36				
	" " "	" 14		E, W	47·25	54·23	41·48	41·42	1·0	0·04	0·0016
12	325 & 329 Newcomb	Jan. 13	27 24	E, W	71 29 20·88	− 18 39·32	41·56				
	" " "	" 14		W, E	20·92	38·52	42·40	41·98	0·7	0·60	0·2520
13	332 & 340 Newcomb	Jan. 13	21 16	W, E	71 14 12·58	− 3 30·52	42·06				
	" " "	" 14		E, W	12·62	31·03	41·59	41·83	0·6	0·45	0·1215

207. Prome—*Co-latitude* 71° 10′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1905	° ′		° ′ ″	′ ″	″	″			
14	364 & 374 Newcomb	Jan. 13	20 54	E, W	71 46 9·45	− 35 27·33	42·12				
	" " "	" 14		W, E	9·48	28·24	41·24	41·68	0·5	0·30	0·0450
15	366 & 374 Newcomb	Jan. 13	20 34	E, W	71 26 17·88	− 15 36·35	41·53				
	" " "	" 14		W, E	17·90	35·63	42·27	41·90	0·5	0·52	0·1352
16	393 & 396 Newcomb	Jan. 13	4 15	W, E	70 58 41·54	+ 12 0·58	42·12				
	" " "	" 14		E, W	41·56	1·06	42·62	42·37	1·0	0·99	0·9801
17	393 & 401 Newcomb	Jan. 14	4 32	E, W	71 15 11·12	− 4 28·63	42·49	42·49	0·5	1·11	0·6161
18	419 & 427 Newcomb	Jan. 13	1 54	E, W	71 37 34·20	− 26 51·49	42·71	42·71	0·5	1·33	0·8845
								Σ P =	14·6	Σ Pvv =	5·6325

Summary.

No. of pairs 18

No. of observations 39

Mean difference between observations taken E, W and those taken W, E = − 0″·04

Observed Co-latitude (weighted mean) 71° 10′ 41″·38 ± 0″·101

Correction for Height above Sea-level 0″·00

Final Co-latitude 71° 10′ 41″·38

		°	′	″	″
Astronomical Latitude (A)	=	18	49	18·62	± 0·101
Geodetic Latitude (G)	=	18	49	14·18	
Deflection of plumb-line (A−G)	=	+		4·44	

208. Quetta—*Co-latitude* 59° 47′ +

Latitude ... 30° 12′ — *Instrument*—T.S. 12-inch Theodolite No. 2

Longitude ... 67 3 — *Mean Height of Barometer* 24·31 in.

Height ... 5500 feet — *Mean Temperature* 54°·5

Observer—Captain H. Wood, R.E.

Serial No. of pair	Stars Observed	Date	N.P.D.	Observed Zenith Distance	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1904	° ′ ″	° ′ ″	″	″			
1	9 H. Draconis*	Apr. 8	13 47 29·3	+ 46 0 31·1	60·4				
	" "	" "	29·3	31·6	60·9				
	ν Hydræ†	" "	105 41 45·5	− 45 53 38·1	67·4				
	"	" "	45·5	38·1	67·4	64·03	1·0	0·10	0·0100
2	33 Sextantis*	Apr. 8	91 14 27·7	− 31 26 22·0	65·7				
	"	" "	27·7	20·8	66·9				
	α Ursæ Majoris†	" "	27 43 50·9	+ 32 4 10·4	61·3				
	" "	" "	50·9	9·6	60·5	63·60	1·0	0·33	0·1089
3	g Girafe‡	Apr. 9	13 56 52·2	+ 45 51 10·3	62·5				
	"	" "	52·2	8·8	61·0				
	μ Hydræ*	" "	106 21 4·8	− 46 32 58·8	66·0				
	"	" "	4·8	58·0	66·8	64·07	1·0	0·14	0·0196
4	76 Draconis*	Apr. 9	− 7 49 35·0	+ 67 37 34·7	59·7				
	"	" "	35·0	36·0	61·0				
	ι Antliæ†	" "	126 37 38·0	− 66 49 31·8	66·2				
	"	" "	38·0	31·7	66·3	63·30	1·0	0·63	0·3969
5	B. A. C. 2320‡	Apr. 10	1 4 32·2	+ 58 43 29·9	62·1				
	" "	" "	32·2	28·9	61·1				
	ξ Hydræ†	" "	121 19 52·6	− 61 31 44·9	67·7				
	"	" "	52·6	44·7	67·9	64·70	1·0	0·77	0·5929
6	ψ Ursæ Majoris†	Apr. 10	44 58 54·0	+ 14 49 9·6	63·6				
	" "	" "	54·0	8·6	62·6				
	θ Leonis*	" "	74 2 54·8	− 14 14 49·9	64·9				
	"	" "	54·8	50·5	64·3	63·85	1·0	0·08	0·0064
7	α Coupe‡	Apr. 11	107 47 33·3	− 47 59 25·6	67·7				
	"	" "	33·3	23·7	69·6				
	4 H. Draconis*	" "	11 51 0·1	+ 47 56 59·5	59·6				
	"	" "	0·1	60·0	60·1	64·25	1·0	0·32	0·1024
8	ν Ursæ Majoris*	Apr. 11	56 23 0·7	+ 3 24 58·5	59·2				
	" "	" "	0·7	59·0	59·7				
	12 Chevelure‡	" "	63 37 23·6	− 3 49 16·9	66·7	63·08	0·5	0·85	0·3613
9	83 Leonis‡	Apr. 11	86 28 1·8	− 26 39 55·0	66·8				
	ε Ursæ Majoris†	" "	33 31 12·9	+ 26 16 48·4	61·3				
	" "	" "	12·9	49·1	62·0	64·22	0·5	0·29	0·0420
10	υ Leonis†	Apr. 11	90 17 50·6	− 30 29 42·4	68·2				
	"	" "	50·6	43·1	67·5				
	76 Ursæ Majoris*	" "	26 45 38·6	+ 33 2 21·8	60·4				
	" "	" "	38·6	21·9	60·5	64·15	1·0	0·22	0·0484

NOTE.—The places of the stars marked *, †, ‡, have been taken from Astronomisches Jahrbüch, 1904, Nautical Almanac, 1904 and Connaissance Des Temps, 1904 respectively.

208. Quetta—*Co-latitude* 59° 47′ +

Serial No. of pair	Stars Observed	Date	N.P.D.	Observed Zenith Distance	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1904	° ′ ″	° ′ ″	″	″			
11	1830 Groombridge‡	Apr. 11	51 35 40·0	+ 8 12 20·8	60 8				
	" "	" "	40·0	19 8	59 8				
	20 Comæ*	" "	68 34 29·1	− 8 46 20·8	68·3				
	"	" "	29·1	23 1	66·0	63·73	1·0	0·20	0·0400
						Σ P = 10·0		Σ Pvv = 1·7288	

Note.—The places of the stars marked ‡, *, have been taken from Connaissance Des Temps, 1904 and Astronomisches Jahrbüch, 1904 respectively.

Summary.

No. of pairs 11
No. of observations 42

Observed Co-latitude (weighted mean)	59°	48′	3″·93	± 0″·089
Correction for Height above Sea-level		+	0″·25	
Final Co-latitude	**59°**	**48′**	**4″·18**	

		°	′	″	″
Astronomical Latitude (A)	=	30	11	55·82	± 0·089
Geodetic Latitude (G)	=	30	11	57·37	
Deflection of plumb-line (A−G)	=		−	1·55	

209. Rajpur—*Co-latitude* 59° 36′ +

Latitude	... 30° 24′	*Instrument*—Zenith Telescope	
Longitude	... 78 8	*Mean Height of Barometer*	in. 26·59
Height	... 3500 feet	*Mean Temperature*	63°·3

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
1	5 & 25 Gr. 80	Oct. 24	2 3	W, E	59 26 36·84	+ 10 13·08	49·9	49·9	0·7	0·8	0·45
2	52 & 114 Gr. 80	Oct. 23	6 51	W, E	59 28 7·63	+ 8 42·98	50·6				
	„ „ „	„ 24		E, W	7·49	43·57	51·1	50·8	1·0	0·1	0·01
3	145 & 146 Gr. 80	Oct. 23	7 33	E, W	59 37 11·52	− 0 20·50	51·0				
	„ „ „	„ 24		W, E	11·37	20·67	50·7	50·8	1·0	0·1	0·01
4	181 & 196 Gr. 80	Oct. 23	0 58	E, W	59 31 4·29	+ 5 45·37	49·7				
	„ „ „	„ 24		W, E	4·14	46·68	50·8	50·2	1·0	0·5	0·25
5	244 & 264 Gr. 80	Oct. 23	10 34	W, E	59 41 24·12	− 4 32·49	51·6				
	„ „ „	„ 24		E, W	23·97	33·43	50·5	51·0	1·0	0·3	0·09
6	234 Gr. 64 & 326 Gr. 80	Oct. 23	7 14	E, W	59 48 39·39	− 11 49·28	50·1				
	„ „ „ „	„ 24		W, E	39·24	48·65	50·6	50·3	0·7	0·4	0·11
7	326 Gr. 80 & 278 Gr. 64	Oct. 23	7 12	W, E	59 50 43·05	− 13 51·86	51·2				
	„ „ „ „	„ 24		E, W	42·91	52·45	50·5	50·8	0·7	0·1	0·01
8	285 Gr. 64 & 334 Gr. 80	Oct. 23	0 37	E, W	59 35 15·10	+ 1 36·42	51·5				
	„ „ „ „	„ 24		W, E	14·96	36·52	51·5	51·5	0·7	0·8	0·45
9	334 Gr. 80 & 328 Gr. 64	Oct. 23	0 46	W, E	59 26 16·77	+ 10 32·92	49·7				
	„ „ „ „ „	„ 24		E, W	16·62	34·04	50·7	50·2	0·7	0·5	0·18
10	382 & 396 Gr. 80	Oct. 23	3 49	E, W	59 35 18·05	+ 1 33·01	51·1				
	„ „ „	„ 24		W, E	17·90	33·45	51·3	51·2	1·0	0·5	0·25
								Σ P = 8·5		Σ Pvv = 1·81	

Summary.

No. of pairs	10
No. of observations	19

Mean difference between observations taken E, W and those taken W, E = +0″·10

Observed Co-latitude (weighted mean) 59° 36′ 50″·69 ± 0″·104

Correction for Height above Sea-level + 0″·16

Final Co-latitude 59° 36′ 50″·85

		°	′	″	″
Astronomical Latitude (A)	=	30	23	9·15	± 0·104
Geodetic Latitude (G)	=	30	23	56·83	
Deflection of plumb-line (A − G)	=		−	47·68	

210. Rajuli—Co-latitude 69° 47′ +

Latitude	... 20° 13′	*Maximum recorded Height of Barometer*	= 28 ·932 in.
Longitude	... 79 47	*Minimum* „ „ „	= 28 ·815
Height	... 1070 feet	*Maximum* „ *Reading of Thermometer*	= 89°·2
Instrument—Zenith Sector No. 2		*Minimum* „ „ „	= 76 ·9

Observer—Lieut. S. G. Burrard, R.E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1887			° ′ ″	° ′ ″	″	″	″		
1	623 Gr. 72	Feb. 26	N	E, W	0 3 56·96	69 43 11·06	8·02				
	„ „	„ 27	S	W, E	57·66	11·04	8·70	8·36	...	0·12	0·0144
2	626 Gr. 72	Feb. 25	N	W, E	8 4 12·28	61 42 58·00	10·28				
	„ „	Mar. 1	S	E, W	9·61	57·84	7·45	8·86	.	0·38	0·1444
3	637 Gr. 72	Feb. 26	N	W, E	12 33 29·39	82 20 39·38	9·99				
	„ „	„ 27	S	E, W	29·29	39·40	10·11	...	10·05	1·12	1·2544
4	645 Gr. 72	Feb. 25	N	E, W	3 43 20·38	73 30 28·76	8·33				
	„ „	Mar. 1	S	W, E	20·19	28·67	8·48	...	8·41	0·52	0·2704
5	649 Gr. 72	Feb. 24	N	W, E	8 8 44·65	61 38 24·36	9·01				
	„ „	„ 28	S	E, W	44·04	24·17	8·21	8·61	...	0·13	0·0169
6	652 Gr. 72	Feb. 26	N	E, W	5 1 31·73	64 45 36·42	8·15				
	„ „	„ 27	S	W, E	31·62	36·38	8·00	8·08	.	0·40	0·1600
7	669 Gr. 72	Feb. 26	N	W, E	6 53 48·82	76 40 57·60	8·78				
	„ „	„ 27	S	E, W	49·08	57·60	8·52	..	8·65	0·28	0·0784
8	676 Gr. 72	Feb. 25	N	W, E	6 0 43·67	63 46 25·01	8·68				
	„ „	Mar. 1	S	E, W	43·19	24·81	8·00	8·34	..	0·14	0·0196
9	679 Gr. 72	Feb. 24	N	E, W	5 51 0·55	63 56 7·76	8·31				
	„ „	„ 28	S	W, E	0·61	7·57	8·18	8·25	...	0·23	0·0529
10	682 Gr. 72	Feb. 26	N	E, W	4 9 32·35	65 37 36·47	8·82				
	„ „	„ 27	S	W, E	32·22	36·43	8·65	8·73	..	0·25	0·0625
11	684 Gr. 72	Feb. 25	N	E, W	0 31 6·32	69 16 2·48	8·80				
	„ „	Mar. 1	S	W, E	6·58	2·36	8·94	8·87	..	0·39	0·1521
12	690 Gr. 72	Feb. 24	N	W, E	4 6 24·26	73 53 33·15	8·89				
	„ „	„ 28	S	E, W	25·34	33·09	7·75	...	8·32	0·61	0·3721
13	693 Gr. 72	Feb. 26	N	W, E	10 12 47·41	59 34 20·19	7·60				
	„ „	„ 27	S	E, W	47·16	20·12	7·28	7·44	...	1·04	1·0816
14	695 Gr. 72	Feb. 25	N	W, E	6 49 30·17	62 57 38·20	8·37				
	„ „	Mar. 1	S	E, W	29·79	37·97	7·76	8·07	...	0·41	0·1681
15	698 Gr. 72	Feb. 24	N	E, W	3 52 1·79	73 39 10·62	8·83				
	„ „	„ 28	S	W, E	2·43	10·55	8·12	...	8·48	0·45	0·2025

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

210. Rajuli—*Co-latitude* 69° 47′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	$v v$
		1887			° ′ ″	° ′ ″	″	″	″		
16	700 Gr. 72	Feb. 26	N	E, W	4 51 49·54	64 55 20·49	10·03	9·58	...	1·10	1·2100
	" "	" 27	S	W, E	48·69	20·45	9·14				
17	706 Gr. 72	Feb. 25	N	E, W	3 28 24·97	73 15 34·56	9·59	...	9·32	0·39	0·1521
	" "	Mar. 1	S	W, E	25·43	34·48	9·05				
18	711 Gr. 72	Feb. 24	N	W, E	1 58 22·32	67 48 46·79	9·11	8·72	...	0·24	0·0576
	" "	" 28	S	E, W	21·72	46·62	8·34				
19	721 Gr. 72	Feb. 25	N	W, E	7 38 19·82	62 8 48·18	8·00	7·92	...	0·56	0·3136
	" "	Mar. 1	S	E, W	19·90	47·93	7·83				
20	724 Gr. 72	Feb. 24	N	E, W	7 48 19·28	61 58 49·04	8·32	8·33	...	0·15	0·0225
	" "	" 28	S	W, E	19·56	48·78	8·34				
21	727 Gr. 72	Feb. 26	N	W, E	1 27 31·47	68 19 36·63	8·10	7·70	...	0·78	0·6084
	" "	" 27	S	E, W	30·70	36·59	7·29				
22	728 Gr. 72	Feb. 25	N	E, W	11 42 5·41	81 29 13·98	8·57	...	8·68	0·25	0·0625
	" "	Mar. 1	S	W, E	5·24	14·03	8·79				
23	737 Gr. 72	Feb. 24	N	W, E	4 8 54·27	73 56 2·82	8·55	...	8·16	0·77	0·5929
	" "	" 28	S	E, W	54·97	2·74	7·77				
24	742 Gr. 72	Feb. 26	N	E, W	6 55 46·66	62 51 22·36	9·02	8·94	...	0·46	0·2116
	" "	" 27	S	W, E	46·57	22·29	8·86				
25	758 Gr. 72	Feb. 24	N	E, W	5 50 8·33	63 56 59·94	8·27	8·47	...	0·01	0·0001
	" "	" 28	S	W, E	8·98	59·68	8·66				
26	759 Gr. 72	Feb. 27	S	W, E	4 27 4·98	65 20 3·19	8·17	8·17	...	0·31	0·0961
27	760 Gr. 72	Feb. 25	N	W, E	8 4 55·07	61 42 13·98	9·05	8·54	...	0·06	0·0036
	" "	Mar. 1	S	E, W	54·36	13·68	8·04				
28	774 Gr. 72	Feb. 24	N	W, E	6 50 27·03	62 56 41·67	8·70	8·45	...	0·03	0·0009
	" "	" 28	S	E, W	26·81	41·38	8·19				
29	777 Gr. 72	Feb. 25	N	E, W	4 7 32·64	73 54 42·29	9·65	...	9·23	0·30	0·0900
	" "	Mar. 1	S	W, E	33·39	42·20	8·81				
30	781 Gr. 72	Feb. 26	N	W, E	5 29 4·94	64 18 3·87	8·81	8·13	...	0·35	0·1225
	" "	" 27	S	E, W	3·64	3·80	7·44				
31	786 Gr. 72	Feb. 25	N	W, E	7 53 37·33	61 53 30·85	8·18	8·07	...	0·41	0·1681
	" "	Mar. 1	S	E, W	37·42	30·53	7·95				
32	792 Gr. 72	Feb. 24	N	W, E	1 41 31·82	68 5 36·44	8·26	8·01	...	0·47	0·2209
	" "	" 28	S	E, W	31·53	36·23	7·76				
33	795 Gr. 72	Feb. 26	N	E, W	5 37 57·60	64 9 10·28	7·88	8·22	...	0·26	0·0676
	" "	" 27	S	W, E	58·33	10·22	8·55				
34	807 Gr. 72	Feb. 26	N	W, E	10 41 2·99	80 28 13·22	10·23	...	9·52	0·59	0·3481
	" "	" 27	S	E, W	4·41	13·23	8·82				

210. Rajuli—*Co-latitude* 69° 47′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude			v	vv
							by each observation	Mean by North Star	Mean by South Star		
		1887	•		° ′ ″	° ′ ″	″	″	″		
35	809 Gr. 72	Feb. 24	N	E, W	7 21 57·88	62 25 10·09	7·97				
	„ „	„ 28	S	W, E	58·63	9·77	8·40	8·19	. .	0·29	0·0841
36	811 Gr. 72	Feb. 25	N	E, W	4 9 38·67	65 37 31·16	9·83				
	„ „	Mar. 1	S	W, E	37·95	30·90	8·85	9·34	..	0·86	0·7396
37	812 Gr. 72	Feb. 26	N	E, W	1 31 21·32	71 18 30·80	9·48				
	„ „	„ 27	S	W, E	21·91	30·76	8·85	...	9·16	0·23	0·0529
38	817 Gr. 72	Feb. 24	N	W, E	2 47 57·79	72 35 5·71	7·92				
	„ „	„ 28	S	E, W	58·23	5·59	7·36	...	7·64	1·29	1·6641
39	820 Gr. 72	Feb. 25	N	W, E	7 5 13·30	62 41 54·42	7·72				
	„ „	Mar. 1	S	E, W	13·76	54·10	7·86	7·79	...	0·69	0·4761
40	826 Gr. 72	Feb. 26	N	W, E	5 37 58·29	75 25 7·75	9·46				
	„ „	„ 27	S	E, W	59·28	7·73	8·45	. .	8·96	0·03	0·0009
41	833 Gr. 72	Feb. 24	N	E, W	4 14 40·63	65 32 28·22	8·85				
	„ „	„ 28	S	W, E	41·55	27·95	9·50	9·17	...	0·69	0·4761
42	837 Gr. 72	Feb. 25	N	E, W	0 36 26·78	69 10 42·17	8·95				
	„ „	Mar. 1	S	W, E	26·37	41·97	8·34	8·64	...	0·16	0·0256
43	839 Gr. 72	Feb. 26	N	E, W	4 15 6·35	65 32 2·23	8·58				
	„ „	„ 27	S	W, E	6·20	2·17	8·37	8·48	...	0·00	0·0000
44	842 Gr. 72	Feb. 24	N	W, E	0 14 20·47	70 1 30·35	9·88				
	„ „	„ 28	S	E, W	21·07	30·18	9·11	..	9·49	0·56	0·3136
45	845 Gr. 72	Feb. 25	N	W, E	0 8 39·54	69 55 48·04	8·50				
	„ „	Mar. 1	S	E, W	39·49	47·85	8·36	...	8·43	0·50	0·2500
46	849 Gr. 72	Feb. 26	N	W, E	0 2 28·06	69 49 36·52	8·46				
	„ „	„ 27	S	E, W	28·48	36·47	7·99	...	8·23	0·70	0·4900
47	852 Gr. 72	Feb. 24	N	E, W	0 5 53·15	69 53 2·33	9·18				
	„ „	„ 28	S	W, E	53·97	2·15	8·18	...	8·68	0·25	0·0625
48	855 Gr. 72	Feb. 25	N	E, W	1 39 26·85	68 7 42·01	8·86				
	„ „	Mar. 1	S	W, E	26·36	41·79	8·15	8·50	..	0·02	0·0004
49	859 Gr. 72	Feb. 26	N	E, W	1 38 52·98	71 26 2·41	9·43				
	„ „	„ 27	S	W, E	53·58	2·37	8·79	...	9·11	0·18	0·0324
50	863 Gr. 72	Feb. 24	N	W, E	8 57 21·14	60 49 47·34	8·48				
	„ „	„ 28	S	E, W	21·71	46·96	8·67	8·57	...	0·09	0·0081
51	864 Gr. 72	Feb. 25	N	W, E	13 23 4·87	83 10 13·85	8·98				
	„ „	Mar. 1	S	E, W	5·05	13·94	8·89	...	8·94	0·01	0·0001
52	868 Gr. 72	Feb. 24	N	E, W	8 27 56·94	61 19 11·24	8·18				
	„ „	„ 28	S	W, E	57·60	10·86	8·46	8·32	...	0·16	0·0256

210. Rajuli—*Co-latitude* 69° 47′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1887			° ′ ″	° ′ ″	″	″	″		
53	873 Gr. 72	Feb. 25	N	E, W	8 9 35·80	77 56 45·89	10·09				
	" "	Mar. 1	S	W, E	36·72	45·87	9·15	...	9·62	0·69	0·4761
54	878 Gr. 72	Feb. 24	N	W, E	7 55 20·97	77 42 30·89	9·92				
	" "	" 28	S	E, W	22·21	30·87	8·66	...	9·29	0·36	0·1296
55	881 Gr. 72	Feb. 25	N	W, E	4 40 48·62	65 6 20·38	9·00				
	" "	Mar. 1	S	E, W	48·10	20·07	8·17	8·58	...	0·10	0·0100
56	888 Gr. 72	Feb. 26	N	W, E	9 5 41·21	78 52 50·64	9·43				
	" "	" 27	S	E, W	42·55	50·65	8·10	...	8·77	0·16	0·0256
57	889 Gr. 72	Feb. 24	N	E, W	2 17 5·70	67 30 2·83	8·53				
	" "	" 28	S	W, E	5·89	2·57	8·46	8·50	...	0·02	0·0004
58	894 Gr. 72	Feb. 25	N	E, W	1 42 38·66	71 29 46·71	8·05				
	" "	Mar. 1	S	W, E	37·77	46·55	8·78	...	8·42	0·51	0·2601
59	895 Gr. 72	Feb. 24	N	W, E	1 31 52·36	68 15 17·14	9·50				
	" "	" 28	S	E, W	52·01	16·90	8·91	9·20	...	0·72	0·5184
60	901 Gr. 72	Feb. 25	N	W, E	2 1 59·36	71 49 8·91	9·55				
	" "	Mar. 1	S	E, W	59·72	8·76	9·04	...	9·29	0·36	0·1296
61	918 Gr. 72	Feb. 26	N	W, E	3 14 56·14	66 32 13·17	9·31				
	" "	" 27	S	E, W	55·68	13·10	8·78	9·04	...	0·56	0·3136
62	919 Gr. 72	Feb. 25	N	E, W	8 25 2·62	78 12 12·19	9·57				
	" "	Mar. 1	S	W, E	3·11	12·18	9·07	...	9·32	0·39	0·1521
63	923 Gr. 72	Feb. 24	N	E, W	3 16 23·88	73 3 32·21	8·33				
	" "	" 28	S	W, E	24·28	32·08	7·80	...	8·07	0·86	0·7396
64	924 Gr. 72	Feb. 26	N	E, W	4 57 38·43	64 49 30·21	8·64				
	" "	" 27	S	W, E	38·80	30·13	8·93	8·78	...	0·30	0·0900
65	927 Gr. 72	Feb. 25	N	W, E	0 35 23·46	69 11 45·48	8·94				
	" "	Mar. 1	S	E, W	22·63	45·26	7·89	8·42	...	0·06	0·0036
66	930 Gr. 72	Feb. 24	N	W, E	9 48 40·98	79 35 49·52	8·54				
	" "	" 28	S	E, W	41·08	49·55	8·47	...	8·51	0·42	0·1764
67	936 Gr. 72	Feb. 26	N	W, E	5 40 44·45	75 27 53·42	8·97				
	" "	" 27	S	E, W	44·23	53·40	9·17	...	9·07	0·14	0·0196
68	939 Gr. 72	Feb. 25	N	E, W	4 4 37·92	65 42 31·19	9·11				
	" "	Mar. 1	S	W, E	37·36	30·89	8·25	8·68	...	0·20	0·0400
69	940 Gr. 72	Feb. 24	N	E, W	7 53 12·86	77 40 21·90	9·04				
	" "	" 28	S	W, E	13·46	21·89	8·43	...	8·74	0·19	0·0361
70	944 Gr. 72	Feb. 25	N	W, E	6 19 18·47	63 27 50·48	8·95				
	" "	Mar. 1	S	E, W	17·79	50·13	7·92	8·44	...	0·04	0·0016

210. Rajuli—*Co-latitude* 69° 47′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1887			° ′ ″	° ′ ″	″	″	″		
71	948 Gr. 72	Feb. 24	N	W, E	7 14 1·46	77 1 10·26	8·80				
	" "	" 28	S	E, W	1·64	10·23	8·59	...	8·70	0·23	0·0529
72	950 Gr. 72	Feb. 26	N	E, W	11 37 51·20	81 25 1·25	10·05				
	" "	" 27	S	W, E	52·24	1·27	9·03	...	9·54	0·61	0·3721
73	951 Gr. 72	Feb. 25	N	E, W	12 15 43·56	57 31 24·71	8·27				
	" "	Mar. 1	S	W, E	43·19	24·22	7·41	7·84	.	0 64	0·4096
74	952 Gr. 72	Feb. 24	N	E, W	2 16 36·63	67 30 32·61	9 24				
	" "	" 28	S	W, E	37·00	32·36	9 36	9·30	..	0·82	0·6724
75	955 Gr. 72	Feb. 25	N	W, E	2 54 13·72	72 41 22·34	8 62				
	" "	Mar. 1	S	E, W	13·45	22·22	8 77	...	8·70	0 23	0·0529
76	958 Gr. 72	Feb. 24	N	W, E	7 41 52·48	77 29 1·65	9 17				
	" "	" 28	S	E, W	53·11	1 64	8 53.	..	8 85	0·08	0·0064
77	962 Gr. 72	Feb. 25	N	E, W	6 18 16·00	76 5 26·08	10 08				
	" "	Mar. 1	S	W, E	16·49	26·03	9·54	..	9 81	0·88	0·7744
78	967 Gr. 72	Feb. 24	N	E, W	1 54 53·35	71 42 2·49	9·14				
	" "	" 28	S	W, E	53·76	2·34	8 58	...	8·86	0·07	0·0049
79	970 Gr. 72	Feb. 25	N	W, E	5 55 31·71	75 42 41·16	9·45				
	" "	Mar. 1	S	E, W	32 45	41·11	8 66	.	9·06	0 13	0·0169
80	975 Gr. 72	Feb. 24	N	W, E	0 11 44·54	69 35 24·65	9·19				
	" "	" 28	S	E, W	43·60	24·44	8 04	8·61	.	0·13	0·0169
81	980 Gr. 72	Feb. 25	N	E, W	4 40 19·53	74 27 28·10	8·57				
	" "	Mar. 1	S	W, E	19·22	28 02	8 80	...	8·69	0·24	0·0576
82	989 Gr. 72	Feb. 24	N	E, W	5 17 46·57	75 4 56·92	10·35				
	" "	" 28	S	W, E	46·79	56·86	10 07	...	10·21	1·28	1·6384
83	996 Gr. 72	Feb. 25	N	W, E	5 30 0·30	75 17 9·44	9 14				
	" "	Mar. 1	S	E, W	0·99	9 38	8·39	..	8·77	0·16	0·0256
84	997 Gr. 72	Feb. 24	N	W, E	10 19 45·16	80 6 54·86	9·70				
	" "	" 28	S	E, W	45·67	54·91	9·24	..	9·47	0·54	0·2916
								Σ vv by N Stars = 8 8881			
								Σ vv by S. Stars = 11·7284			

Summary.

No. of North Stars 44 No. of South Stars 40

No. of observations 174

	°	′	″	″
Co-latitude by North Stars	69	47	8·483	± 0·046
" " South "	69	47	8·931	± 0·059
Mean Co-latitude	69	47	8·707	± 0·037
Correction for Height above Sea-level	+		0·04	

Final Co-latitude 69° 47′ 8″·747

		°	′	″	″
Astronomical Latitude (A)	=	20	12	51·253	± 0·037
Geodetic Latitude (G)	=	20	12	55·45	
Deflection of plumb-line (A − G)	=		−	4·20	

211. Ramai—*Co-latitude* 69° 3′ +

Latitude	... 20° 57′	*Instrument*—Zenith Telescope	
Longitude	... 82 11	*Mean Height of Barometer*	in. 28·60
Height	... 1313 feet	*Mean Temperature*	72°·4

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	1014 & 1029 Gr. 80	Feb. 21	16 32	W, E	69 18 56·38	− 15 46·97	9·41				
	„ „ „	„ 22		E, W	56·38	46·32	10·06	9·74	1·0	0·10	0·0100
2	1043 & 1059 Gr. 80	Feb. 21	1 58	E, W	68 50 26·79	+ 12 43·55	10·34				
	„ „ „ 80	„ 22		W, E	26·79	43·58	10·37				
	1052 & 1059 Gr. 80	„ 21	1 52	E, W	56 24·34	6 45·72	10·06				
	1057 & 1059 Gr. 80	„ 21	1 40	E, W	69 8 15·81	− 5 6·04	9·77				
	„ „ „	„ 22		W, E	15·81	5·57	10·24	10·16	1·5	0·52	0·4056
3	1076 & 1081 Gr. 80	„ 21	28 34	W, E	69 13 18·51	− 10 8·92	9·59				
	„ „ „	„ 22		E, W	18·50	9·18	9·32	9·46	1·0	0·18	0·0324
4	1101 & 1105 Gr. 80	Feb. 21	25 44	E, W	68 58 35·57	+ 4 33·13	8·70	8·70	0·5	0·94	0·4418
5	1139 & 1159 Gr. 80	Feb. 21	4 23	W, E	69 8 37·74	− 5 29·34	8·40				
	„ „ „	„ 22		E, W	37·72	28·27	9·45	8·93	1·0	0·71	0·5041
6	1179 & 1186 Gr. 80	Feb. 21	4 36	W, E	69 5 34·30	− 2 24·89	9·41				
	„ „ „ 80	„ 22		E, W	34·29	24·91	9·38				
	1186 & 1218 Gr. 80	„ 21	4 43	E, W	12 21·76	9 12·60	9·16				
	„ „ „	„ 22		W, E	21·75	11·68	10·07	9·51	1·5	0·13	0·0254
7	1237 & 1250 Gr. 80	Feb. 21	4 10	E, W	69 6 46·08	− 3 34·53	11·55				
	„ „ „ 80	„ 22		W, E	46·06	33·85	12·21				
	1250 & 1265 Gr. 80	„ 21	4 16	W, E	1 12·65	+ 1 56·75	9·40				
	„ „ „	„ 22		E, W	12·63	56·87	9·50	10·67	1·5	1·03	1·5914
8	1279 & 1281 Gr. 80	Feb. 21	0 36	E, W	68 56 54·52	+ 6 15·73	10·25				
	„ „ „	„ 22		W, E	54·50	15·55	10·05	10·15	1·0	0·51	0·2601
9	1350 & 1368 Gr. 80	Feb. 21	4 49	E, W	69 8 26·03	− 5 16·61	9·42				
	„ „ „	„ 22		W, E	25·99	17·29	8·70	9·06	1·0	0·58	0·3364
10	1350 & 1390 Gr. 80	Feb. 22	4 53	W, E	69 4 7·00	− 0 57·71	9·29	9·29	0·5	0·35	0·0613
11	1367 & 1368 Gr. 80	Feb. 21	4 19	W, E	68 57 17·53	+ 5 53·25	10·78				
	1368 & 1390 Gr. 80	„ 21	4 33	E, W	43 54·69	19 15·38	10·07	10·43	1·0	0·79	0·6241
12	1405 & 1428 Gr. 80	Feb. 21	6 30	W, E	68 57 40·56	+ 5 29·13	9·69				
	„ „ „ 80	„ 22		E, W	40·54	29·06	9·60				
	1414 & 1428 Gr. 80	„ 21	6 51	W, E	37 14·20	25 54·97	9·17				
	„ „ „ 80	„ 22		E, W	14·17	55·80	9·97				
	1416 & 1428 Gr. 80	„ 21	6 22	W, E	69 6 5·54	− 2 55·36	10·18				
	„ „ „	„ 22		E, W	5·51	56·09	9·42	9·67	2·0	0·03	0·0018

211. Ramai—*Co-latitude* 69° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
13	1436 & 1465 Gr. 80	Feb. 21	0 32	E, W	68 41 55·12	+ 21 14·62	9·74				
	" " "	" 22		W, E	55·09	14·08	9·17				
	1459 & 1465 Gr. 80	" 21	0 44	E, W	54 31·88	8 38·11	9·99				
	" " "	" 22		W, E	31·85	37·64	9·49				
	1461 & 1465 Gr. 80	" 21	0 58	E, W	69 8 23·92	− 5 14·02	9·90				
	" " "	" 22		W, E	23·88	14·86	9·02	9·55	2·0	0·09	0·0162
14	1474 & 1476 Gr. 80	Feb. 21	8 20	W, E	69 12 7·50	− 8 57·58	9·92				
	" " "	" 22		E, W	7·47	56·82	10·65				
	1474 & 1494 Gr 80	" 21	8 34	W, E	26 11·39	23 1·70	9·69				
	" " "	" 22		E, W	11·35	1·33	10·02				
	1474 & 1504 Gr. 80	" 21	8 27	W, E	19 5·24	15 55·82	9·42				
	" " "	" 22		E, W	5·20	54·84	10·36	10·01	2·0	0·37	0·2738
15	1517 & 1546 Gr. 80	Feb. 21	15 52	E, W	68 38 41·04	+ 24 28·45	9·49				
	" " "	" 22		W, E	41·00	28·02	9·02	9·26	1·0	0·38	0·1444
16	1577 & 1590 Gr. 80	Feb. 21	15 52	E, W	69 1 57·63	+ 1 11·55	9·18				
	" " "	" 22		W, E	57·59	11·65	9·24				
	1580 & 1590 Gr. 80	" 21	15 35	E, W	19 20·17	− 16 10·40	9·77				
	" " "	" 22		W, E	20·14	10·84	9·30	9·38	1·5	0·26	0·1014
17	2212 & 2217 Gr. 80	Feb. 26	26 2	E, W	69 29 35·74	− 26 26·85	8·89	8·89	0·5	0·75	0·2813
18	2242 & 2263 Gr. 80	Feb. 25	23 19	W, E	68 28 37·87	+ 34 31·61	9·48				
	" " "	" 26		E, W	37·90	31·56	9·46	9·47	1·0	0·17	0·0289
19	2268 & 2273 Gr. 80	Feb. 25	6 24	E, W	69 27 1·65	− 23 51·64	10·01				
	" " "	" 26		W, E	1·69	52·22	9·47	9·74	1·0	0·10	0·0100
20	2282 & 2311 Gr. 80	Feb. 25	6 20	W, E	68 49 56·52	+ 13 12·18	8·70				
	" " "	" 26		E, W	56·56	12·83	9·39				
	2311 & 2332 Gr. 80	" 25	6 15	E, W	54 41·11	8 27·47	8·58				
	" " "	" 26		W, E	41·16	28·21	9·37	9·02	1·5	0·62	0·5766
									Σ P = 24·0		Σ Pvv = 5·7270

Summary.

No. of pairs 20
No. of observations 60

Mean difference between observations taken E, W and those taken W, E = + 0″·13

Observed Co-latitude (weighted mean) 69° 3′ 9″·64 ± 0″·076

Correction for Height above Sea-level + 0″·05

Final Co-latitude 69° 3′ 9″·69

		°	′	″	″
Astronomical Latitude (A)	=	20	56	50·31	± 0·076
Geodetic Latitude (G)	=	20	56	51·47	
Deflection of plumb-line (A − G)	=		−	1·16	

212. Ramgir—*Co-latitude* 71° 24′ +

Latitude	... 18° 35′	*Maximum recorded Height of Barometer*	=	in. 28·176
Longitude	... 79 34	*Minimum* „ „ „	=	28·030
Height	... 1772 feet	*Maximum* „ *Reading of Thermometer*	=	82°·5
Instrument—Zenith Sector No. 2		*Minimum* „ „ „	=	70 ·5

Observer—J. Eccles, M. A.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	$v\,v$
		1889			° ′ ″	° ′ ″	″	″	″		
1	577 Gr. 72	Feb. 14	N	E, W	1 5 58·8	70 18 34·6	33·4				
	„ „	„ 17	S	W, E	59·3	34·6	33·9	33·7	...	0·2	0·04
2	579 Gr. 72	Feb. 15	N	E, W	4 40 36·3	66 43 56·7	33·0				
	„ „	„ 18	S	W, E	37·1	56·7	33·8	33·4	...	0·1	0·01
3	581 Gr. 72	Feb. 13	N	E. W	5 3 23·3	66 21 10·8	34·1				
	„ „	„ 16	S	W, E	22·3	10·7	33·0	33·6	...	0·1	0·01
4	589 Gr. 72	Feb. 14	N	W, E	4 32 20·6	66 52 13·3	33·9				
	„ „	„ 17	S	E, W	21·0	13·2	34·2	34·1	...	0·6	0·36
5	593 Gr. 72	Feb. 15	N	W, E	4 20 28·3	67 4 5·9	34·2				
	„ „	„ 18	S	E, W	28·2	5·8	34·0	34·1	...	0·6	0·36
6	600 Gr. 72	Feb. 13	N	W, E	3 56 48·2	67 27 45·8	34·0				
	„ „	„ 14	„	E, W	47·6	45·8	33·4				
	„ „	„ 16	S	E, W	47·9	45·7	33·6				
	„ „	„ 17	„	W, E	48·0	45·7	33·7	33·7	...	0·2	0·04
7	610 Gr. 72	Feb. 13	N	E, W	3 58 41·3	67 25 52·5	33·8				
	„ „	„ 15	„	E, W	41·3	52·5	33·8				
	„ „	„ 16	S	W, E	41·2	52·4	33·6	33·7	...	0·2	0·04
8	618 Gr. 72	Feb. 14	N	W, E	2 15 52·9	69 8 38·7	31·6				
	„ „	„ 17	S	E, W	54·1	38·7	32·8	32·2	...	1·3	1·69
9	623 Gr. 72	Feb. 13	N	W, E	1 41 23·8	69 43 10·1	33·9				
	„ „	„ 15	„	W, E	23·0	10·0	33·0				
	„ „	„ 16	S	E, W	23·4	10·0	33·4	33·4	...	0·1	0·01
10	645 Gr. 72	Feb. 13	N	E, W	2 5 56·7	73 30 29·1	32·4				
	„ „	„ 14	„	E, W	57·0	29·1	32·1				
	„ „	„ 15	„	E, W	57·1	29·1	32·0				
	„ „	„ 16	S	W, E	56·9	29·0	32·1				
	„ „	„ 17	„	W, E	57·2	29·0	31·8				
	„ „	„ 18	„	W, E	57·6	29·0	31·4	...	32·0	0·6	0·36
11	676 Gr. 72	Feb. 13	N	W, E	7 38 4·3	63 46 29·0	33·3				
	„ „	„ 16	S	E, W	5·4	28·8	34·2	33·8	...	0·3	0·09
12	679 Gr. 72	Feb. 14	N	W, E	7 28 21·1	63 56 11·9	33·0				
	„ „	„ 17	S	E, W	21·5	11·8	33·3	33·2	...	0·3	0·09
13	682 Gr. 72	Feb. 15	N	W, E	5 46 52·7	65 37 41·2	33·9	33·9	...	0·4	0·16

Note.—The barometer was read during work every hour, the thermometer every fifteen minutes. For the calculations of refraction a separate value for the pressure and temperature was deduced for each star.

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Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
14	684 Gr. 72	Feb. 13	N	E, W	2 8 25·6	69 16 7·4	33·0				
	,, ,,	,, 16	S	W, E	25·3	7·3	32·6	32·8	...	0·7	0·49
15	690 Gr. 72	Feb. 13	N	W, E	2 29 5·9	73 53 38·7	32·8				
	,, ,,	,, 14	,,	E, W	6·4	38·7	32·3				
	,, ,,	,, 16	S	E, W	6·5	38·7	32·2				
	,, ,,	,, 17	,,	W, E	6·7	38·7	32·0	...	32·3	0·3	0·09
16	697 Gr. 72	Feb. 15	N	E, W	5 43 18·9	65 41 14·9	33·8	33·8	...	0·3	0·09
17	706 Gr. 72	Feb. 13	N	E, W	1 51 8·7	73 15 41·6	32·9				
	,, ,,	,, 14	,,	W, E	7·6	41·6	34·0				
	,, ,,	,, 15	,,	W, E	8·9	41·6	32·7				
	,, ,,	,, 16	S	W, E	9·2	41·6	32·4				
	,, ,,	,, 17	,,	E, W	8·7	41·6	32·9				
	,, ,,	,, 18	,,	E, W	9·2	41·6	32·4	...	32·9	0·3	0·09
18	727 Gr. 72	Feb. 14	N	E, W	3 4 46·2	68 19 45·6	31·8				
	,, ,,	,, 17	,,	W, E	47·0	45·5	32·5	32·2	...	1·3	1·69
19	728 Gr 72	Feb. 13	N	W, E	10 4 49·1	81 29 22·3	33·2				
	,, ,,	,, 15	,,	E, W	49·6	22·3	33·7				
	,, ,,	,, 16	S	E, W	49·7	22·3	33·6	...	32·8	0·2	0·04
20	737 Gr. 72	Feb. 13	N	E, W	2 31 39·8	73 56 12·3	32·5				
	,, ,,	,, 14	,,	W, E	39·7	12·2	32·5				
	,, ,,	,, 16	S	W, E	40·1	12·2	32·1				
	,, ,,	,, 17	,,	E, W	39·8	12·2	32·4	...	32·4	0·2	0·04
21	742 Gr. 72	Feb. 15	N	W, E	8 33 1·5	62 51 32·9	34·4				
	,, ,,	,, 18	S	E, W	1·5	32·7	34·2	34·3	...	0·8	0·64
22	759 Gr. 72	Feb. 14	N	E, W	6 4 18·2	65 20 15·0	33·2				
	,, ,,	,, 17	S	W, E	18·3	14·8	33·1	33·2	...	0·3	0·09
23	760 Gr. 72	Feb. 13	N	W, E	9 42 7·9	61 42 26·0	33·9				
	,, ,,	,, 15	,,	E, W	7·6	25·9	33·5				
	,, ,,	,, 16	S	E, W	7·1	25·8	32·9	33·4	...	0·1	0·01
24	777 Gr. 72	Feb. 13	N	E, W	2 30 22·3	73 54 55·5	33·2				
	,, ,,	,, 14	,,	W, E	23·2	55·5	32·3				
	,, ,,	,, 15	,,	W, E	23·0	55·5	32·5				
	,, ,,	,, 16	S	W, E	22·6	55·5	32·9				
	,, ,,	,, 17	,,	E, W	22·4	55·5	33·1	...	32·8	0·2	0·04
25	792 Gr. 72	Feb. 13	N	W, E	3 18 40·9	68 5 51·6	32·5				
	,, ,,	,, 14	,,	E, W	40·8	51·6	32·4				
	,, ,,	,, 15	,,	E, W	41·6	51·6	33·2				
	,, ,,	,, 16	S	E, W	40·9	51·5	32·4				
	,, ,,	,, 17	,,	W, E	41·1	51·5	32·6				
	,, ,,	,, 18	,,	W, E	41·0	51·4	32·4	32·6	...	0·9	0·81
26	807 Gr. 72	Feb. 13	N	E, W	9 3 56·6	80 28 29·1	32·5				
	,, ,,	,, 14	,,	W, E	57·0	29·1	32·1				
	,, ,,	,, 15	,,	W, E	56·4	29·1	32·7				
	,, ,,	,, 16	S	W, E	56·3	29·1	32·8				
	,, ,,	,, 17	,,	E, W	56·2	29·1	32·9				
	,, ,,	,, 18	,,	E, W	56·2	29·2	33·0	...	32·7	0·1	0·01

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Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1889			° ′ ″	° ′ ″	″	″	″		
27	812 Gr. 72	Feb. 13	N	W, E	0 5 44·6	71 18 48·1	32·7				
	„ „	„ 15	„	E, W	45·3	48·1	33·4				
	„ „	„ 16	S	E, W	45·3	48·1	33·4				
	„ „	„ 18	„	W, E	44·9	48·0	32·9	33·1	...	0·4	0·16
28	819 Gr. 72	Feb. 14	N	E, W	8 42 17·3	62 42 16·7	34·0				
	„ „	„ 17	S	W, E	15·9	16·5	32·4	33·2	...	0·3	0·09
29	833 Gr. 72	Feb. 15	N	E, W	5 51 47·2	65 32 47·0	34·2				
	„ „	„ 18	S	E, W	47·4	46·8	34·2	34·2	...	0·7	0·49
30	837 Gr. 72	Feb. 13	N	E, W	2 13 31·8	69 11 1·0	32·8				
	„ „	„ 14	„	W, E	32·1	1·0	33·1				
	„ „	„ 16	S	W, E	31·8	0·9	32·7				
	„ „	„ 17	„	E, W	32·9	0·9	33·8	33·1	...	0·4	0·16
31	850 Gr. 72	Feb. 13	N	W, E	1 48 25·2	69 36 8·6	33·8				
	„ „	„ 16	S	E, W	25·1	8·5	33·6	33·7	...	0·2	0·04
32	852 Gr. 72	Feb. 14	N	E, W	1 31 10·6	69 53 22·2	32·8				
	„ „	„ 17	S	W, E	11·2	22·1	33·3	33·1	...	0·4	0·16
33	855 Gr. 72	Feb. 15	N	E, W	3 16 30·3	68 8 2·2	32·5				
	„ „	„ 18	S	W, E	30·0	2·1	32·1	32·3	...	1·2	1·44
34	868 Gr. 72	Feb. 13	N	E, W	10 4 59·2	61 19 33·2	32·4				
	„ „	„ 16	S	W, E	60·1	32·9	33·0	32·7	...	0·8	0·64
35	873 Gr. 72	Feb. 14	N	W, E	6 32 34·3	77 57 7·4	33·1				
	„ „	„ 15	„	W, E	33·9	7·4	33·5				
	„ „	„ 17	S	E, W	34·7	7·4	32·7				
	„ „	„ 18	„	E, W	34·5	7·5	33·0	...	33·1	0·5	0·25
36	878 Gr. 72	Feb. 13	N	W, E	6 18 19·7	77 42 52·8	33·1				
	„ „	„ 16	S	E, W	20·1	52·9	32·8	...	33·0	0·4	0·16
37	881 Gr. 72	Feb. 14	N	E, W	6 17 49·9	65 6 43·5	33·4				
	„ „	„ 15	„	E, W	50·0	43·4	33·4				
	„ „	„ 17	S	W, E	50·1	43·3	33·4				
	„ „	„ 18	„	W, E	50·3	43·2	33·5	33·4	...	0·1	0·01
38	888 Gr. 72	Feb. 13	N	E, W	7 28 42·0	78 53 13·5	31·5				
	„ „	„ 14	„	W, E	41·3	13·5	32·2				
	„ „	„ 15	„	W, E	40·9	13·5	32·6				
	„ „	„ 16	S	W, E	41·6	13·5	31·9				
	„ „	„ 17	„	E, W	40·6	13·5	32·9				
	„ „	„ 18	„	E, W	41·6	13·6	32·0	...	32·2	0·4	0·16
39	894 Gr. 72	Feb. 14	N	E, W	0 5 38·5	71 30 10·6	32·1				
	„ „	„ 15	„	E, W	37·7	10·6	32·9				
	„ „	„ 17	S	W, E	38·6	10·6	32·0				
	„ „	„ 18	„	W, E	38·5	10·5	32·0	...	32·3	0·3	0·09
40	895 Gr. 72	Feb. 13	N	W, E	3 8 52·5	68 15 41·5	34·0	34·0	...	0·5	0·25

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Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
41	901 Gr. 72	Feb. 13	N	E, W	0 24 61·0	71 49 34·0	33·0				
	„ „	„ 14	„	W, E	61·6	34·0	32·4				
	„ „	„ 15	„	W, E	59·9	34·0	34·1				
	„ „	„ 16	S	W, E	60·7	34·0	33·3				
	„ „	„ 17	„	E, W	61·3	34·0	32·7				
	„ „	„ 18	„	E, W	60·7	33·9	33·2	.	33·1	0·5	0·25
42	918 Gr. 72	Feb. 13	N	W, E	4 51 53·7	66 32 40·0	33·7				
	„ „	„ 16	S	E, W	54·2	39·9	34·1	33·9	...	0·4	0·16
43	919 Gr. 72	Feb. 14	N	E, W	6 48 6·0	78 12 38·3	32·3				
	„ „	„ 15	„	E, W	5·4	38·3	32·9				
	„ „	„ 17	S	W, E	6·3	38·4	32·1				
	„ „	„ 18	„	W, E	6·8	38·4	31·6	.	32·2	0·4	0·16
44	923 Gr. 72	Feb. 13	N	E, W	1 39 27·8	73 3 58·9	31·1				
	„ „	„ 14	„	W, E	27·3	58·9	31·6				
	„ „	„ 16	S	W, E	27·5	58·9	31·4				
	„ „	„ 17	„	E, W	27·5	58·9	31·4	.	31·4	1·2	1·44
45	924 Gr. 72	Feb. 15	N	W, E	6 34 35·4	64 49 57·8	33·2				
	„ „	„ 18	S	E, W	35·3	57·6	32·9	33·1	.	0·4	0·16
46	939 Gr. 72	Feb. 13	N	W, E	5 41 34·7	65 42 59·6	34·3				
	„ „	„ 14	„	E, W	33·7	59·5	33·2				
	„ „	„ 15	„	E, W	34·6	59·5	34·1				
	„ „	„ 16	S	E, W	34·5	59·4	33·9				
	„ „	„ 17	„	W, E	32·4	59·4	31·8				
	„ „	„ 18	„	W, E	34·0	59·3	33·3	33·4	.	0·1	0·01
47	948 Gr. 72	Feb. 13	N	E, W	5 37 7·2	77 1 39·2	32·0				
	„ „	„ 14	„	W, E	8·0	39·2	31·2				
	„ „	„ 15	„	W, E	5·9	39·2	33·3				
	„ „	„ 16	S	W, E	7·1	39·2	32·1				
	„ „	„ 17	„	E, W	6·9	39·3	32·4				
	„ „	„ 18	„	E, W	6·8	39·3	32·5		32·3	0·3	0·09
48	955 Gr. 72	Feb. 13	N	W, E	1 17 19·2	72 41 52·5	33·3				
	„ „	„ 14	„	E, W	20·4	52·5	32·1				
	„ „	„ 16	S	E, W	19·9	52·5	32·6				
	„ „	„ 17	„	W, E	20·8	52·5	31·7	..	32·4	0·2	0·04
49	958 Gr. 72	Feb. 15	N	E, W	6 4 57·8	77 29 31·5	33·7				
	„ „	„ 18	S	W, E	59·9	31·6	31·7	.	32·7	0·1	0·01
50	967 Gr. 72	Feb. 13	N	E, W	0 18 0·4	71 42 33·5	33·1				
	„ „	„ 16	S	W, E	0·9	33·5	32·6	...	32·9	0·3	0·09
51	970 Gr. 72	Feb. 14	N	W, E	4 18 40·0	75 43 12·0	32·0				
	„ „	„ 17	S	E, W	39·3	12·1	32·8	..	32·4	0·2	0·04
52	975 Gr. 72	Feb. 15	N	W, E	1 48 36·5	69 35 56·4	32·9				
	„ „	„ 18	S	E, W	37·4	56·3	33·7	33·3	.	0·2	0·04
53	980 Gr. 72	Feb. 13	N	W, E	3 3 26·2	74 27 59·5	33·3				
	„ „	„ 14	„	E, W	28·1	59·5	31·4				
	„ „	„ 16	S	E, W	27·8	59·5	31·7				
	„ „	„ 17	„	W, E	27·6	59·5	31·9	...	32·1	0·5	0·25

212. Ramgir—*Co-latitude* 71° 24′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
54	989 Gr. 72	Feb. 13	N	E, W	3 40 56·0	75 5 28·9	32·9				
	,, ,,	,, 16	S	W, E	54·8	29·0	34·2	...	33·6	1·0	1·00
55	996 Gr. 72	Feb. 14	N	W, E	3 53 9·9	75 17 41·6	31·7				
	,, ,,	,, 17	S	E, W	8·8	41·7	32·9	...	32·3	0·3	0·09
56	997 Gr. 72	Feb. 15	N	E, W	8 42 53·5	80 7 26·9	33·4				
	,, ,,	,, 18	S	W, E	53·8	27·0	33·2	...	33·3	0·7	0·49
57	1007 Gr. 72	Feb. 15	N	W, E	9 30 40·1	61 53 54·1	34·2				
	,, ,,	,, 18	S	E, W	39·9	53·9	33·8	34·0	...	0·5	0·25
58	1012 Gr. 72	Feb. 13	N	W, E	5 10 36·8	66 13 57·7	34·5				
	,, ,,	,, 14	,,	E, W	36·8	57·7	34·5				
	,, ,,	,, 16	S	E, W	37·1	57·6	34·7				
	,, ,,	,, 17	,,	W, E	36·4	57·6	34·0	34·4	...	0·9	0·81
59	1014 Gr. 72	Feb. 15	N	E, W	3 48 42·9	75 13 15·8	32·9				
	,, ,,	,, 18	S	W, E	43·2	15·8	32·6	...	32·8	0·2	0·04
60	1015 Gr. 72	Feb. 13	N	E, W	7 27 36·4	78 52 8·8	32·4				
	,, ,,	,, 16	S	W, E	36·0	8·9	32·9	...	32·7	0·1	0·01
61	1023 Gr. 72	Feb. 13	N	W, E	6 44 56·5	64 39 36·4	32·9				
	,, ,,	,, 14	,,	W, E	55·8	36·4	32·2				
	,, ,,	,, 15	,,	W, E	56·9	36·3	33·2				
	,, ,,	,, 16	S	E, W	57·4	36·3	33·7				
	,, ,,	,, 17	,,	E, W	56·7	36·3	33·0				
	,, ,,	,, 18	,,	E, W	56·9	36·2	33·1	33·0	...	0·5	0·25
62	1036 Gr. 72	Feb. 13	N	E, W	10 39 23·8	82 3 56·3	32·5				
	,, ,,	,, 15	,,	E, W	23·3	56·4	33·1				
	,, ,,	,, 16	S	W, E	23·6	56·5	32·9				
	,, ,,	,, 18	,,	W, E	23·9	56·6	32·7	...	32·8	0·2	0·04
63	1039 Gr. 72	Feb. 14	N	E, W	6 39 59·8	64 44 34·1	33·9				
	,, ,,	,, 17	S	W, E	59·4	34·0	33·4	33·7	...	0·2	0·04
64	1046 Gr. 72	Feb. 13	N	W, E	2 32 21·3	68 52 12·5	33·8				
	,, ,,	,, 14	,,	W, E	21·9	12·5	34·4				
	,, ,,	,, 16	S	E, W	21·3	12·4	33·7				
	,, ,,	,, 17	,,	E, W	21·9	12·4	34·3	34·1	...	0·6	0·36
65	1048 Gr. 72	Feb. 15	N	W, E	2 33 23·6	73 57 55·4	31·8				
	,, ,,	,, 18	S	E, W	24·1	55·4	31·3	...	31·6	1·0	1·00
66	1060 Gr. 72	Feb. 14	N	E, W	7 27 6·5	78 51 39·5	33·0				
	,, ,,	,, 17	S	W, E	6·8	39·6	32·8	...	32·9	0·3	0·09
67	1061 Gr. 72	Feb. 15	N	E, W	1 31 33·8	72 56 7·3	33·5				
	,, ,,	,, 18	S	W, E	34·0	7·4	33·4	...	33·5	0·9	0·81
68	1066 Gr. 72	Feb. 14	N	W, E	0 25 43·4	70 58 51·1	34·5				
	,, ,,	,, 17	S	E, W	43·3	51·2	34·5	34·5	...	1·0	1·00

212. Ramgir—*Co-latitude* 71° 24′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1889			° ′ ″	° ′ ″	″	″	″		
69	1090 Gr. 72	Feb. 15	N	W, E	3 23 59·7	74 48 32·8	33·1				
	„ „	„ 18	S	E, W	60·4	32·9	32·5	..	32·8	0·2	0·04
								Σ vv by N. Stars = 13·24			
								Σ vv by S. Stars = 7·31			

Summary.

No. of North Stars 39 No. of South Stars 30
No. of observations 208

	°	′	″	″
Co-latitude by North Stars	71	24	33·47	± 0·063
„ „ South „	71	24	32·61	± 0·062
Mean Co-latitude	71	24	33·04	± 0·044
Correction for Height above Sea-level		+	0·06	

Final Co-latitude 71° 24′ 33″·10

		°	′	″	″
Astronomical Latitude (A)	=	18	35	26·90	± 0·044
Geodetic Latitude (G)	=	18	35	26·12	
Deflection of plumb-line (A−G)	=		+	0·78	

213. Ranjitgarh—*Co-latitude* 57° 24′ +

Latitude	... 32° 35′		*Instrument*—Zenith Telescope	
Longitude	... 74 40		*Mean Height of Barometer*	in. 28·91
Height	... 900 feet		*Mean Temperature*	72°·3

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
1	506 & 511 Newcomb	Apr. 6	15 53	E, W	58 3 48·79	− 38 54·97	53·82				
	,, ,, ,,	,, 7		W, E	48·73	55·15	53·58	53·70	1·0	0·26	0·0676
2	521 & 533 Newcomb	Apr. 6	10 49	W, E	57 18 51·51	+ 6 1·92	53·43				
	,, ,, ,,	,, 7		E, W	51·43	2·83	54·26	53·85	0·7	0·41	0·1177
3	533 & 544 Newcomb	Apr. 6	11 22	E, W	57 51 36·88	− 26 43·91	52·97				
	,, ,, ,,	,, 7		W, E	36·81	42·32	54·49	53·73	0·7	0·29	0·0589
4	546 & 568 Newcomb	Apr. 7	20 32	E, W	57 28 14·14	− 3 20·68	53·46	53·46	0·5	0·02	0·0002
5	546 & 571 Newcomb	Apr. 6	20 25	W, E	57 21 8·11	+ 3 45·55	53·66				
	,, ,, ,,	,, 7		E, W	8·02	45·04	53·06	53·36	0·7	0·08	0·0045
6	575 & 583 Newcomb	Apr. 6	21 48	W, E	57 7 53·98	+ 16 58·37	52·35				
	,, ,, ,,	,, 7		E, W	54·88	58·98	53·86	53·11	1·0	0·33	0·1089
7	584 & 587 Newcomb	Apr. 6	10 36	E, W	56 57 58·84	+ 26 54·43	53·27	53·27	0·7	0·17	0·0202
8	623 & 634 Newcomb	Apr. 6	8 39	W, E	57 7 26·89	+ 17 25·95	52·84				
	,, ,, ,,	,, 7		E, W	26·75	26·60	53·35	53·10	0·7	0·34	0·0809
9	634 & 648 Newcomb	Apr. 6	8 49	E, W	57 17 2·30	+ 7 51·00	53·30				
	,, ,, ,,	,, 7		W, E	2·14	50·21	52·35	52·83	0·7	0·61	0·2605
10	666 & 669 Newcomb	Apr. 5	23 21	E, W	56 51 3·58	+ 33 49·44	53·02				
	,, ,, ,,	,, 7		W, E	3·33	49·96	53·29	53·16	1·0	0·28	0·0784
11	683 & 697 Newcomb	Apr. 5	8 38	E, W	57 40 13·87	− 15 20·67	53·20				
	,, ,, ,,	,, 7		W, E	13·57	20·49	53·08	53·14	1·0	0·30	0·0900
12	701 & 703 Newcomb	Apr. 5	24 31	W, E	57 36 40·50	− 11 46·86	53·64				
	,, ,, ,,	,, 6		E, W	40·40	47·24	53·16	53·40	1·0	0·04	0·0016

213. Ranjitgarh—*Co-latitude* 57° 24′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1901	° ′		° ′ ″	′ ″	″	″			
13	708 & 712 Newcomb " " "	Apr. 5 " 6	11 59	E, W W, E	56 57 9·47 9·33	+ 27 43·76 44·20	53·23 53·53	53·38	1·0	0·06	0·0036
14	715 Newc & 1831 Gr. 80	Apr. 6	17 34	E, W	57 32 14·60	− 7 20·37	54·33	54·33	0·7	0·89	0·5545
15	740 & 749 Newcomb " " "	Apr. 5 " 6	16 4	W, E E, W	57 44 27·04 26·90	− 19 33·34 32·89	53·70 54·01	53·86	1·0	0·42	0·1764
								Σ P = 12·4		Σ Pvv = 1·6239	

Summary.

No. of pairs 15

No. of observations 27

Mean difference between observations taken E, W and those taken W, E = + 0″·16

Observed Co-latitude (weighted mean) 57° 24′ 53″·44 ± 0″·065

Correction for Height above Sea-level + 0″·04

Final Co-latitude 57° 24′ 53″·48

		°	′	″	″
Astronomical Latitude (A)	=	32	35	6·52	± 0·065
Geodetic Latitude (G)	=	32	35	12·11	
Deflection of plumb-line (A − G)	=		−	5·59	

214. Rawal—*Co-latitude* 71° 27′ +

Latitude	... 18° 32′	*Instrument*—Zenith Telescope	
Longitude	... 83 36	*Mean Height of Barometer*	in. 29·02
Height	... 874 feet	*Mean Temperature*	71°·4

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898-99	° ′		° ′ ″	′ ″	″	″			
1	155 & 160 Gr. 80 " " "	Jan. 2 " 5	12 40	E, W W, E	71 23 47·83 48·01	+ 4 7·52 7·56	55·35 55·57	55·46	1·0	0·22	0·0484
2	168 & 181 Gr. 80 " " "	Jan. 2 " 5	13 11	W, E E, W	71 42 9·66 9·83	− 14 15·94 14·62	53·72 55·21	54·47	1·0	0·77	0·5929
3	188 & 194 Gr. 80 " " "	Jan. 2 " 5	16 36	E, W W, E	71 30 0·08 0·26	− 2 5·21 6·76	54·87 53·50	54·19	1·0	1·05	1·1025
4	219 & 239 Gr. 80 " " "	Jan. 2 " 5	0 21	W, E E, W	71 42 4·10 4·26	− 14 9·33 9·28	54·77 54·98	54·88	1·0	0·36	0·1296
5	264 & 273 Gr. 80 " " "	Jan. 2 " 5	1 27	E, W W, E	71 39 16·68 16·83	− 11 19·78 21·28	56·90 55·55	56·23	1·0	0·99	0·9801
6	290 & 296 Gr. 80 " " "	Jan. 2 " 5	1 30	W, E E, W	71 10 38·95 39·08	+ 17 17·46 16·36	56·41 55·44	55·93	1·0	0·69	0·4761
7	342 & 368 Gr. 80 " " "	Jan. 2 " 5	10 26	W, E E, W	71 12 4·64 4·74	+ 15 51·77 51·06	56·41 55·80	56·11	0·7	0·87	0·5298
8	368 & 369 Gr. 80 " " "	Jan. 2 " 5	10 37	E, W W, E	71 23 2·85 2·95	+ 4 52·38 51·62	55·23 54·57	54·90	0·7	0·34	0·0809
9	374 & 403 Gr. 80 " " "	Jan. 2 " 5	1 10	W, E E, W	71 34 41·12 41·22	− 6 45·33 44·63	55·79 56·59	56·19	1·0	0·95	0·9025
10	406 & 412 Gr. 80 " " "	Jan. 2 " 5	8 48	E, W W, E	71 30 53·00 53·10	− 2 56·46 58·09	56·54 55·01	55·78	0·7	0·54	0·2041
11	412 & 419 Gr. 80 " " "	Jan. 2 " 5	8 35	W, E E, W	71 43 52·62 52·72	− 15 56·36 57·43	56·26 55·29	55·78	0·7	0·54	0·2041
12	449 & 464 Gr. 80 " " "	Jan. 2 " 5	21 43	W, E E, W	71 8 51·20 51·26	+ 19 6·47 3·96	57·67 55·22	56·45	1·0	1·21	1·4641
13	517 & 539 Gr. 80 " " "	Dec. 31 Jan. 3	5 54	E, W W, E	71 31 9·09 9·14	− 3 14·40 13·46	54·69 55·68	55·19	1·0	0·05	0·0025
14	630 & 664 Gr. 80 " " "	Dec. 31 Jan. 3	3 20	W, E E, W	71 31 16·12 16·20	− 3 22·76 21·27	53·36 54·93	54·15	1·0	1·09	1·1881
15	677 & 680 Gr. 80 " " "	Dec. 31 Jan. 3	3 5	E, W W, E	71 32 30·02 30·09	− 4 35·80 35·15	54·22 54·94	54·58	1·0	0·66	0·4356

214. Rawal—*Co-latitude* 71° 27′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	P v v
		1898-99	° ′		° ′ ″	′ ″	″	″			
16	703 & 712 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 3	0 38	W, E E, W	71 40 18·23 18·28	− 12 23·75 22·78	54·48 55·50	54·99	1·0	0·25	0·0625
17	750 & 783 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 3	9 51	E, W W, E	71 25 31·03 31·10	+ 2 24·01 21 06	55·04 52·16	53·60	1·0	1·64	2·6896
18	803 & 836 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 3	5 24	W, E E, W	71 15 19·94 20·00	+ 12 35·41 35·51	55·35 55·51	55·43	1·0	0·19	0·0361
19	846 & 877 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	3 16	E, W W, E	71 16 8·19 8·29	+ 11 48·27 47·73	56·46 56·02	56·24	1·0	1·00	1·0000
20	888 & 918 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	18 50	W, E E, W	71 32 26·57 26·67	− 4 32·54 31·93	54·03 54·74	54·39	1·0	0·85	0·7225
21	946 & 962 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	2 18	E, W W, E	71 13 5·61 5·71	+ 14 50·49 48·70	56·10 54·41	55·26	0·7	0·02	0·0003
22	962 & 998 Gr. 80	Jan. 4	1 53	E, W	71 37 48·70	− 9 53·52	55·18	55·18	0·5	0·06	0·0018
23	1037 & 1052 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	4 5	E, W W, E	71 8 38·42 38·57	+ 19 17·37 17·64	55·79 56·21	56·00	1·0	0·76	0·5776
24	1104 & 1139 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	1 54	E, W W, E	71 37 10·25 10·37	− 9 16·26 15·09	53·99 55 28	54·64	1·0	0·60	0·3600
25	1168 & 1197 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	5 41	E, W W, E	71 19 7·50 7·68	+ 8 47·34 45·90	54·84 53·58	54·21	1·0	1·03	1·0609
26	1206 & 1218 Gr. 80	Jan. 4	2 19	E, W	71 35 44·51	− 7 49·17	55·34	55·34	0·7	0·10	0·0070
27	1232 & 1261 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	18 39	E, W W, E	71 41 18·61 18·81	− 13 23·96 22·43	54·65 56·38	55·52	1·0	0·28	0·0784
28	1265 & 1272 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	6 41	W, E E, W	71 26 42·67 42·87	+ 1 12·19 12·94	54·86 55·81	55·34	1·0	0·10	0·0100
29	1282 & 1289 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	9 49	E, W W, E	71 41 33·11 33·34	− 13 38·08 36·70	55·03 56·64	55·84	1·0	0·60	0·3600
30	1402 & 1405 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	9 1	E, W W, E	71 28 52·17 52·48	− 0 57·86 57·79	54·31 54·69	54·50	1·0	0·74	0·5476
31	1417 & 1449 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	8 38	E, W W, E	71 21 58·51 58·81	+ 5 58·97 55·31	57·48 54·12	55·80	1·0	0·56	0·3136
32	1480 & 1490 Gr. 80 ,, ,, ,,	Dec. 31 Jan. 4	12 23	E, W W, E	71 24 58·24 58·58	+ 2 59·51 57·19	57·75 55·77	56·76	1·0	1·52	2·3104
33	1493 & 1499 Gr. 80 ,, ,, ,,	Jan. 1 ,, 4	12 9	E, W W, E	71 31 36·00 36·27	− 3 42·29 41·78	53·71 54·49	54·10	1·0	1·14	1·2996
34	1529 & 1533 Gr. 80 ,, ,, ,,	Jan. 1 ,, 4	3 30	E, W W, E	71 5 52·68 52·96	+ 22 4·55 0·49	57·23 53·45	55·34	0·6	0·10	0·0060

214. Rawal—*Co-latitude* 71° 27′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1899	° ′		° ′ ″	′ ″	″	″			
35	1533 & 1536 Gr. 80 " " "	Jan. 1 " 4	3 9	W, E E, W	71 27 5·95 6·25	+ 0 50·18 47·88	56·13 54·13	55·13	0·6	0·11	0·0073
36	1536 & 1541 Gr. 80 " " "	Jan. 1 " 4	3 11	E, W W, E	71 28 22·80 23·09	− 0 27·27 28·49	55·53 54·60	55·07	0·6	0·17	0·0173
37	1529 & 1541 Gr. 80 " " "	Jan. 1 " 4	3 32	E, W W, E	71 7 9·52 9·81	+ 20 47·11 44·13	56·63 53·94	55·29	0·6	0·05	0·0015
38	1621 & 1650 Gr. 80 " " "	Jan. 1 " 4	8 0	W, E E, W	71 30 56·41 56·77	− 3 0·52 1·91	55·89 54·86	55·38	1·0	0·14	0·0196
39	1725 & 1728 Gr. 80	Jan. 1	12 58	W, E	71 45 28·69	− 17 32·90	55·79	55·79	0·7	0·55	0·2118
40	1743 & 1777 Gr. 80	Jan. 1	16 8	E, W	71 22 19·76	+ 5 35·44	55·20	55·20	0·7	0·04	0·0011
41	1802 & 1819 Gr. 80 " " "	Jan. 1 " 5	15 7	W, E E, W	71 28 29·71 30·29	− 0 35·44 35·11	54·27 55·18	54·73	1·0	0·51	0·2601
42	1831 & 1850 Gr. 80 " " "	Jan. 1 " 5	3 30	E, W W, E	71 35 1·05 1·68	− 7 5·73 7·85	55·32 53·83	54·58	1·0	0·66	0·4356
43	1862 & 1874 Gr. 80	Jan. 1	2 17	W, E	71 30 34·76	− 2 38·22	56·54	56·54	0·7	1·30	1·1830
44	1929 & 1965 Gr. 80 " " "	Jan. 1 " 5	0 18	W, E E, W	71 21 43·71 44·46	+ 6 11·12 11·05	54·83 55·51	55·17	0·7	0·07	0·0034
45	1990 & 2006 Gr. 80 " " "	Jan. 1 " 5	21 25	W, E E, W	71 35 32·37 33·11	− 7 36·48 37·20	55·89 55·91	55·90	1·0	0·66	0·4356
46	2029 & 2063 Gr. 80 " " "	Jan. 1 " 5	12 40	W, E E, W	71 20 17·49 18·29	+ 7 35·44 37·42	52·93 55·71	54·32	1·0	0·92	0·8464
								Σ P = 40·9		Σ Pvv = 23·2079	

Summary.

No. of pairs 46

No. of observations 87

Mean difference between observations taken E, W and those taken W, E = + 0″·43

Observed Co-latitude (weighted mean) 71° 27′ 55″·24 ± 0″·076

Correction for Height above Sea-level + 0″·03

Final Co-latitude 71° 27′ 55″·27

		°	′	″	
Astronomical Latitude (A)	=	18	32	4·73	± 0·076
Geodetic Latitude (G)	=	18	32	9·22	
Deflection of plumb-line (A−G)	=		−	4·49	

215. Rojhra—*Co-latitude* 65° 2′ +

Latitude	... 24° 57′	*Instrument*—Zenith Telescope	
Longitude	... 70 17	*Mean Height of Barometer*	in 29·55
Height	... 518 feet	*Mean Temperature*	63°·8

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co latitude by each observation	Seconds of Co latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	10 & 14 Newcomb	Dec. 13	10 48	W, E	64 33 40·62	+ 28 52·99	33 61				
	" " "	" 16		W, E	40·70	53·36	34 06				
	" " "	" 17		E, W	40·73	53·50	34·23	34·04	1·2	0 15	0·0270
2	75 Gr. 80 & 36 Newc.	Dec. 13	5 17	E, W	64 57 43·77	+ 4 50 66	34·43				
	" " " "	" 16		E, W	43·84	51·18	35·02				
	" " " "	" 17		W, E	43·87	50·09	33·96	34·35	0·8	0·46	0·1693
3	36 Newc. & 113 Gr. 80	Dec. 13	5 39	W, E	65 19 4·62	− 16 30·58	34·04				
	" " " "	" 16		W, E	4·68	29·98	34·70	34·37	0·7	0·48	0·1613
4	136 & 160 Gr. 80	Dec. 13	6 19	E, W	65 2 4·12	+ 0 30·58	34 67				
	" " "	" 16		E, W	4·15	30 10	34·25				
	" " "	" 17		W, E	4·16	28·04	32·20	33·33	0·8	0 56	0·2509
5	136 & 181 Gr. 80	Dec. 13	6 25	E, W	64 55 43·77	+ 6 50·63	34·40				
	" " "	" 16		E, W	43·79	50 27	34·06				
	" " "	" 17		W, E	43 79	50 17	33 96	34·10	0·8	0 21	0·0353
6	73 & 74 Newcomb	Dec. 22	4 32	E, W	64 57 37·34	+ 4 56·17	33·51	33·51	0·7	0 38	0·1011
7	185 Gr. 80 & 79 Newc.	Dec. 13	21 49	W, E	65 5 35·62	− 3 2·42	33·20				
	" " " "	" 16		W, E	35·65	2·08	33·57				
	" " " "	" 17		E, W	35 66	1 92	33·74	33·57	1·2	0 32	0·1229
8	82 & 93 Newcomb	Dec. 13	19 41	E, W	64 40 30·11	+ 22 3·56	33 67				
	" " "	" 16		E, W	30·09	3·43	33·52				
	" " "	" 17		W, E	30·09	3·41	33·50	33·55	0 8	0 34	0·0925
9	88 & 93 Newcomb	Dec. 13	19 38	E, W	64 43 55·78	+ 18 37·64	33·42				
	" " "	" 16		E, W	55·78	37·81	33·59				
	" " "	" 17		W, E	55·62	37·49	33·11	33·31	0 8	0·58	0·2691
10	88 & 104 Newcomb	Dec. 22	19 58	E, W	65 3 20·79	− 0 46·65	34·14	34·14	0·7	0·25	0·0438
11	97 & 108 Newcomb	Dec. 13	16 8	W, E	65 12 43·57	− 10 9·85	33·72				
	" " "	" 16		W, E	43·57	9·76	33·81				
	" " "	" 17		E, W	43·57	9·88	33·69	33·73	1·2	0·16	0·0307
12	108 & 131 Newcomb	Dec. 22	16 36	W, E	64 44 24·25	+ 18 9·13	33·38	33·38	0·5	0·51	0·1301
13	118 & 121 Newcomb	Dec. 16	4 24	E, W	65 17 12·29	− 14 38·58	33·71				
	" " "	" 17		W, E	12·28	38·43	33·85	33·78	1·0	0·11	0·0121

215. Rojhra—*Co-latitude* 65° 2′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
14	131 & 138 Newcomb	Dec. 22	16 44	E, W	64 52 4·74	+ 9 50·11	33·85	33·85	0·5	0·04	0·0008
15	296 & 317 Gr. 80 ,, ,, ,,	Dec. 16 ,, 17	7 44	W, E E, W	64 55 35·90 35·88	+ 6 58·31 58·73	34·21 34·61	34·41	1·0	0·52	0·2704
16	334 & 339 Gr. 80 ,, ,, ,,	Dec. 13 ,, 16	4 33	E, W E, W	64 42 17·81 17·75	+ 20 15·63 16·21	33·44 33·96	33·70	1·0	0·19	0·0361
17	347 Gr. 80 & 155 Newc. ,, ,, ,, ,,	Dec. 13 ,, 16	7 49	W, E W, E	64 54 54·25 54·21	+ 7 38·67 39·86	32·92 34·07	33·50	1·0	0·39	0·1521
18	161 Newc. & 414 Gr. 80 ,, ,, ,, ,,	Dec. 16 ,, 17	3 39	W, E E, W	64 48 47·29 47·27	+ 13 46·43 46·33	33·72 33·60	33·66	0·7	0·23	0·0370
19	414 Gr. 80 & 185 Newc. ,, ,, ,, ,, ,, ,, ,, ,,	Dec. 13 ,, 16 ,, 17	3 57	E, W E, W W, E	65 6 28·05 28·00 27·98	− 3 54·48 53·88 53·85	33·57 34·12 34·13	33·99	0·8	0·10	0·0080
20	471 Gr. 80 & 203 Newc. ,, ,, ,, ,,	Dec. 13 ,, 16	4 1	W, E W, E	65 18 36·32 36·26	− 16 1·47 1·86	34·85 34·40	34·63	0·7	0·74	0·3833
21	471 Gr. 80 & 209 Newc. ,, ,, ,, ,,	Dec. 13 ,, 16	3 58	W, E W, E	65 15 13·75 13·69	− 12 39·28 39·16	34·47 34·53	34·50	0·7	0·61	0·2605
22	229 Newc. & 577 Gr. 80 ,, ,, ,, ,,	Dec. 20 ,, 21	0 26	W, E E, W	65 24 56·49 56·48	− 22 23·32 22·87	33·17 33·61	33·39	1·0	0·50	0·2500
23	589 Gr. 80 & 248 Newc. ,, ,, ,, ,,	Dec. 20 ,, 21	14 27	E, W W, E	64 43 4·16 4·14	+ 19 30·23 30·31	34·39 34·45	34·42	1·0	0·53	0·2809
24	256 & 258 Newcomb ,, ,, ,,	Dec. 20 ,, 21	3 28	W, E E, W	64 43 35·75 35·73	+ 18 57·87 58·03	33·62 33·76	33·69	1·0	0·20	0·0400
25	273 & 283 Newcomb ,, ,, ,,	Dec. 20 ,, 21	9 27	W, E E, W	65 7 29·10 29·10	− 4 55·58 55·17	33·52 33·93	33·73	1·0	0·16	0·0256
26	740 & 776 Gr. 80 ,, ,, ,,	Dec. 20 ,, 21	12 30	E, W W, E	65 11 13·57 13·57	− 8 39·88 39·41	33·69 34·16	33·93	0·7	0·04	0·0011
27	749 & 776 Gr. 80	Dec. 20	12 39	E, W	65 20 29·97	− 17 55·55	34·42	34·42	0·5	0·53	0·1405
28	305 & 313 Newcomb ,, ,, ,,	Dec. 20 ,, 21	19 7	W, E E, W	65 26 37·64 37·63	− 24 3·69 3·85	33·95 33·78	33·87	1·0	0·02	0·0004
29	327 Newc. & 869 Gr. 80 ,, ,, ,, ,,	Dec. 20 ,, 21	13 35	W, E E, W	65 12 6·68 6·67	− 9 32·47 32·95	34·21 33·72	33·97	1·0	0·08	0·0064
30	343 Newc. & 902 Gr. 80	Dec. 20	3 20	E, W	64 48 45·01	+ 13 48·57	33·58	33·58	0·7	0·31	0·0673
31	348 Newc. & 943 Gr. 80 ,, ,, ,, ,,	Dec. 20 ,, 21	7 35	W, E E, W	65 27 6·76 6·77	− 24 32·68 32·05	34·08 34·72	34·40	0·7	0·51	0·1821
32	348 & 371 Newcomb ,, ,, ,,	Dec. 20 ,, 21	7 13	W, E E, W	65 5 43·49 43·69	− 3 10·20 9·12	33·29 34·57	33·93	0·7	0·04	0·0011

215. Rojhra—*Co-latitude* 65° 2′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1900	° ′		° ′ ″	′ ″	″	″			
33	387 & 394 Newcomb	Dec. 20	20 24	W, E	65 27 1·30	− 24 27·39	33·91				
	,, ,, ,,	,, 21		E, W	1·29	27·42	33·87	33·89	0·7	0·00	0·0000
34	387 & 415 Newcomb	Dec. 20	20 9	W, E	65 12 39·43	− 10 6·08	33·35	33·35	0·5	0·54	0·1458
35	426 & 430 Newcomb	Dec. 20	14 45	W, E	65 16 8·72	− 13 35·04	33·68				
	,, ,, ,,	,, 21		E. W	8·74	34·87	33·87	33·78	1·0	0·11	0·0121
36	440 & 458 Newcomb	Dec. 20	9 0	W, E	64 55 2·71	+ 7 30·53	33·24				
	,, ,, ,,	,, 21		E, W	2·73	31·22	33·95	33·60	0·7	0·29	0·0589
37	440 & 464 Newcomb	Dec. 20	8 53	W, E	64 47 54·01	+ 14 39·33	33·34				
	,, ,, ,,	,, 21		E, W	54·03	39·26	33·29	33·32	0·7	0·57	0·2274
38	468 & 479 Newcomb	Dec. 18	16 17	W, E	65 13 42·28	− 11 7·94	34·34				
	,, ,, ,,	,, 19		E, W	42·30	8·66	33·64	33·99	0·7	0·10	0·0070
39	475 & 479 Newcomb	Dec. 18	16 11	W, E	65 19 34·92	− 17 1·33	33·59				
	,, ,, ,,	,, 19		E, W	34·94	1·83	33·11	33·35	0·7	0·54	0·2041
40	484 Newc. & 1811 Gr. 80	Dec. 18	7 7	E, W	64 59 58·69	+ 2 36·58	35·27				
	,, ,, ,, ,,	,, 19		W, E	58·71	34·60	33·31	34·29	1·0	0·40	0·1600
41	498 & 511 Newcomb	Dec. 18	8 48	E, W	65 8 46·17	− 6 12·17	34·00				
	,, ,, ,,	,, 19		W, E	46·19	12·16	34·03	34·02	1·0	0·13	0·0169
42	517 & 521 Newcomb	Dec 18	3 6	W, E	65 1 57·12	+ 0 37·11	34·23				
	,, ,, ,,	,, 19		E, W	57·15	37·14	34·29	34·26	0·7	0·37	0·0958
43	521 & 531 Newcomb	Dec. 18	2 50	E, W	65 17 57·87	− 15 23·39	34·48				
	,, ,, ,,	,, 19		W, E	57·92	23·69	34·23	34·36	0·7	0·47	0·1546
44	544 & 558 Newcomb	Dec. 18	4 11	W, E	65 3 12·91	− 0 39·08	33·83				
	,, ,, ,,	,, 19		E, W	12·96	39·18	33·78	33·81	0·7	0·08	0·0045
45	1459 Gr. 80 & 558 Newc.	Dec. 18	4 23	W, E	65 15 49·70	− 13 15·39	34·31	34·31	0·5	0·42	0·0882
46	1495 & 1500 Gr. 80	Dec. 18	8 40	E, W	65 22 37·20	− 20 3·59	33·61				
	,, ,, ,,	,, 19		W, E	37·27	3·89	33·38	33·50	1·0	0·39	0·1521
47	578 & 583 Newcomb	Dec. 18	13 54	E, W	65 2 46·65	− 0 12·78	33·87				
	,, ,, ,,	,, 19		W, E	46·72	12·89	33·83	33·85	1·0	0·04	0·0016

215. Rojhra—*Co-latitude* 65° 2′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1900	° ′		° ′ ″	′ ″	″	″			
48	1541 Gr. 80 & 595 Newc.	Dec. 19	9 44	E, W	64 55 19·13	+ 7 14·53	33·66	33·66	0·7	0·23	0·0370
49	1555 & 1571 Gr. 80 " " "	Dec. 18 " 19	1 36	E, W W, E	64 59 50·00 50·08	+ 2 43·84 43·54	33·84 33·62	33·73	1·0	0·16	0·0256
50	1585 Gr. 80 & 623 Newc. " " " "	Dec. 18 " 19	0 27	W, E E, W	65 19 52·38 52·48	− 17 16·32 18·31	36·06 34·17	35·12	1·0	1·23	1·5129
51	634 & 638 Newcomb	Dec. 19	16 30	W, E	64 58 50·22	+ 3 43·35	33·57	33·57	0·7	0·32	0·0717
52	641 Newc. & 1662 Gr. 80 " " " "	Dec. 18 " 19	7 22	W, E E, W	65 24 4·84 4·95	− 21 31·58 31·46	33·26 33·49	33·38	1·0	0·51	0·2601
53	657 & 673 Newcomb " " "	Dec. 18 " 19	17 16	E, W W, E	65 16 24·23 24·35	− 13 50·08 50·44	34·15 33·91	34·03	1·0	0·14	0·0196
54	683 & 694 Newcomb " " "	Dec. 18 " 19	0 47	W, E E, W	65 30 41·95 42·10	− 28 8·15 8·37	33·80 33·73	33·77	1·0	0·12	0·0144
55	699 & 708 Newcomb " " "	Dec. 18 " 19	20 27	E, W W, E	65 24 41·07 41·21	− 22 7·14 6·91	33·93 34·30	34·12	1·0	0·23	0·0529
56	713 & 718 Newcomb " " "	Dec. 18 " 19	8 50	W, E E, W	65 12 4·59 4·75	− 9 30·73 31·21	33·86 33·54	33·70	1·0	0·19	0·0361
57	720 & 728 Newcomb " " "	Dec. 18 " 19	18 34	E, W W, E	64 51 34·32 34·48	+ 10 59·43 59·22	33·75 33·70	33·73	0·7	0·16	0·0179
58	728 & 739 Newcomb " " "	Dec. 18 " 19	18 19	W, E E, W	64 36 12·22 12·39	+ 26 21·69 21·07	33·91 33·46	33·69	0·7	0·20	0·0280
59	1520 & 1528 Newcomb " " "	Dec. 13 " 16	16 28	W, E E, W	64 39 41·43 41·63	+ 22 52·81 52·25	34·24 33·88	34·06	0·7	0·17	0·0202
60	1520 & 1534 Newcomb " " " " " "	Dec. 13 " 16 " 17	16 49	W, E E, W W, E	65 0 27·42 27·62 27·68	+ 2 6·62 6·28 6·42	34·04 33·90 34·10	33·99	0·8	0·10	0·0080
61	3908 Gr. 80 & 1552 Newc. " " " "	Dec. 13 " 16	23 53	E, W W, E	65 24 7·60 7·75	− 21 33·20 33·77	34·40 33·98	34·19	1·0	0·30	0·0900
62	1561 & 1583 Newcomb " " " " " "	Dec. 13 " 16 " 17	6 7	W, E E, W W, E	65 19 16·20 16·35 16·40	− 16 42·04 42·25 42·48	34·16 34·10 33·92	34·07	1·2	0·18	0·0389

215. Rojhra—*Co-latitude* 65° 2′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
63	3959 & 4013 Gr. 80	Dec. 22	6 7	W, E	65 19 17·26	− 16 42·89	34·37	34·37	0·7	0·48	0·1613
64	4036 Gr. 80 & 44 Newc.	Dec. 22	18 27	E, W	65 13 4·67	− 10 31·08	33·59	33·59	0·7	0·30	0·0630
								ΣP = 53·4		ΣPvv = 7·3763	

Summary.

No. of pairs 64

No. of observations 127

Mean difference between observations taken E, W and those taken W, E = + 0″·05

Observed Co-latitude (weighted mean) 65° 2′ 33″·89 ± 0″·032

Correction for Height above Sea-level + 0″·02

Final Co-latitude 65° 2′ 33″·91

		°	′	″	″
Astronomical Latitude (A)	=	24	57	26·09	± 0·032
Geodetic Latitude (G)	=	24	57	26·28	
Deflection of plumb-line (A−G)	=		−	0·19	

216. Salimpur—*Co-latitude* 62° 13′ +

Latitude ... 27° 47′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 78 33 *Mean Height of Barometer* 29·27 in.

Height ... 645 feet *Mean Temperature* 61°·5

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	846 & 872 Gr. 80	Feb. 27	12 16	E, W	62 15 32·89	− 2 9·98	22·91				
	" " "	" 28		W, E	32·89	8·75	24·14	23·53	1·0	0·21	0·0441
2	888 & 916 Gr. 80	Feb. 27	9 23	W, E	62 5 36·82	+ 7 47·25	24·07				
	" " "	" 28		E, W	36·83	47·23	24·06	24·06	1·0	0·32	0·1024
3	962 & 978 Gr. 80	Feb. 27	11 20	E, W	62 11 6·44	+ 2 16·66	23·10				
	" " "	" 28		W, E	6·44	16·73	23·17				
	962 & 984 Gr. 80	" 27	11 20	E, W	62 11 57·00	+ 1 26·16	23·16				
	" " "	" 28		W, E	56·99	26·47	23·46	23·23	1·5	0·51	0·3902
4	1023 & 1062 Gr. 80	Feb. 28	15 21	E, W	62 21 20·11	− 7 55·53	24·58				
	1672 & 1686 Gr. 80	" 28	7 59	E, W	2 52·92	+ 10 31·02	23·94	24·26	1·5	0·52	0·4056
5	1135 & 1179 Gr. 80	Feb. 27	11 35	E, W	62 6 10·63	+ 7 13·18	23·81				
	" " "	" 28		W, E	10·60	13·65	24·25				
	1135 & 1218 Gr. 80	" 27	11 42	E, W	62 12 58·28	+ 0 26·24	24·52				
	" " "	" 28		W, E	58·24	25·21	23·45	24·01	1·5	0·27	0·1094
6	1223 & 1240 Gr. 80	Mar. 1	0 32	E, W	62 27 18·81	− 13 53·93	24·88				
	" " "	" 2		W, E	18·77	55·04	23·73				
	1240 & 1303 Gr. 80	" 1	0 29	W, E	62 24 24·50	− 10 59·05	25·45				
	" " "	" 2		E, W	24·45	11 0·55	23·90				
	1303 & 1271 Gr. 80	" 1	0 27	E, W	62 26 38·83	− 13 14·29	24·54				
	" " "	" 2		W, E	38·77	14·89	23·88				
	1271 & 1223 Gr. 80	" 1	0 29	W, E	62 29 33·14	− 16 9·19	23·95				
	" " "	" 2		E, W	33·09	9·36	23·73	24·26	2·0	0·52	0·5408
7	1287 & 1343 Gr. 80	" 1	0 39	W, E	62 19 38·18	− 6 13·30	24·88				
	" " "	" 2		E, W	38·12	14·96	23·16				
	1343 & 1324 Gr. 80	" 1	0 37	E, W	62 21 20·53	− 7 56·64	23·89				
	" " "	" 2		W, E	20·47	56·75	23·72				
	1324 & 1417 Gr. 80	" 1	0 30	W, E	62 14 13·66	− 0 50·42	23·24				
	" " "	" 2		E, W	13·60	49·82	23·78				
	1417 & 1371 Gr. 80	" 1	0 25	E, W	62 20 1·65	− 6 37·89	23·76				
	" " "	" 2		W, E	1·65	38·46	23·19				
	1371 & 1405 Gr. 80	" 1	0 16	W, E	62 11 38·83	+ 1 44·27	23·10				
	" " "	" 2		E, W	38·83	44·76	23·59				
	1405 & 1287 Gr. 80	" 1	0 24	E, W	62 4 8·49	+ 9 15·05	23·54				
	" " "	" 2		W, E	8·43	15·18	23·61	23·62	3·0	0·12	0·0432
8	1450 & 1465 Gr. 80	Mar. 1	5 40	E, W	62 30 48·08	− 17 24·41	23·77				
	" " "	" 2		W, E	48·01	23·96	24·05				
	1452 & 1465 Gr. 80	" 1	5 38	E, W	62 32 55·00	− 19 31·99	23·01				
	" " "	" 2		W, E	54·93	31·53	23·40	23·56	1·5	0·18	0·0486
9	1490 & 1511 Gr. 80	Mar. 1	3 4	W, E	62 6 3·09	+ 7 20·74	23·83				
	" " "	" 2		E, W	3·01	20·43	23·44				
	1499 & 1511 Gr. 80	" 1	2 53	W, E	62 16 15·49	− 2 51·71	23·78				
	" " "	" 2		E, W	15·40	51·69	23·71	23·69	1·5	0·05	0·0038

216. Salimpur—*Co-latitude* 62° 13′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
10	1520 & 1554 Gr. 80	Mar. 1	2 14	E, W	62 10 12·42	+ 3 11·53	23·95				
	" " "	" 2		W, E	12·33	12·52	24·85				
	1554 & 1599 Gr. 80	" 1	2 25	W, E	61 58 53·35	+ 14 29·80	23·15				
	" " "	" 2		E, W	53·26	30·30	23 56				
	1520 & 1585 Gr. 80	" 1	2 29	E, W	62 24 56·02	− 11 31·58	24·44				
	" " "	" 2		W, E	55·94	30·63	25·31				
	1585 & 1599 Gr. 80	" 1	2 40	W, E	62 13 36·95	− 0 13·31	23·64				
	" " "	" 2		E, W	36·87	12·52	24 35	24·16	2·0	0·42	0·3528
11	1613 & 1628 Gr. 80	Feb. 27	18 32	W, E	62 3 25·53	+ 9 58·16	23·69				
	" " "	" 28		E, W	25·44	57·16	22·60	23·15	1·0	0·59	0·3481
12	1652 & 1664 Gr. 80	Feb. 27	15 29	E, W	62 4 10·27	+ 9 13·00	23 27				
	" " "	" 28		W, E	10·19	13 10	23·29	23 28	1·0	0·46	0·2116
13	1672 & 1706 Gr. 80	Feb. 27	7 46	W, E	62 15 48·73	− 2 25·28	23·45				
	" " "	" 28		E, W	48·64	24·84	23·80	23·62	1·0	0 12	0·0144
14	1713 & 1724 Gr. 80	Feb. 27	4 24	E, W	61 54 3·41	+ 19 19·59	23·00				
	" " "	" 28		W, E	3·31	19·24	22·55	22·78	1·0	0·96	0·9216
15	1743 & 1762 Gr. 80	Feb. 27	7 1	W, E	62 16 11·13	− 2 48·38	22·75				
	" " "	" 28		E, W	11·04	45·91	25·13				
	1743 & 1791 Gr. 80	" 27	6 51	W, E	62 5 31·40	+ 7 51·31	22·71				
	" " "	" 28		E, W	31·37	52·39	23·76	23·59	1·5	0·15	0·0338
16	1803 & 1816 Gr. 80	Feb. 27	10 52	E, W	62 8 6·23	+ 5 17·26	23·49				
	" " "	" 28		W, E	6·11	18·05	24·16	23·83	1·0	0·09	0·0081
17	1858 & 1882 Gr. 80	Mar. 1	20 35	E, W	62 15 8 66	− 1 44·79	23·87				
	" " "	" 2		W, E	8·58	44·81	23·77	23·82	1·0	0·08	0·0064
18	1898 & 1940 Gr. 80	Mar. 1	1 12	W, E	62 22 47·97	− 9 23·63	24·34				
	" " "	" 2		E, W	47·91	23·55	24·36				
	1933 & 1940 Gr. 80	" 1	1 13	W, E	62 23 34·98	− 10 11·04	23 94				
	" " "	" 2		E, W	34·91	11·69	23·22	23·97	1·5	0·23	0·0794
19	1961 & 2009 Gr. 80	Mar. 1	14 28	E, W	62 34 27·60	− 21 4·38	23·22				
	" " "	" 2		W, E	27·53	3·82	23·71	23·47	1·0	0·27	0·0729
20	2068 & 2109 Gr. 80	Mar. 1	21 46	E, W	62 14 37·58	− 1 13·33	24·25				
	" " "	" 2		W, E	37·53	13·27	24·26				
	2068 & 2147 Gr. 80	" 1	21 55	E, W	62 6 4·78	+ 7 19·40	24·18				
	" " "	" 2		W, E	4·73	18·58	23·31	24·00	1·5	0·26	0·1014
21	2227 & 2250 Gr. 80	Mar. 3	11 0	E, W	62 15 2·68	− 1 38·85	23·83				
	" " "	" 4		W, E	2·64	38·54	24·10				
	2250 & 2266 Gr. 80	" 3	10 57	W, E	62 12 35·38	+ 0 47·88	23·26				
	" " "	" 4		E, W	35·34	48·58	23·92	23·78	1·5	0·04	0·0024
22	2281 & 2293 Gr. 80	Mar. 3	10 25	E, W	62 12 1·06	+ 1 23·48	24·54				
	" " "	" 4		W, E	1·05	21·90	22·95	23·75	1·0	0·01	0·0001
23	2311 & 2327 Gr. 80	Mar. 3	12 58	W, E	62 11 17·00	+ 2 7·06	24·06				
	" " "	" 4		E, W	16·97	6·23	23·20	23·63	1·0	0·11	0·0121

216. Salimpur—*Co-latitude* 62° 13′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
24	2345 & 2352 Gr. 80	Mar. 3	1 26	E, W	61 53 45·49	+ 19 38·63	24·12				
	" " "	" 4		W, E	45·48	38·44	23·92				
	2345 & 2389 Gr. 80	" 3	1 23	E, W	61 56 18·79	+ 17 5·38	24·17				
	" " "	" 4		W, E	18·77	5·74	24·51	24·18	1·5	0·44	0·2904
25	2429 & 2445 Gr. 80	Mar. 3	9 16	E, W	62 18 0·43	− 4 38·06	22·37				
	" " "	" 4		W, E	0·43	36·55	23·88	23·13	1·0	0·61	0·3721
								Σ P = 34·0		Σ Pvv = 4·5157	

Summary.

No. of pairs 25

No. of observations 90

Mean difference between observations taken E, W and those taken W, E = − 0″·05

Observed Co-latitude (weighted mean) 62° 13′ 23″·74 ± 0″·050

Correction for Height above Sea-level + 0″·03

Final Co-latitude 62° 13′ 23″·77

		°	′	″	″
Astronomical Latitude (A)	=	27	46	36·23	± 0·050
Geodetic Latitude (G)	=	27	46	36·46	
Deflection of plumb-line (A−G)	=		−	0·23	

217. Samdari—*Co-latitude* 64° 10′ +

Latitude	...	25° 49′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	...	72 37	*Mean Height of Barometer*	29·55 in.
Height	...	600 feet	*Mean Temperature*	66°·0

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	285 & 300 Gr. 80	Jan. 11	3 0	E, W	63 55 56·72	+ 15 3·76	60·48				
	" " "	" 12		W, E	56·76	2·47	59·23				
	" " "	" 14		W, E	56·84	5·15	61·99	60·57	0·8	0·17	0·0231
2	285 & 301 Gr. 80	Jan. 11	3 0	E, W	63 55 43·92	+ 15 16·35	60·27				
	" " "	" 12		W, E	43·96	16·43	60·39	60·33	0·7	0·07	0·0034
3	317 & 331 Gr. 80	Jan. 11	6 53	W, E	64 6 58·60	+ 4 2·80	61·40				
	" " "	" 12		E, W	58·63	2·24	60·87				
	" " "	" 14		E, W	58·71	0·42	59·13	60·47	1·2	0·07	0·0059
4	347 & 350 Gr. 80	Jan. 11	6 44	E, W	63 51 51·19	+ 19 10·04	61·23				
	" " "	" 12		W, E	51·22	9·44	60·66	60·94	1·0	0·54	0·2916
5	368 & 354 Gr. 80	Jan. 11	3 16	E, W	64 3 54·74	+ 7 5·68	60·42				
	" " "	" 12		W, E	54·76	6·36	61·12				
	" " "	" 14		W, E	54·82	7·21	62·03	61·19	1·2	0·79	0·7489
6	382 & 374 Gr. 80	Jan. 11	8 30	W, E	64 16 20·74	− 5 19·18	61·56				
	" " "	" 12		E, W	20·76	21·67	59·09				
	" " "	" 14		E, W	20·80	20·40	60·40	60·35	0·8	0·05	0·0020
7	383 & 374 Gr. 80	Jan. 11	8 30	W, E	64 15 14·58	− 4 14·25	60·33				
	" " "	" 12		E, W	14·59	15·99	58·60				
	" " "	" 14		E, W	14·64	15·26	59·38	59·44	0·8	0·96	0·7373
8	401 & 411 Gr. 80	Jan. 11	13 52	W, E	64 7 47·06	+ 3 14·43	61·49				
	" " "	" 12		E, W	47·07	12·51	59·58				
	" " "	" 14		E, W	47·10	13·79	60·89	60·65	1·2	0·25	0·0750
9	434 & 444 Gr. 80	Jan. 11	5 18	E, W	63 47 24·50	+ 23 38·20	62·70				
	" " "	" 12		W, E	24·50	34·93	59·43	61·06	1·0	0·66	0·4356
10	454 Gr. 80	Jan. 11	0 13	W, E	63 57 33·12	+ 13 26·42	59·54				
	" "	" 12		E, W	33·13	27·23	60·36	59·95	1·0	0·45	0·2025

217. Samdari—*Co-latitude* 64° 10′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
11	610 & 620 Gr. 80	Jan. 11	13 46	E, W	64 3 12·92	+ 7 47·44	60·36				
	" " "	" 12		W, E	12·91	45·90	58·81				
	" " "	" 13		E, W	12·89	48·40	61·29	60·15	1·2	0·25	0·0750
12	693 & 703 Gr. 80	Jan. 12	8 1	W, E	64 12 54·03	− 1 54·22	59·81				
	" " "	" 13		E, W	54·01	53·64	60·37				
	" " "	" 14		W, E	53·99	54·07	59·92	60·03	0·8	0·37	0·1095
13	695 & 703 Gr. 80	Jan. 12	8 1	W, E	64 17 59·28	− 6 59·14	60·14				
	" " "	" 13		E, W	59·21	58·75	60·46				
	" " "	" 14		W, E	59·24	58·83	60·41	60·34	0·8	0·06	0·0029
14	724 & 707 Gr. 80	Jan. 13	2 59	E, W	64 16 6·33	− 5 5·58	60·75	60·75	0·5	0·35	0·0613
15	728 & 707 Gr. 80	Jan. 12	2 59	W, E	64 15 6·70	− 4 7·05	59·65				
	" " "	" 13		E, W	6·68	5·19	61·49	60·57	0·7	0·17	0·0202
16	750 & 753 Gr. 80	Jan. 11	2 50	E, W	64 25 32·90	− 14 32·05	60·85				
	" " "	" 12		W, E	32·87	32·68	60·19				
	" " "	" 13		E, W	32·85	31·95	60·90	60·65	0·8	0·25	0·0500
17	750 & 754 Gr. 80	Jan. 11	2 50	E, W	64 25 6·31	− 14 5·64	60·67				
	" " "	" 12		W, E	6·29	6·21	60·08				
	" " "	" 13		E, W	6·27	5·92	60·35	60·37	0·8	0·03	0·0007
18	800 & 785 Gr. 80	Jan. 11	7 10	E, W	64 10 15·13	+ 0 44·19	59·32				
	" " "	" 12		W, E	15·10	44·96	60·06				
	" " "	" 13		E, W	15·08	45·59	60·67	60·02	1·2	0·38	0·1733
19	860 & 833 Gr. 80	Jan. 11	7 2	W, E	64 28 1·72	− 17 1·43	60·29				
	" " "	" 12		E, W	1·69	2·63	59·06				
	" " "	" 13		W, E	1·66	16 59·46	62·20	60·52	0·8	0·12	0·0115
20	861 & 833 Gr. 80	Jan. 11	7 2	W, E	64 27 56·36	− 16 56·79	59·57				
	" " "	" 12		E, W	56·33	57·33	59·00				
	" " "	" 13		W, E	56·31	54·49	61·82	60·13	0·8	0·27	0·0583
21	872 & 869 Gr. 80	Jan. 11	14 24	E, W	64 23 8·67	− 12 8·97	59·70				
	" " "	" 12		W, E	8·64	9·15	59·49				
	" " "	" 13		E, W	8·62	8·17	60·45	59·88	1·2	0·52	0·3245
22	508 Gr. 72 & 891 Gr. 80	Jan. 11	8 32	W, E	64 12 25·10	− 1 25·35	59·75				
	" " " "	" 12		E, W	25·08	24·71	60·37				
	" " " "	" 13		W, E	25·04	25·38	59·66	59·93	0·8	0·47	0·1767
23	508 Gr. 72 & 892 Gr. 80	Jan. 11	8 32	W, E	64 12 25·87	− 1 26·37	59·50				
	" " " "	" 12		E, W	25·84	26·20	59·64				
	" " " "	" 13		W, E	25·80	26·15	59·65	59·60	0·8	0·80	0·5120

217. Samdari—*Co-latitude* 64° 10′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
24	510 Gr. 72 & 891 Gr. 80	Jan. 11	8 32	W, E	64 9 49·12	+ 1 12·76	61·88				
	″ ″ ″ ″	″ 12		E, W	49·09	11·17	60·26				
	″ ″ ″ ″	″ 13		W, E	49·06	10·88	59·94	60·69	0·8	0·29	0·0673
25	510 Gr. 72 & 892 Gr. 80	Jan. 11	8 32	W, E	64 9 49·88	+ 1 11·74	61·62				
	″ ″ ″ ″	″ 12		E, W	49·85	9·68	59·53				
	″ ″ ″ ″	″ 13		W, E	49·82	10·11	59·93	60·36	0·8	0·04	0·0013
26	526 Gr. 72 & 927 Gr. 80	Jan. 11	1 49	E, W	64 13 4·00	− 2 3·27	60·73				
	″ ″ ″ ″	″ 12		W, E	3·97	1·56	62·41				
	″ ″ ″ ″	″ 13		E, W	3·94	5·10	58·84	60·66	1·2	0·26	0·0811
27	953 Gr. 80	Jan. 12	0 1	W, E	64 9 40·54	+ 1 20·48	61·02	61·02	0·7	0·62	0·2691
								Σ P = 24·4		Σ Pvv = 4·5200	

Summary.

No. of pairs 27

No. of observations 72

Mean difference between observations taken E, W and those taken W, E = −0″·50

Observed Co-latitude (weighted mean) 64° 11′ 0″·40 ± 0″·057

Correction for Height above Sea-level + 0″·02

Final Co-latitude 64° 11′ 0″·42

		°	′	″	″
Astronomical Latitude (A)	=	25	48	59·58	± 0·057
Geodetic Latitude (G)	=	25	48	59·55	
Deflection of plumb-line (A−G)	=	+		0·03	

218. Sanjib—*Co-latitude* 72° 28′ +

Latitude	...	17° 31′	*Instrument*—Zenith Telescope	
Longitude	...	82 44	*Mean Height of Barometer*	in. 27·89
Height	...	2142 feet	*Mean Temperature*	75°·6

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	1365 & 1368 Gr. 80	Mar. 27	0 26	E, W	72 49 33·17	− 20 44·27	48·90	48·27	1·0	0·68	0·4624
	" " "	" 28		W, E	33·14	45·50	47·64				
2	1390 & 1402 Gr. 80	Mar. 27	8 10	W, E	72 19 43·48	+ 9 4·65	48·13	47·99	1·0	0·40	0·1600
	" " "	" 28		E, W	43·44	4·40	47·84				
3	1411 & 1413 Gr. 80	Mar. 27	0 38	E, W	71 57 56·10	+ 30 52·23	48·33	48·33	0·7	0·74	0·3833
4	1428 & 1436 Gr. 80	Mar. 27	3 7	W, E	72 19 4·97	+ 9 43·78	48·75	48·28	0·7	0·69	0·3333
	" " "	" 28		E, W	4·92	42·89	47·81				
5	1428 & 1459 Gr. 80	Mar. 27	2 55	W, E	72 31 40·21	− 2 50·94	49·27	49·01	0·7	1·42	1·4115
	" " "	" 28		E, W	40·17	51·43	48·74				
6	1465 & 1466 Gr. 80	Mar. 27	4 24	E, W	72 32 39·28	− 3 51·56	47·72	47·80	1·0	0·21	0·0441
	" " "	" 28		W, E	39·24	51·37	47·87				
7	1474 & 1480 Gr. 80	Mar. 27	11 28	W, E	72 18 40·31	+ 10 6·98	47·29	47·26	1·0	0·33	0·1089
	" " "	" 28		E, W	40·27	6·95	47·22				
8	1494 & 1524 Gr. 80	Mar. 27	5 13	E, W	72 44 50·49	− 16 2·33	48·16	48·10	0·7	0·51	0·1821
	" " "	" 28		W, E	50·44	2·41	48·03				
9	1504 & 1524 Gr. 80	Mar. 27	5 6	E, W	72 37 43·62	− 8 55·86	47·76	47·94	0·7	0·35	0·0858
	" " "	" 28		W, E	43·57	55·46	48·11				
10	1494 & 1529 Gr. 80	Mar. 27	5 12	E, W	72 46 15·99	− 17 27·57	48·42	48·88	0·7	1·29	1·1649
	" " "	" 28		W, E	15·94	26·61	49·33				
11	1529 & 1504 Gr. 80	Mar. 27	5 5	W, E	72 39 9·12	− 10 21·09	48·03	48·72	1·0	1·13	1·2769
	" " "	" 28		E, W	9·07	19·66	49·41				
12	1546 & 1565 Gr. 80	Mar. 26	19 47	W, E	72 31 38·33	− 2 51·33	47·00	47·51	1·0	0·08	0·0064
	" " "	" 27		E, W	38·28	50·26	48·02				
13	1571 & 1572 Gr. 80	Mar. 26	5 50	E, W	72 23 52·66	+ 4 54·81	47·47	47·37	1·0	0·22	0·0484
	" " "	" 27		W, E	52·61	54·65	47·26				
14	1585 & 1596 Gr. 80	Mar. 26	7 24	W, E	72 14 23·68	+ 14 22·78	46·46	47·59	0·7	0·00	0·0000
	" " "	" 27		E, W	23·62	25·09	48·71				
15	1596 & 1606 Gr. 80	Mar. 26	6 57	E, W	72 40 55·52	− 12 8·39	47·13	48·04	0·7	0·45	0·1418
	" " "	" 27		W, E	55·46	6·52	48·94				

218. Sanjib—*Co-latitude* 72° 28′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
16	1621 & 1628 Gr. 80 " " "	Mar. 26 " 27	8 32	W, E E, W	72 1 47·48 47·42	+ 26 59·25 59·35	46·73 46·7	46·75	1·0	0·84	0·7056
17	1650 & 1665 Gr. 80 " " "	Mar. 26 " 27	6 46	E, W W, E	72 43 39·04 38·98	− 14 50·60 51·38	48·44 47·60	48·02	1·0	0·43	0·1849
18	1673 & 1681 Gr. 80	Mar. 27	2 26	E, W	72 3 26·52	+ 25 20·55	47·07	47·07	0·5	0·52	0·1352
19	1673 & 1703 Gr. 80	Mar. 27	2 51	E, W	72 28 18·36	+ 0 29·45	47·81	47·81	0·5	0·22	0·0242
20	1724 & 1732 Gr. 80 " " "	Mar. 26 " 27	6 20	W, E E, W	72 34 36·83 36·77	− 5 48·85 49·14	47·98 47·63	47·81	1·0	0·22	0·0484
21	1743 & 1748 Gr 80 " " "	Mar. 26 " 27	16 45	E, W W, E	71 57 26·52 26·45	+ 31 19·72 20·25	46·24 46·70	46·47	0·7	1·12	0·8781
22	1743 & 1766 Gr. 80 " " "	Mar. 26 " 27	17 7	E, W W, E	72 19 24·31 24·24	+ 9 22·77 21·32	47·08 45·56	46·32	0·7	1·27	1·1290
23	1777 & 1799 Gr. 80 " " "	Mar. 28 " 29	14 48	E, W W, E	72 40 25·32 25·26	− 11 37·27 37·66	48·05 47·60	47·83	0·7	0·24	0·0403
24	1798 & 1799 Gr. 80 " " "	Mar. 28 " 29	14 46	E, W W, E	72 38 32·93 32·86	− 9 45·23 45·47	47·70 47·39	47·55	0·7	0·04	0·0011
25	1802 & 1812 Gr. 80 " " "	Mar. 28 " 29	15 51	W, E E, W	72 10 15·24 15·17	+ 18 32·38 32·48	47·63 47·65	47·64	1·0	0·05	0·0025
26	1816 & 1827 Gr. 80 " " "	Mar. 28 " 29	1 0	E, W W, E	71 59 9·29 9·21	+ 29 37·67 37·97	46·96 47·18	47·07	1·0	0·52	0·2704
27	1831 & 1862 Gr. 80 " " "	Mar. 28 " 29	2 56	W, E E, W	72 7 15·53 15·45	+ 21 32·64 31·45	48·17 46·90	47·54	0·7	0·05	0·0018
28	1862 & 1865 Gr. 80 " " "	Mar. 28 " 29	2 49	E, W W, E	72 0 58·45 58·37	+ 27 48·32 48·36	46·77 46·73	46·75	0·7	0·84	0·4939
29	1888 & 1898 Gr 80 " " "	Mar. 28 " 29	8 35	W, E E, W	72 6 42·08 42·00	+ 22 5·32 5·62	47·40 47·62	47·51	0·7	0·08	0·0045
30	1888 & 1933 Gr. 80 " " "	Mar. 28 " 29	8 34	W, E E, W	72 7 29·66 29·58	+ 21 16·94 17·68	46·60 47·26	46·93	0·7	0·66	0·3049
31	1939 & 1969 Gr. 80 " " "	Mar. 28 " 29	22 26	E, W W, E	72 49 25·07 25·00	− 20 37·07 37·46	48·00 47·54	47·77	1·0	0·18	0·0324
32	1977 & 2009 Gr. 80 " " "	Mar. 28 " 29	4 20	W, E E, W	72 41 0·65 0·57	− 12 13·15 12·25	47·50 48·32	47·91	0·7	0·32	0·0717
33	2008 & 2009 Gr. 80 " " "	Mar. 28 " 29	4 25	W, E E, W	72 35 44·45 44·36	− 6 57·56 56·40	46·89 47·96	47·43	0·7	0·16	0·0179
34	2020 & 2025 Gr. 80 " " "	Mar. 28 " 29	21 4	E, W W, E	72 10 41·96 41·89	+ 18 6·24 4·37	48·20 46·26	47·23	0·7	0·36	0·0907

218. Sanjib—*Co-latitude* 72° 28′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1894	° ′		° ′ ″	′ ″	″	″			
35	2020 & 2027 Gr. 80 " " "	Mar. 28 " 29	20 51	E, W W, E	71 57 26·91 26·83	+ 31 20·24 19·35	47·15 46·18	46·67	0·7	0·92	0·5925
36	2035 & 2047 Gr. 80 " " "	Mar. 28 " 29	21 6	W, E E, W	72 0 2·84 2·76	+ 28 43·93 43·55	46·77 46·31	46·54	0·7	1·05	0·7718
37	2035 & 2048 Gr. 80 " " "	Mar. 28 " 29	21 5	W, E E, W	72 1 8·52 8·44	+ 27 38·31 38·03	46·83 46·47	46·65	0·7	0·94	0·6185
38	2050 & 2063 Gr. 80 " " "	Mar. 28 " 29	11 12	E, W W, E	72 46 55·06 54·98	− 18 8·14 8·09	46·92 46·89	46·91	1·0	0·68	0·4624
39	2084 & 2124 Gr. 80 " " "	Mar. 28 " 29	3 4	E, W W, E	72 35 10·05 9·97	− 6 22·21 21·84	47·84 48·13	47·99	1·0	0·40	0·1600
40	2144 & 2150 Gr. 80	Mar. 28	0 50	W, E	72 51 0·64	− 22 12·74	47·90	47·90	0·5	0·31	0·0481
41	2150 & 2167 Gr. 80 " " "	Mar. 28 " 29	1 18	E, W W, E	72 22 41·49 41·41	+ 6 5·74 6·84	47·23 48·25	47·74	0·7	0·15	0·0158
								Σ P = 32·6		Σ Pvv = 12·9164	

Summary.

No. of pairs 41

No. of observations 78

Mean difference between observations taken E, W and those taken W, E = + 0″·16

Observed Co-latitude (weighted mean) 72° 28′ 47″·59 ± 0″·067

Correction for Height above Sea-level + 0″·09

Final Co-latitude* 72° 28′ 47″·68

		°	′	″	″
Astronomical Latitude (A)	=	17	31	12·32	± 0·067
Geodetic Latitude (G)	=	17	31	18·68	
Deflection of plumb-line (A − G)	=		−	6·36	

219. Sankrao—*Co-latitude* 61° 57′ +

Latitude ... 28° 2′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 78 35 *Mean Height of Barometer* in. 29·30

Height ... 670 feet *Mean Temperature* 61°·2

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = p	v	p v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	693 & 704 Gr. 80	Feb. 19	5 40	W, E	61 45 20·06	+ 12 10·59	30·65				
	,, ,, ,,	,, 20		E, W	20·09	10·47	30·56	30·61	1·0	0·44	0·1936
2	719 & 731 Gr. 80	Feb. 19	12 48	E, W	61 43 54·10	+ 13 36·63	30·73				
	,, ,, ,,	,, 20		W, E	54·12	36·85	30·97				
	731 & 742 Gr. 80	,, 19	12 40	W, E	61 36 32·89	+ 20 58·01	30·90				
	,, ,, ,,	,, 20		E, W	32·91	57·66	30·57	30·79	1·5	0·26	0·1014
3	776 & 785 Gr. 80	Feb. 16	9 19	E, W	62 0 29·34	− 2 58·97	30·37				
	,, ,, ,,	,, 17		W, E	29·36	58·07	31·29				
	,, ,, ,,	,, 19		E, W	29·39	58·31	31·08				
	,, ,, ,,	,, 20		W, E	29·40	58·81	30·59				
	785 & 809 Gr. 80	,, 16	9 32	W, E	61 47 40·92	+ 9 50·65	31·57				
	,, ,, ,,	,, 17		E, W	40·93	50·91	31·84				
	,, ,, ,,	,, 18		E, W	40·94	50·27	31·21				
	,, ,, ,,	,, 20		E, W	40·96	50·17	31·13	31·16	3·0	0·11	0·0363
4	851 & 892 Gr. 80	Feb. 16	10 33	W, E	62 10 15·68	− 12 44·21	31·47				
	,, ,, ,,	,, 17		E, W	15·67	44·19	31·48				
	,, ,, ,,	,, 18		E, W	15·67	44·93	30·74				
	,, ,, ,,	,, 20		E, W	15·66	44·73	30·93	31·26	2·0	0·21	0·0882
5	915 & 927 Gr. 80	Feb. 16	4 5	E, W	61 57 14·59	+ 0 17·04	31·63				
	,, ,, ,,	,, 17		W, E	14·58	16·94	31·52				
	,, ,, ,,	,, 18		W, E	14·58	16·33	30·91				
	,, ,, ,,	,, 20		W, E	14·56	16·93	31·49	31·47	2·0	0·42	0·3528
6	962 & 978 Gr. 80	Feb. 16	11 20	W, E	62 11 6·55	− 13 35·33	31·22				
	,, ,, ,,	,, 17		E, W	6·53	36·93	29·60				
	,, ,, ,,	,, 18		E, W	6·52	35·62	30·90				
	,, ,, ,,	,, 21		E, W	6·48	35·21	31·27				
	,, ,, ,,	,, 22		W, E	6·47	35·38	31·09				
	984 & 962 Gr. 80	,, 16	11 20	E, W	62 11 57·12	− 14 25·84	31·28				
	,, ,, ,,	,, 17		W, E	57·10	27·64	29·46				
	,, ,, ,,	,, 18		W, E	57·09	26·02	31·07				
	,, ,, ,,	,, 21		W, E	57·05	25·93	31·12				
	,, ,, ,,	,, 22		E, W	57·03	25·25	31·78	30·96	4·0	0·09	0·0324
7	1014 & 1059 Gr. 80	Feb. 16	9 1	W, E	61 48 7·44	+ 9 23·47	30·91				
	,, ,, ,,	,, 17		E, W	7·41	23·29	30·70				
	,, ,, ,,	,, 18		E, W	7·39	23·44	30·83				
	,, ,, ,,	,, 21		E, W	7·32	22·81	30·13				
	,, ,, ,,	,, 22		W, E	7·29	24·01	31·30	30·84	2·5	0·21	0·1103
8	1240 & 1271 Gr. 80	Feb. 19	0 3	W, E	61 58 2·37	− 0 32·53	29·84				
	,, ,, ,,	,, 20		E, W	2·32	31·07	31·25				
	1271 & 1287 Gr. 80	,, 19	0 10	E, W	61 50 27·42	+ 7 2·75	30·17				
	,, ,, ,,	,, 20		W, E	27·37	3·10	30·47	30·43	1·5	0·62	0·5766
9	1300 & 1323 Gr. 80	Feb. 19	3 16	W, E	62 5 37·76	− 8 6·65	31·11				
	,, ,, ,,	,, 20		E, W	37·71	5·84	31·87	31·49	1·0	0·44	0·1936

219. Sankrao—*Co-latitude* 61° 57′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
10	1328 & 1342 Gr. 80	Feb. 19	5 32	E, W	61 52 32·11	+ 4 59·26	31·37				
	" " "	" 20		W, E	32·06	58·85	30·91				
	1373 & 1328 Gr. 80	" 19	5 40	W, E	61 59 45·33	− 2 13·82	31·51				
	" " "	" 20		E, W	45·27	14·41	30·86	31·17	1·5	0·12	0·0216
11	1390 & 1397 Gr. 80	Feb. 19	2 5	W, E	62 7 8·02	− 9 36·48	31·54				
	" " "	" 20		E, W	7·96	36·28	31·68	31·61	1·0	0·56	0·3136
12	1405 & 1414 Gr. 80	Feb. 19	0 21	E, W	62 7 13·51	− 9 41·86	31·65				
	" " "	" 20		W, E	13·45	42·35	31·10	31·37	1·0	0·32	0·1024
13	1449 & 1454 Gr. 80	Feb. 19	18 6	W, E	61 54 33·16	+ 2 58·45	31·61				
	" " "	" 20		E, W	33·10	58·42	31·52	31·57	1·0	0·52	0·2704
14	1490 & 1511 Gr. 80	Feb. 19	3 4	E, W	62 6 3·82	− 8 32·93	30·89				
	" " "	" 20		W, E	3·75	32·21	31·54	31·21	1·0	0·16	0·0256
15	1536 & 1550 Gr. 80	Feb. 19	6 34	W, E	61 44 54·26	+ 12 37·22	31·48				
	" " "	" 20		E, W	54·19	36·12	30·31				
	1567 & 1536 Gr. 80	" 19	6 12	E, W	62 6 30·65	− 8 59·19	31·46				
	" " "	" 20		W, E	30·59	9 0·08	30·51	30·94	1·5	0·11	0·0182
16	1585 & 1599 Gr. 80	Feb. 17	2 40	W, E	62 13 37·83	− 16 6·71	31·12				
	" " "	" 18		E, W	37·76	5·62	32·14				
	" " "	" 21		W, E	37·55	5·74	31·81	31·80	1·5	0·75	0·8438
17	1613 & 1628 Gr. 80	Feb. 17	8 33	E, W	62 3 26·19	− 5 54·24	31·95				
	" " "	" 21		E, W	25·94	54·61	31·33				
	" " "	" 22		W, E	25·87	54·78	31·09	31·37	1·5	0·32	0·1536
18	1637 & 1668 Gr. 80	Feb. 17	4 24	W, E	61 59 34·27	− 2 3·42	30·85				
	" " "	" 18		E, W	34·20	4·24	29·96				
	" " "	" 21		W, E	34·00	3·45	30·55				
	" " "	" 22		E, W	33·94	3·02	30·92				
	1668 & 1662 Gr. 80	" 17	4 11	E, W	62 13 6·42	− 15 35·51	30·91				
	" " "	" 18		W, E	6·35	35·89	30·46				
	" " "	" 21		E, W	6·16	35·10	31·06				
	" " "	" 22		W, E	6·09	35·01	31·08	30·73	3·0	0·32	0·3072
19	1637 & 1666 Gr. 80	Feb. 17	4 15	W, E	61 50 19·91	+ 7 11·22	31·13				
	1666 & 1662 Gr. 80	" "	4 2	E, W	62 3 52·05	− 6 20·87	31·18	31·16	1·0	0·11	0·0121
20	1673 & 1686 Gr. 80	Feb. 17	7 48	E, W	61 51 49·59	+ 5 41·20	30·79				
	" " "	" 18		W, E	49·53	41·23	30·76				
	" " "	" 21		E, W	49·33	42·79	32·12				
	" " "	" 22		W, E	49·26	41·97	31·23	31·22	2·0	0·17	0·0578
21	1701 & 1724 Gr. 80	Feb. 17	4 36	W, E	61 42 9·18	+ 15 21·79	30·68				
	" " "	" 18		E, W	9·11	20·95	30·06				
	" " "	" 21		W, E	8·91	20·92	29·83				
	" " "	" 22		E, W	8·85	21·16	30·01				
	1724 & 1713 Gr. 80	" 17	4 24	E, W	61 54 4·11	+ 3 26·34	30·45				
	" " "	" 18		W, E	4·05	26·89	30·94				
	" " "	" 21		E, W	3·86	25·90	29·76				
	" " "	" 22		W, E	3·80	25·92	29·72	30·19	3·0	0·86	2·2188
22	1794 & 1799 Gr. 80	Feb. 17	4 14	W, E	62 8 20·96	− 10 49·81	31·15				
	" " "	" 18		E, W	20·91	50·50	30·41				
	" " "	" 21		W, E	20·75	49·44	31·31				
	" " "	" 22		E, W	20·70	48·94	31·76	31·16	2·0	0·11	0·0242

219. Sankrao—*Co-latitude* 61° 57′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
23	1810 & 1846 Gr. 80	Feb. 17	17 18	E, W	61 38 4·47	+ 19 26·31	30·78				
	" " "	" 18		W, E	4·42	26·14	30·56				
	" " "	" 21		E, W	4·28	26·59	30·87				
	" " "	" 22		W, E	4·23	27·54	31·77	30·99	2·0	0·06	0·0072
24	1867 & 1872 Gr. 80	Feb. 17	25 58	E, W	61 42 57·50	+ 14 33·10	30·60				
	" " "	" 18		E, W	57·48	33·26	30·74				
	" " "	" 21		W, E	57·42	34·15	31·57				
	" " "	" 22		W, E	57·40	33·88	31·28				
	1872 & 1892 Gr 80	" 17	25 54	W, E	39 1·75	18 29·04	30·79				
	" " "	" 18		W, E	1·73	29·00	30·73				
	" " "	" 21		E, W	1·66	29·74	31·40				
	" " "	" 22		E, W	1·64	29·55	31·19				
	1892 Gr. 80 & 764 Newc.	" 17	25 46	E, W	46 49·34	10 41·48	30·82				
	" " " "	" 18		E, W	49·31	41·41	30·72				
	" " " "	" 21		W, E	49·23	41·83	31·06				
	" " " "	" 22		W, E	49·20	41·25	30·45				
	764 Newc. & 1867 Gr. 80	" 17	25 50	W, E	50 45·08	6 45·52	30·60				
	" " " "	" 18		W, E	45·06	45·65	30·71				
	" " " "	" 21		E, W	44·98	45·99	30·97				
	" " " "	" 22		E, W	44·96	45·56	30·52	30·89	4·0	0·16	0·1024
25	1935 & 1940 Gr. 80	Feb. 19	1 6	E, W	62 16 2·41	− 18 30·61	31·80				
	" " "	" 20		W, E	2·38	30·40	31·98	31·89	1·0	0·84	0·7056
26	1970 & 2020 Gr. 80	Feb. 19	10 37	W, E	61 45 23·55	+ 12 7·48	31·03				
	" " "	" 20		E, W	23·52	7·54	31·06				
	2048 & 1970 Gr. 80	" 19	10 42	E, W	40 14·10	17 16·39	30·49				
	" " "	" 20		W, E	14·08	16·98	31·06	30·92	1·5	0·13	0·0254
27	2068 & 2109 Gr. 80	Feb. 19	21 46	E, W	62 14 37·75	− 17 6·61	31·14				
	" " "	" 20		W, E	37·76	6·44	31·32				
	2147 & 2063 Gr. 80	" 19	21 55	W, E	6 4·90	− 8 34·53	30·37				
	" " "	" 20		E, W	4·90	32·57	32·33	31·29	1·5	0·24	0·0864
									ΣP = 49·5		ΣPvv = 6·9815

Summary.

No. of pairs 27

No. of observations 121

Mean difference between observations taken E, W and those taken W, E = − 0″·08

Observed Co-latitude (weighted mean) 61° 57′ 31″·05 ± 0″·050

Correction for Height above Sea-level + 0·03

Final Co-latitude 61° 57′ 31″·08

		°	′	″	″
Astronomical Latitude (A)	=	28	2	28·92	± 0·050
Geodetic Latitude (G)	=	28	2	29·00	
Deflection of plumb-line (A−G)	=		−	0·08	

220. Sarey Khan—*Co-latitude* 67° 47′ +

Latitude	... 22° 13′	*Maximum recorded Height of Barometer*	=	in. 29·037
Longitude	... 80 5	*Minimum* ,, ,, ,,	=	28·911
Height	... 1409 feet	*Maximum* ,, *Reading of Thermometer*	=	69°·7
Instrument—Zenith Sector No. 2		*Minimum* ,, ,, ,,	=	50·3

Observer—Lieut. S. G. Burrard, R.E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Mean by North Star	Mean by South Star	v	v v
		1886			° ′ ″	° ′ ″	″	″	″		
1	138 Gr. 72	Dec. 30	S	W, E	7 27 6·66	75 14 15·95	9·29				
	,, ,,	,, 31	,,	E, W	7·45	16·00	8·55	...	8·92	0·56	0·3136
2	152 Gr. 72	Dec. 28	S	W, E	6 22 57·76	74 10 6·97	9·21				
	,, ,,	,, 30	,,	E, W	57·48	7·06	9·58				
	,, ,,	,, 31	,,	W, E	58·81	7·11	8·30	...	9·03	0·45	0·2025
3	165 Gr. 72	Dec. 28	S	E, W	13 37 36·78	81 24 46·08	9·30				
	,, ,,	,, 30	,,	W, E	36·34	46·21	9·87				
	,, ,,	,, 31	,,	E, W	35·89	46·27	10·38	...	9·85	0·37	0·1369
4	173 Gr. 72	Dec. 25	N	E, W	6 48 51·16	60 58 18·24	9·40				
	,, ,,	,, 27	,,	W, E	50·59	18·26	8·85				
	,, ,,	,, 28	S	W, E	48·93	18·27	7·20				
	,, ,,	,, 29	,,	E, W	49·77	18·28	8·05	8·38	...	0·72	0·5184
5	185 Gr. 72	Dec. 25	N	W, E	10 28 8·55	78 15 18·34	9·79				
	,, ,,	,, 27	,,	E, W	7·99	18·45	10·46				
	,, ,,	,, 28	S	E, W	8·97	18·50	9·53				
	,, ,,	,, 30	,,	W, E	8·66	18·61	9·95	...	9·93	0·45	0·2025
6	194 Gr. 72	Dec. 25	N	E, W	0 6 17·53	67 53 27·27	9·74				
	,, ,,	,, 27	,,	W, E	18·45	27·31	8·86				
	,, ,,	,, 31	S	W, E	18·51	27·40	8·89	...	9·16	0·32	0·1024
7	195 Gr. 72	Dec. 28	S	W, E	0 42 46·87	67 4 21·82	8·69				
	,, ,,	,, 29	,,	E, W	47·13	21·84	8·97	8·83	...	0·27	0·0729
8	203 Gr. 72	Dec. 28	S	E, W	7 27 55·39	75 15 4·62	9·23				
	,, ,,	,, 30	,,	E, W	54·78	4·71	9·93				
	,, ,,	,, 31	,,	W, E	55·89	4·75	8·86	...	9·34	0·14	0·0196
9	210 Gr. 72	Dec. 24	N	W, E	2 50 12·79	70 37 22·27	9·48				
	,, ,,	,, 25	,,	W, E	13·14	22·30	9·16				
	,, ,,	,, 27	,,	E, W	13·62	22·35	8·73				
	,, ,,	,, 31	S	E, W	13·24	22·46	9·22	...	9·15	0·33	0·1089
10	211 Gr. 72	Dec. 28	S	W, E	5 54 22·19	61 52 46·09	8·28				
	,, ,,	,, 29	,,	E, W	22·89	46·08	8·97				
	,, ,,	,, 30	,,	W, E	22·40	46·08	8·48	8·58	...	0·52	0·2704
11	223 Gr. 72	Dec. 24	N	E, W	6 56 63·39	60 50 8·35	11·74				
	,, ,,	,, 27	,,	W, E	59·88	8·32	8·20				
	,, ,,	,, 29	S	W, E	60·07	8·30	8·37	9·44	...	0·34	0·1156

Note.—The barometer was read every hour, the thermometer every fifteen minutes. For the calculation of refraction a separate value for the pressure and temperature was deduced for each star.

220. Sarey Khan—*Co-latitude* 67° 47′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Mean by North Star	Mean by South Star	v	v v
		1886			° ′ ″	° ′ ″	″	″	″		
12	225 Gr. 72	Dec. 28	S	E, W	5 0 40·56	72 47 51·29	10·73				
	,, ,,	,, 30	,,	W, E	41·53	51·36	9·83				
	,, ,,	,, 31	,,	W, E	41·29	51·39	10·10	...	10·22	0·74	0·5476
13	240 Gr 72	Dec. 24	N	W, E	0 44 34·38	68 31 42·55	8·17				
	,, ,,	,, 25	,,	W, E	33·95	42·56	8·61				
	,, ,,	,, 27	,,	E, W	33·63	42·59	8·96				
	,, ,,	,, 31	S	E, W	32·11	42·64	10·53	.	9·07	0·41	0·1681
14	249 Gr. 72	Dec. 28	S	E, W	5 0 39·96	62 46 29·67	9·63				
	,, ,,	,, 29	,,	W, E	39·39	29·66	9·05				
	,, ,,	,, 30	,,	E, W	40·46	29·65	10·11				
	,, ,,	,, 31	,,	W, E	39·68	29·64	9·32	9·53	.	0·43	0·1849
15	261 Gr. 72	Dec. 24	N	E, W	4 34 46·79	63 12 23·56	10·35				
	,, ,,	,, 27	,,	W, E	45·46	23·53	8·99				
	,, ,,	,, 30	S	E, W	46·87	23·50	10·37	9·90	...	0·80	0·6400
16	264 Gr. 72	Dec. 28	S	W, E	7 35 59·09	75 23 8·51	9·42				
	,, ,,	,, 29	,,	E, W	58·03	8·54	10·51				
	,, ,,	,, 31	,,	E, W	57·83	8·62	10·70	.	10·24	0·76	0·5776
17	274 Gr. 72	Dec. 25	N	W, E	1 19 38·19	69 6 47·45	9·26				
	,, ,,	,, 27	,,	E, W	37·91	47·47	9·56				
	,, ,,	,, 28	S	E, W	38·00	47·48	9·48				
	,, ,,	,, 29	,,	W, E	38·13	47·49	9·36	...	9·42	0·06	0·0036
18	292 Gr. 72	Dec. 24	N	E, W	2 54 59·81	70 42 9·14	9·32				
	,, ,,	,, 27	,,	W, E	60·37	9·18	8·81				
	,, ,,	,, 28	S	W, E	61·00	9·20	8·20				
	,, ,,	,, 29	,,	E, W	60·67	9·21	8·54	.	8·72	0·76	0·5776
19	297 Gr. 72	Dec. 30	S	W, E	1 35 24·73	69 22 34·25	9·52				
	,, ,,	,, 31	,,	E, W	25·28	34·26	8·98	...	9·25	0·23	0·0529
20	309 Gr. 72	Dec. 23	N	E, W	1 28 34·21	69 15 44·42	10·21				
	,, ,,	,, 24	,,	W, E	34·27	44·43	10·16				
	,, ,,	,, 25	,,	E, W	33·92	44·43	10·51				
	,, ,,	,, 27	,,	W, E	33·62	44·45	10·83	..	10·43	0·95	0·9025
21	313 Gr. 72	Dec. 28	S	E, W	2 6 28·92	65 40 40·85	9·77				
	,, ,,	,, 29	,,	W, E	28·40	40·84	9·24				
	,, ,,	,, 30	,,	E, W	29·85	40·83	10·68				
	,, ,,	,, 31	,,	W, E	27·59	40·81	8·40	9·52	...	0·42	0·1764
22	321 Gr. 72	Dec. 23	N	W, E	0 11 53·81	67 35 15·09	8·90				
	,, ,,	,, 25	,,	W, E	54·67	15·09	9·76	9·33	...	0·23	0·0529
23	325 Gr. 72	Dec. 28	S	W, E	9 40 4·51	77 27 11·60	7·09				
	,, ,,	,, 29	,,	E, W	1·51	11·65	10·14				
	,, ,,	,, 30	,,	W, E	1·62	11·69	10·07				
	,, ,,	,, 31	,,	E, W	1·51	11·73	10·22	...	9·38	0·10	0·0100
24	329 Gr. 72	Dec. 23	N	E, W	2 52 10·68	65 55 0·63	11·31				
	,, ,,	,, 24	,,	W, E	7·08	0·62	7·70				
	,, ,,	,, 25	,,	E, W	10·12	0·61	10·73				
	,, ,,	,, 27	,,	W, E	9·32	0·58	9·90	9·91	...	0·81	0·6561

220. Sarey Khan—*Co-latitude* 67° 47′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1886			° ′ ″	° ′ ″	″	″	″		
25	335 Gr. 72	Dec. 23	N	W, E	2 44 51·58	65 2 17·19	8·77				
	„ „	„ 24	„	E, W	52·07	17·17	9·24				
	„ „	„ 25	„	W, E	51·99	17·15	9·14				
	„ „	„ 27	„	E, W	52·51	17·11	9·62	9·19	...	0·09	0·0081
26	340 Gr. 72	Dec. 28	S	E, W	9 42 51·34	58 4 16·24	7·58				
	„ „	„ 29	„	W, E	51·86	16·19	8·05				
	„ „	„ 30	„	E, W	52·81	16·14	8·95				
	„ „	„ 31	„	W, E	52·06	16·09	8·15	8·18	...	0·92	0·8464
27	349 Gr. 72	Dec. 23	N	E, W	1 32 21·01	66 14 47·18	8·19				
	„ „	„ 24	„	W, E	20·75	47·17	7·92				
	„ „	„ 25	„	E, W	22·04	47·16	9·20				
	„ „	„ 27	„	W, E	21·52	47·13	8·65	8·49	...	0·61	0·3721
28	351 Gr. 72	Dec. 28	S	W, E	1 29 29·29	66 17 39·67	8·96				
	„ „	„ 29	„	E, W	30·49	39·66	10·15				
	„ „	„ 30	„	W, E	29·40	39·64	9·04				
	„ „	„ 31	„	E, W	30·25	39·63	9·88	9·51	...	0·41	0·1681
29	355 Gr. 72	Dec. 23	N	W, E	9 19 55·46	58 27 14·09	9·55				
	„ „	„ 24	„	E, W	55·10	14·03	9·13				
	„ „	„ 27	„	E, W	55·58	13·87	9·45				
	„ „	„ 31	S	W, E	55·51	13·66	9·17	9·32	...	0·22	0·0484
30	367 Gr. 72	Dec. 28	S	E, W	10 2 45·80	77 49 54·99	9·19				
	„ „	„ 30	„	W, E	44·04	55·08	11·04				
	„ „	„ 31	„	E, W	45·57	55·13	9·56	...	9·93	0·45	0·2025
31	373 Gr. 72	Dec. 23	N	E, W	0 26 35·70	68 13 46·05	10·35				
	„ „	„ 24	„	W, E	37·30	46·05	8·75				
	„ „	„ 25	„	E, W	35·42	46·04	10·62				
	„ „	„ 27	„	W, E	36·07	46·03	9·96	...	9·92	0·44	0·1936
32	377 Gr. 72	Dec. 28	S	W, E	6 28 45·13	61 18 22·89	8·02				
	„ „	„ 30	„	E, W	46·15	22·80	8·95				
	„ „	„ 31	„	W, E	46·50	22·76	9·26	8·74	...	0·36	0·1296
33	381 Gr. 72	Dec. 23	N	W, E	3 58 10·04	63 48 58·43	8·47				
	„ „	„ 24	„	E, W	10·61	58·40	9·01				
	„ „	„ 25	„	W, E	11·42	58·37	9·79				
	„ „	„ 27	„	E, W	10·21	58·31	8·52	8·95	...	0·15	0·0225
34	392 Gr. 72	Dec. 28	S	E, W	1 54 58·45	69 42 7·37	8·92				
	„ „	„ 30	„	W, E	58·50	7·37	8·87				
	„ „	„ 31	„	E, W	58·19	7·37	9·18	...	8·99	0·49	0·2401
35	399 Gr. 72	Dec. 23	N	E, W	6 51 43·59	74 38 52·78	9·19				
	„ „	„ 24	„	W, E	43·51	52·81	9·30				
	„ „	„ 25	„	E, W	43·58	52·84	9·26				
	„ „	„ 27	„	W, E	44·40	52·90	8·50	...	9·06	0·42	0·1764
36	406 Gr. 72	Dec. 28	S	W, E	1 49 25·28	65 57 43·58	8·86				
	„ „	„ 30	„	E, W	28·15	43·54	11·69				
	„ „	„ 31	„	W, E	25·71	43·53	9·24	9·93	...	0·83	0·6889
37	407 Gr. 72	Dec. 28	S	W, E	1 49 14·97	65 57 53·31	8·28				
	„ „	„ 30	„	E, W	17·35	53·27	10·62				
	„ „	„ 31	„	W, E	15·84	53·26	9·10	9·33	...	0·23	0·0529

220. Sarey Khan—*Co-latitude* 67° 47′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	$v v$
		1886			° ′ ″	′ ″	″	″	″		
38	419 Gr. 72	Dec. 23	N	W, E	3 17 14·26	71 4 22·88	8 62				
	" "	" 25	"	W, E	13 67	22·90	9 23				
	" "	" 27	"	E, W	13 65	22 91	9 26				
	" "	" 28	S	E, W	13 82	22·92	9 10				
	" "	" 30	"	W, E	13·25	22·94	9 69	.	9 18	0·30	0·0900
39	429 Gr. 72	Dec. 28	S	W, E	5 56 6·92	73 43 14 81	7 89				
	" "	" 30	"	E, W	4 58	14 86	10 28				
	" "	" 31	"	W, E	5·59	14 88	9 29	..	9 15	0 33	0·1089
40	440 Gr. 72	Dec. 28	S	E, W	6 10 45 87	61 36 23·39	9·26				
	" "	" 30	"	W, E	45·18	23 31	8·49				
	" "	" 31	"	E, W	45·49	23 26	8·75	8·83		0 27	0 0729
41	441 Gr. 72	Dec. 23	N	E, W	0 31 22·30	67 15 45 69	7 99				
	" "	" 24	"	W, E	22 93	45 68	8 61				
	" "	" 27	"	W, E	23·62	45·04	9·26	8 62	.	0·48	0·2304
42	449 Gr. 72	Dec. 23	N	W, E	3 34 10·36	71 21 20·18	9 82				
	" "	" 24	"	E, W	9·76	20·19	10·43				
	" "	" 25	"	W, E	11·98	20 20	8 23				
	" "	" 27	"	E, W	9·87	20·22	10·35	. .	9 70	0 22	0·0484
43	450 Gr. 72	Dec. 28	S	W, E	14 17 43·79	53 29 24·63	8 42				
	" "	" 30	"	E, W	44·12	24·45	8 57				
	" "	" 31	"	W, E	44 31	24·36	8 67	8·55	...	0 55	0·3025
44	459 Gr. 72	Dec. 28	S	E, W	5 14 27·22	73 1 36·48	9·26				
	" "	" 31	"	W, E	26·25	36 54	10 29	.	9 77	0 29	0·0841
45	460 Gr. 72	Dec. 23	N	E, W	2 39 31·42	65 7 37·58	9 00				
	" "	" 24	"	W, E	32·08	37 55	9 63				
	" "	" 25	"	E, W	31·56	37 53	9 09				
	" "	" 27	"	W, E	32·39	37 48	9 87	9·40	. .	0·30	0·0900
46	468 Gr. 72	Dec 28	S	W, E	0 47 19·12	68 34 28·68	9·56				
	" "	" 30	"	E, W	19·31	28 67	9·36	.	9·46	0·02	0·0004
47	472 Gr. 72	Dec. 23	N	W, E	3 43 25 88	71 30 34·72	8·84				
	" "	" 24	"	E, W	24·21	34 73	10·51				
	" "	" 25	"	W, E	24·75	34 74	9 99				
	" "	" 27	"	E, W	25·84	34·77	8 03	...	9·57	0·09	0·0081
48	498 Gr. 72	Dec. 23	N	E, W	5 37 31·93	62 9 38·04	9·97				
	" "	" 24	"	W, E	31·14	38 00	9·14				
	" "	" 25	"	E, W	31·37	37 96	9 33				
	" "	" 27	"	W, E	31·76	37 87	9·63	9·52	...	0·42	0·1764
49	506 Gr. 72	Dec. 27	N	E, W	6 17 41·20	61 29 28·02	9·22				
	" "	" 28	S	W, E	41 20	27·97	9·17				
	" "	" 30	"	E, W	41·43	27 89	9 32				
	" "	" 31	"	W, E	42·65	27·84	10·49	0·55	..	0·45	0·2025
50	519 Gr. 72	Dec. 28	S	E, W	3 42 26·36	71 29 35·23	8·87				
	" "	" 30	"	W, E	26·54	35 26	8·72				
	" "	" 31	"	E, W	24·69	35·28	10 59	...	9·39	0·09	0·0081

220. Sarey Khan—*Co-latitude* 67° 47′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	vv
		1886			° ′ ″	° ′ ″	″	″	″		
51	530 Gr. 72	Dec. 23	N	W, E	1 8 38·78	68 55 47·36	8·58				
	" "	" 24	"	W, E	38·36	47·36	9·00				
	" "	" 25	"	E, W	36·86	47·36	10·50				
	" "	" 27	"	W, E	36·11	47·36	11·25	...	9·83	0·35	0·1225
52	534 Gr. 72	Dec. 28	S	W, E	3 36 57·34	64 10 9·84	7·18				
	" "	" 30	"	E, W	59·01	9·78	8·79				
	" "	" 31	"	W, E	58·52	9·76	8·28	8·08	...	1·02	1·0404
								$\Sigma\, vv$ by N. Stars =			7·1397
								$\Sigma\, vv$ by S. Stars =			5·2094

Summary.

No. of North Stars 25 No. of South Stars 27

No. of observations 183

	°	′	″		″
Co-latitude by North Stars	67	47	9·104	±	0·073
" " South "	67	47	9·484	±	0·058
Mean Co-latitude	67	47	9·294	±	0·047
Correction for Height above Sea-level		+	0·05		

Final Co-latitude 67° 47′ 9″·344

		°	′	″		″
Astronomical Latitude (A)	=	22	12	50·656	±	0·047
Geodetic Latitude (G)	=	22	12	55·61		
Deflection of plumb-line (A − G)	=		−	4·95		

221. Sarkara—*Co-latitude* 60° 44′ +

Latitude ... 29° 16′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 78 35 *Mean Height of Barometer* 29·22 in.

Height ... 761 feet *Mean Temperature* 55°·9

Observer—Capt. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1899	° ′		° ′ ″	′ ″	″	″			
1	44 & 46 Gr. 80	Dec. 3	13 47	E, W	60 31 46·91	+ 12 37·70	24·61				
	" " "	" 4		W, E	46·89	37·39	24 28	24·45	1·0	0·43	0·1849
2	121 & 136 Gr. 80	Dec. 3	10 57	W, E	60 24 20·27	+ 20 4·37	24 64				
	" " "	" 4		E, W	20·24	3·64	23·88	24·26	1·0	0 62	0·3844
3	139 & 160 Gr. 80	Dec. 2	2 19	E, W	61 1 43·19	− 17 17·97	25·22				
	181 & 139 Gr. 80	" 2	2 25	W, E	60 55 22·73	10 57·05	25·68	25 45	1·5	0·57	0·4874
4	210 & 242 Gr. 80	Dec. 1	15 26	E, W	60 25 7·87	+ 19 17·28	25·15				
	" " "	" 2		W, E	7·82	17·94	25 76				
	242 & 222 Gr. 80	" 1	15 23	W, E	60 28 33 30	15 52·10	25·40				
	" " "	" 2		E, W	33·25	50·99	24 24	25·14	1·5	0·26	0·1014
5	275 & 319 Gr. 80	Dec. 1	12 42	W, E	60 50 34·08	− 6 7·22	26·86				
	" " "	" 2		E, W	34·02	9·17	24 85	25·86	1·0	0·98	0·9604
6	382 & 390 Gr. 80	Dec. 1	5 2	W, E	60 45 55·35	− 1 29·66	25·69				
	" " "	" 2		E, W	55·28	31·04	24·24	24·97	1·0	0·09	0·0081
7	404 & 412 Gr. 80	Dec. 1	19 34	E, W	60 44 55·19	− 0 30·38	24·81				
	" " "	" 2		W, E	55·13	29·30	25·83	25·32	1·0	0·44	0·1936
8	417 & 464 Gr. 80	Dec. 1	11 22	W, E	60 46 43·29	− 2 19·21	24·08				
	" " "	" 2		E, W	43·23	18·94	24·29				
	464 & 431 Gr. 80	" 1	11 20	E, W	60 44 56·50	0 32·46	24·04				
	" " "	" 2		W, E	56·43	33·01	23·42	23·96	1·5	0·92	1·2696
9	472 & 475 Gr. 80	Dec. 1	9 57	E, W	60 42 26·93	+ 1 56·13	23·06				
	" " "	" 2		W, E	26·87	59·23	26·10	24·58	1·0	0·30	0·0900
10	513 & 523 Gr. 80	Dec. 1	20 25	E, W	60 54 24·44	− 10 0·02	24·42				
	" " "	" 4		W, E	24·24	9 59·32	24·92	24·67	1·0	0·21	0·0441
11	528 & 546 Gr. 80	Dec. 3	20 4	W, E	60 53 56·65	− 9 30·55	26·10				
	" " "	" 4		E, W	56·58	31·45	25·13	25·62	1·0	0·74	0·5476
12	563 & 589 Gr. 80	Dec. 3	18 19	E, W	60 50 47·67	− 6 23·79	23·88				
	" " "	" 4		W, E	47·61	21·96	25·65	24·77	1·0	0·11	0·0121
13	603 & 637 Gr. 80	Dec. 3	2 8	W, E	60 32 23·96	+ 12 1·02	24·98				
	" " "	" 4		E, W	23·90	1·51	25·41	25·20	1·0	0·32	0·1024

221. Sarkara—*Co-latitude* 60° 44′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
14	713 & 720 Gr. 80	Dec. 3	13 32	E, W	60 43 8·18	+ 1 17·26	25·44				
	„ „ „	„ 4		W, E	8·13	17·77	25·90				
	720 & 734 Gr. 80	„ 3	13 15	W, E	60 26 5·66	18 19·59	25·25				
	„ „ „	„ 4		E, W	5·61	19·85	25·46	25·52	1·5	0·64	0·6144
15	785 & 810 Gr. 80	Dec. 3	10 25	E, W	60 54 46·58	− 10 21·44	25·14				
	„ „ „	„ 4		W, E	46·53	23·01	23·52				
	810 & 833 Gr. 80	„ 3	10 30	W, E	60 59 32·70	15 7·74	24·96				
	„ „ „	„ 4		E, W	32·66	8·78	23·88				
	833 & 872 Gr. 80	„ 3	10 45	E, W	60 44 20·62	+ 0 3·83	24·45				
	„ „ „	„ 4		W, E	20·59	4·89	25·48				
	872 & 785 Gr. 80	„ 3	10 41	W, E	60 39 34·50	4 50·14	24·64				
	„ „ „	„ 4		E, W	34·46	50·67	25·13	24·65	2·0	0·23	0·1058
16	888 & 902 Gr. 80	Dec. 3	7 44	W, E	60 25 41·58	+ 18 42·84	24·42				
	„ „ „	„ 4		E, W	41·55	43·77	25·32	24·87	1·0	0·01	0·0001
17	928 Gr. 80 & ο Aurigæ A.J. 99	Dec. 3	20 11	E, W	60 23 53·65	+ 20 30·48	24·13				
	„ „ „ „	„ 4		W, E	53·62	31·63	25·25	24·69	1·0	0·19	0·0361
18	978 & 999 Gr. 80	Dec. 3	9 43	W, E	60 33 42·46	+ 10 42·97	25·43				
	„ „ „	„ 4		E, W	42·44	43·31	25·75				
	999 & 984 Gr. 80	„ 3	9 42	E, W	60 34 33·03	9 51·64	24·67				
	„ „ „	„ 4		W, E	33·01	52·29	25·30				
	984 & 1022 Gr. 80	„ 3	9 43	W, E	60 35 41·50	8 42·82	24·32				
	„ „ „	„ 4		E, W	41·48	41·62	23·10				
	1022 & 978 Gr. 80	„ 3	9 44	E, W	60 34 50·93	9 34·13	25·06				
	„ „ „	„ 4		W, E	50·91	32·65	23·56	24·65	2·0	0·23	0·1058
19	1062 & 1101 Gr. 80	Dec. 2	17 14	E, W	60 28 34·94	+ 15 49·60	24·54				
	„ „ „	„ 4		W, E	34·93	50·59	25·52	25·03	1·0	0·15	0·0225
20	1150 & 1167 Gr. 80	Dec. 1	19 28	W, E	60 33 34·62	+ 10 50·24	24·86				
	„ „ „	„ 2		E, W	34·63	48·68	23·31	24·08	1·0	0·80	0·6400
21	1192 & 1206 Gr. 80	Dec. 1	8 44	W, E	60 32 53·74	+ 11 31·16	24·90				
	„ „ „	„ 2		E, W	53·76	29·66	23·42	24·16	1·0	0·72	0·5184
22	1221 & 1240 Gr. 80	Dec. 1	1 11	E, W	60 45 41·24	− 1 16·32	24·92				
	„ „ „	„ 2		W, E	41·26	17·11	24·15				
	1271 & 1221 Gr. 80	„ 1	1 13	W, E	60 47 55·41	3 30·95	24·46				
	„ „ „	„ 2		E, W	55·44	31·34	24·10	24·41	1·5	0·47	0·3314
23	1284 & 1303 Gr. 80	Dec. 1	2 26	W, E	60 27 4·63	+ 17 20·04	24·67				
	„ „ „	„ 2		E, W	4·68	20·44	25·12				
	1303 & 1299 Gr. 80	„ 1	2 30	E, W	60 23 20·83	21 4·47	25·30				
	„ „ „	„ 2		W, E	20·88	3·53	24·41	24·88	1·5	0·00	0·0000
24	1323 & 1328 Gr. 80	Dec. 1	4 31	E, W	60 51 9·54	− 6 44·43	25·11				
	„ „ „	„ 2		W, E	9·60	45·17	24·43	24·77	1·0	0·11	0·0121
25	1371 & 1397 Gr. 80	Dec. 1	0 56	W, E	60 59 12·67	− 14 47·41	25·26				
	„ „ „	„ 2		E, W	12·74	47·61	25·12	25·19	1·0	0·31	0·0961
26	3798 & 3846 Gr. 80	Dec. 3	9 9	W, E	60 36 50·75	+ 7 35·21	25·96				
	„ „ „	„ 4		E, W	50·78	34·00	24·78	25·37	1·0	0·49	0·2401

221. Sarkara—*Co-latitude* 60° 44′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
27	3867 & 3922 Gr 80	Dec. 3	1 52	E, W	60 35 34·41	+ 8 50·90	25 31				
	" " "	" 4		W, E	34 43	50·64	25·07				
	3922 & 3902 Gr. 80	" 3	1 47	W, E	60 30 42·10	13 44·10	26·20				
	" " "	" 4		E, W	42·12	42·67	24 79	25 35	1·5	0 47	0·3314
28	3945 & 3971 Gr. 80	Dec. 3	16 52	W, E	60 55 58·27	− 11 32·76	25·51				
	" " "	" 4		E, W	58·27	32·84	25·43				
	3991 & 3945 Gr 80	" 3	16 50	E, W	60 57 30·76	13 5·60	25 16				
	" " "	" 4		W, E	30·76	6·06	24 70	25·20	1·5	0 32	0·1530
29	4059 & 15 Gr. 80	Dec. 3	16 21	W, E	60 49 4·47	− 4 39·25	25·22				
	" " "	" 4		E, W	4·46	40·74	23·72	24·47	1·0	0 41	0·1681
								ΣP = 35·0		ΣPvv = 7 7619	

Summary.

No. of pairs 29
No. of observations 84

Mean difference between observations taken E, W and those taken W, E = − 0″·44

Observed Co-latitude (weighted mean) 60° 44′ 24″·88 ± 0″·060

Correction for Height above Sea-level + 0″·03

Final Co-latitude 60° 44′ 24″·91

		°	′	″	″
Astronomical Latitude (A)	=	29	15	35·09	± 0·060
Geodetic Latitude (G)	=	29	15	46·91	
Deflection of plumb-line (A−G)	=		−	11·82	

222. Saugor—*Co-latitude* 66° 10′ +

Latitude ... 23° 50′ *Instrument*—Zenith Telescope

Longitude ... 78 49 *Mean Height of Barometer* 27·99 in.

Height ... 2033 feet *Mean Temperature* 64°·2

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
1	178 & 185 Newcomb	Feb. 5	2 58	E, W	66 5 35·35	+ 4 35·79	11·14				
	„ „ „	„ 7		W, E	35·47	35·93	11·40				
	„ „ „	„ 8		W, E	35·54	35·28	10·82				
	„ „ „	„ 9		E, W	35·60	35·51	11·11				
	„ „ „	„ 10		W, E	35·66	35·83	11·49	11·19	1·4	0·02	0·0006
2	196 & 201 Newcomb	Feb. 5	25 25	W, E	66 9 29·25	+ 0 42·39	11·64				
	„ „ „	„ 6		E, W	29·29	42·22	11·51				
	„ „ „	„ 7		W, E	29·34	42·07	11·41				
	„ „ „	„ 8		E, W	29·38	41·87	11·25				
	„ „ „	„ 9		W, E	29·43	42·27	11·70				
	„ „ „	„ 10		E, W	29·48	41·68	11·16	11·45	1·0	0·24	0·0576
3	201 & 211 Newcomb	Feb. 5	25 33	E, W	66 1 17·28	+ 8 53·85	11·13				
	„ „ „	„ 6		W, E	17·32	53·36	10·68				
	„ „ „	„ 7		E, W	17·36	53·45	10·81				
	„ „ „	„ 8		W, E	17·39	53·43	10·82				
	„ „ „	„ 9		E, W	17·43	53·27	10·70				
	„ „ „	„ 10		W, E	17·48	53·54	11·02	10·86	1·0	0·35	0·1225
4	217 & 224 Newcomb	Feb. 5	23 47	W, E	66 7 23·27	+ 2 48·22	11·49				
	„ „ „	„ 6		E, W	23·32	48·31	11·63				
	„ „ „	„ 7		W, E	23·36	47·44	10·80				
	„ „ „	„ 8		E, W	23·39	48·27	11·66				
	„ „ „	„ 9		W, E	23·43	48·28	11·71				
	„ „ „	„ 10		E, W	23·47	47·82	11·29	11·43	1·0	0·22	0·0484
5	224 & 230 Newcomb	Feb. 5	23 42	E, W	66 12 52·93	− 2 41·33	11·60				
	„ „ „	„ 6		W, E	52·96	41·36	11·60				
	„ „ „	„ 7		E, W	53·00	41·53	11·47				
	„ „ „	„ 8		W, E	53·02	41·46	11·56				
	„ „ „	„ 9		E, W	53·06	41·39	11·67				
	„ „ „	„ 10		W, E	53·09	41·57	11·52	11·57	1·0	0·36	0·1296
6	250 & 252 Newcomb	Feb. 5	11 39	W, E	66 8 10·75	+ 2 0·83	11·58				
	„ „ „	„ 6		E, W	10·78	0·76	11·54				
	„ „ „	„ 7		W, E	10·82	0·79	11·61				
	„ „ „	„ 8		E, W	10·83	1 59·97	10·80				
	„ „ „	„ 9		W, E	10·87	2 0·62	11·49				
	„ „ „	„ 10		E, W	10·90	1 59·45	10·35	11·23	1·5	0·02	0·0006
7	256 & 263 Newcomb	Feb. 5	2 13	E, W	65 58 41·54	+ 11 29·30	10·84				
	„ „ „	„ 7		W, E	41·61	29·09	10·70				
	„ „ „	„ 8		W, E	41·62	30·14	11·76				
	„ „ „	„ 9		E, W	41·66	30·11	11·77				
	„ „ „	„ 10		W, E	41·69	30·29	11·98	11·40	1·4	0·19	0·0505
8	258 & 262 Newcomb	Feb. 6	4 42	E, W	65 57 17·11	+ 12 54·20	11·31				
	„ „ „	„ 11		W, E	17·23	54·00	11·23	11·27	1·0	0·06	0·0036

222. Saugor—*Co-latitude* 66° 10′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
9	303 & 319 Newcomb	Feb. 5	17 9	E, W	66 3 13·01	+ 6 57·35	10·36				
	" " "	" 6		W, E	13·02	58·06	11·08				
	" " "	" 7		W, E	13·02	58·13	11·15				
	" " "	" 8		E, W	13·02	57·97	10·99				
	" " "	" 9		E, W	13·02	58·10	11·12				
	" " "	" 10		W, E	13·02	58·18	11·20	10·98	1·0	0·23	0·0529
10	329 & 341 Newcomb	Feb. 4	22 5	W, E	66 10 23·24	− 0 11·85	11·39				
	" " "	" 5		E, W	23·24	12·50	10·74				
	" " "	" 6		W, E	23·23	12·12	11·11				
	" " "	" 7		E, W	23·23	11·75	11·48				
	" " "	" 8		W, E	23·22	12·49	10·73				
	" " "	" 9		E, W	23·22	11·83	11·39	11·14	1·5	0·07	0·0074
11	415 & 432 Newcomb	Feb. 4	19 31	E, W	65 50 40·05	+ 19 31·36	11·41				
	" " "	" 5		W, E	40·02	31·35	11·37				
	" " "	" 6		E, W	39·99	30·66	10·65				
	" " "	" 7		W, E	39·96	30·94	10·90				
	" " "	" 8		W, E	39·93	31·75	11·68				
	" " "	" 9		E, W	39·90	31·42	11·32	11·23	1·0	0·02	0·0004
12	440 & 445 Newcomb	Feb. 4	10 24	W, E	66 18 47·08	− 8 35·85	11·23				
	" " "	" 5		E, W	47·05	35·90	11·15				
	" " "	" 6		W, E	47·02	36·06	10·96				
	" " "	" 7		E, W	46·99	35·72	11·27				
	" " "	" 8		E, W	46·96	36·09	10·87				
	" " "	" 9		W, E	46·93	36·21	10·72	11·04	1·5	0·17	0·0434
13	483 & 489 Newcomb	Feb. 4	11 18	E, W	66 29 46·73	− 19 34·67	12·06				
	" " "	" 6		W, E	46·66	34·72	11·94				
	" " "	" 7		W, E	46·63	35·75	10·88				
	" " "	" 8		E, W	46·61	34·68	11·93				
	" " "	" 9		W, E	46·57	34·37	12·20				
	" " "	" 10		E, W	46·54	34·62	11·92	11·82	1·5	0·61	0·5582
14	515 & 521 Newcomb	Feb. 4	1 54	E, W	66 14 33·78	− 4 22·60	11·18				
	" " "	" 5		W, E	33·75	22·05	11·70				
	" " "	" 6		E, W	33·72	22·03	11·69				
	" " "	" 8		W, E	33·64	22·76	10·88				
	" " "	" 9		W, E	33·61	22·58	11·03				
	" " "	" 10		E, W	33·57	22·68	10·89	11·23	1·5	0·01	0·0006
15	529 & 543 Newcomb	Feb. 4	14 26	E, W	66 5 12·73	+ 4 58·58	11·31				
	" " "	" 5		W, E	12·69	58·06	10·75				
	" " "	" 6		E, W	12·66	58·78	11·44				
	" " "	" 7		W, E	12·62	58·62	11·24				
	" " "	" 8		E, W	12·60	58·72	11·32				
	" " "	" 9		W, E	12·56	58·28	10·84	11·15	1·5	0·06	0·0054
16	556 & 558 Newcomb	Feb. 4	5 18	W, E	66 11 27·87	− 1 16·47	11·40				
	" " "	" 5		E, W	27·84	17·26	10·58				
	" " "	" 6		W, E	27·80	16·55	11·25				
	" " "	" 7		E, W	27·77	16·67	11·10				
	" " "	" 8		W, E	27·75	16·97	10·78				
	" " "	" 10		E, W	27·67	15·90	11·77	11·15	1·0	0·06	0·0036
17	556 & 565 Newcomb	Feb. 4	5 6	W, E	66 23 51·97	− 13 41·01	10·96				
	" " "	" 5		E, W	51·94	41·50	10·44				
	" " "	" 6		W, E	51·91	40·89	11·02				
	" " "	" 7		E, W	51·88	40·39	11·49				
	" " "	" 8		W, E	51·86	41·00	10·86				
	" " "	" 10		E, W	51·78	40·78	11·00	10·97	1·0	0·24	0·0576

222. Saugor—*Co-latitude* 66° 10′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1903	° ′		° ′ ″	′ ″	″	″			
18	577 & 584 Newcomb	Feb. 4	1 12	W, E	66 22 3·74	− 11 52·92	10·82				
	" " "	" 5		E, W	3·71	53·66	10·05				
	" " "	" 6		W, E	3·68	52·93	10·75				
	" " "	" 7		E, W	3·65	52·41	11·24				
	" " "	" 8		W, E	3·62	52·54	11·08				
	" " "	" 9		E, W	3·59	53·29	10·30	10·71	1·5	0·50	0·3750
								Σ P = 22·3		Σ Pvv = 1·5179	

Summary.

No. of pairs 18

No. of observations 102

Mean difference between observations taken E, W and those taken W, E = − 0″·05

Observed Co-latitude (weighted mean) 66° 10′ 11″·21 ± 0″·043

Correction for Height above Sea-level + 0″·08

Final Co-latitude 66° 10′ 11″·29

		°	′	″	
Astronomical Latitude (A)	=	23	49	48·71	± 0·043
Geodetic Latitude (G)	=	23	49	48·07	
Deflection of plumb-line (A − G)	=		+	0·64	

223. Senchal—*Co-latitude* 63° 1′ +

Latitude	... 26° 59′	*Instrument*—Zenith Telescope	
Longitude	... 88 20	*Mean Height of Barometer*	in. 22 02
Height	... 8600 feet	*Mean Temperature*	40° 8

Observer—Lieut. H. M. Cowie, R.E.

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	492 & 506 Newcomb	Feb. 19	21 11	W, E	63 21 20·44	− 19 54·50	25·94				
	" " "	" 20		E, W	20·39	53·56	26·83	26 39	1·0	0·24	0 0576
2	515 & 517 Newcomb	Feb. 19	1 13	E, W	63 8 16·83	− 6 49·69	27·14				
	" " "	" 20		W, E	16·78	51·61	25·17	26·16	1·0	0·47	0·2209
3	529 & 533 Newcomb	Feb. 19	17 1	W, E	63 30 29·63	− 29 2 84	26·79				
	" " "	" 20		E, W	29·58	3 63	25 95	26·37	1·0	0·26	0·0676
4	538 & 543 Newcomb	Feb. 19	11 55	E, W	63 33 34·64	− 32 7·98	26·66				
	" " "	" 20		W, E	34·59	8·71	25 88	26·27	1 0	0·36	0·1296
5	547 & 569 Newcomb	Feb. 19	21 12	E, W	62 46 3·60	+ 15 22·87	26·47				
	" " "	" 20		W, E	3·55	23·90	27·45	26·96	0·7	0 33	0·0762
6	567 & 369 Newcomb	Feb. 19	21 3	E, W	62 37 52·25	+ 23 34·55	26·80				
	" " "	" 20		W, E	52·19	35·40	27 59	27·20	0·7	0·57	0·2274
7	573 & 583 Newcomb	Feb. 20	15 34	W, E	63 23 13·42	− 21 47·30	26·12	26 12	0 7	0 51	0·1821
8	598 & 626 Newcomb	Feb. 19	32 6	W, E	62 36 5·97	+ 25 21 61	27·58				
	" " "	" 20		E, W	5·93	21·15	27 08	27·33	0 7	0·70	0·3430
9	610 & 626 Newcomb	Feb. 19	32 30	W, E	62 59 34·42	+ 1 52 91	27 33	27·33	0·4	0·70	0·1960
10	634 & 642 Newcomb	Feb. 19	14 33	W, E	63 1 12·30	+ 0 13·88	26 18				
	" " "	" 20		E, W	12 25	14 77	27·02	26 60	0·7	0 03	0·0006
11	642 & 657 Newcomb	Feb. 19	14 47	E, W	62 47 6·80	+ 14 20·24	27·04				
	" " "	" 20		W, E	6·75	20·31	27·06	27 05	0 7	0·42	0·1235
								Σ P =	8 6	Σ Pvv =	1·6245

Summary.

No. of pairs 11
No. of observations 20

Mean difference between observations taken E, W and those taken W, E = + 0″·14

Observed Co-latitude (weighted mean) 63° 1′ 26″·63 ± 0″·092

Correction for Height above Sea-level + 0″·36

Final Co-latitude 63° 1′ 26″·99

		°	′	″	″
Astronomical Latitude (A)	=	26	58	33·01	± 0·092
Geodetic Latitude (G)	=	26	59	8·25	
Deflection of plumb-line (A − G)	=		−	35·24	

224. Siliguri—*Co-latitude* 63° 18′ +

Latitude	... 26° 42′	*Instrument*—Zenith Telescope	
Longitude	... 88 27	*Mean Height of Barometer*	in. 29·51
Height	... 401 feet	*Mean Temperature*	61°·4

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	134 & 143 Newcomb	Jan. 26	7 33	E, W	63 0 44·50	+ 17 57·99	42·49				
	” ” ”	” 27		E, W	44·54	57·74	42·28	42·39	1·0	0·51	0·2601
2	160 & 170 Newcomb	Jan. 27	21 50	W, E	63 0 31·25	+ 18 11·34	42·59				
	” ” ”	” 30		E, W	31·40	10·26	41·66	42·13	1·0	0·25	0·0625
3	189 & 196 Newcomb	Jan. 26	22 46	W, E	63 31 36·88	− 12 54·04	42·84				
	” ” ”	” 27		W, E	36·91	54·56	42·35				
	” ” ”	” 29		E, W	36·97	55·23	41·74				
	” ” ”	” 30		E, W	37·00	54·64	42·36	42·32	1·4	0·44	0·2710
4	208 & 211 Newcomb	Jan. 26	23 15	E, W	63 44 14·84	− 25 33·82	41·02				
	” ” ”	” 27		E, W	14·86	33·80	41·06				
	” ” ”	” 29		W, E	14·91	33·58	41·33				
	” ” ”	” 30		W, E	14·93	33·43	41·50	41·23	1·4	0·65	0·5915
5	218 & 234 Newcomb	Jan. 26	15 39	W, E	63 21 52·78	− 3 10·23	42·55				
	” ” ”	” 27		W, E	52·79	10·27	42·52				
	” ” ”	” 29		E, W	52·81	10·88	41·93	42·24	1·2	0·36	0·1555
6	244 & 256 Newcomb	Jan. 26	4 54	E, W	63 17 46·17	+ 0 55·98	42·15				
	” ” ”	” 27		E, W	46·18	55·86	42·04				
	” ” ”	” 29		W, E	46·20	55·18	41·38				
	” ” ”	” 30		W, E	46·21	55·89	42·10	41·92	1·4	0·04	0·0022
7	262 & 273 Newcomb	Jan. 27	7 30	W, E	63 9 35·06	+ 9 7·09	42·15				
	” ” ”	” 29		E, W	35·09	7·14	42·23				
	” ” ”	” 30		W, E	35·10	6·99	42·09	42·18	1·2	0·30	0·1080
8	289 & 298 Newcomb	Jan. 29	30 4	E, W	63 29 6·59	− 10 24·52	42·07				
	” ” ”	” 30		W, E	6·58	24·58	42·00	42·04	1·0	0·16	0·0256
9	348 & 362 Newcomb	Jan. 26	5 31	E, W	63 23 59·98	− 5 17·91	42·07				
	” ” ”	” 27		E, W	59·96	17·90	42·06				
	” ” ”	” 29		W, E	59·91	17·80	42·11				
	” ” ”	” 30		W, E	59·88	17·77	42·11	42·09	1·4	0·21	0·0617
10	364 & 377 Newcomb	Jan. 29	29 10	E, W	63 29 15·30	− 10 33·60	41·70				
	” ” ”	” 30		E, W	15·27	33·83	41·44	41·57	0·7	0·31	0·0673
11	366 & 377 Newcomb	Jan. 30	28 51	E, W	63 9 23·42	+ 9 19·35	42·77	42·77	0·4	0·89	0·3168
12	382 & 387 Newcomb	Jan. 27	18 47	E, W	63 50 18·10	− 31 36·80	41·30				
	” ” ”	” 29		W, E	18·05	36·66	41·39				
	” ” ”	” 30		E, W	18·02	37·75	40·27	41·09	1·2	0·79	0·7489

224. Siliguri—*Co-latitude* 63° 18′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
13	394 & 413 Newcomb " " "	Jan. 29 " 30	22 36	E, W W, E	63 15 2·73 2·71	+ 3 38·47 39·04	41·20 41·75	41·48	0·7	0·40	0·1120
14	413 & 415 Newcomb	Jan. 30	22 21	E, W	63 0 41·64	+ 18 0·20	41·84	41·84	0·4	0·04	0·0006
15	426 & 433 Newcomb	Jan. 30	13 15	W, E	63 45 46·54	− 27 5·76	40·78	40·78	0·4	1·10	0·4840
16	426 & 445 Newcomb	Jan. 30	13 6	W, E	63 36 44·86	− 18 4·35	40·51	40·51	0·4	1·37	0·7508
17	1227 & 1240 Gr. 80	Jan 30	1 53	E, W	63 49 21·34	− 30 39·25	42·09	42·09	0·7	0·21	0·0309
18	471 & 481 Newcomb " " "	Jan. 29 " 30	4 55	E, W W, E	62 55 54·05 54·00	+ 22 48·17 47·83	42·22 41·83	42·03	1·0	0·15	0·0225
									Σ P = 16·9	Σ Pvv = 4·0719	

Summary.

No. of pairs 18
No. of observations 42

Mean difference between observations taken E, W and those taken W, E = − 0″·06

Observed Co-latitude (weighted mean) 63° 18′ 41″·88 ± 0″·080

Correction for Height above Sea-level + 0″·02

Final Co-latitude 63° 18′ 41″·90

		°	′	″	″
Astronomical Latitude (A)	=	26	41	18·10	± 0·080
Geodetic Latitude (G)	=	26	41	40·37	
Deflection of plumb-line (A−G)	=		−	22·27	

225. Singawaram—*Co-latitude* 72° 14′ +

Latitude ... 17° 45′ *Instrument*—Zenith Telescope

Longitude ... 80 59 *Mean Height of Barometer* 29·39 in.

Height ... 714 feet *Mean Temperature* 78°·0

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	856 & 861 Gr. 80	Feb. 14	14 55	W, E	72 20 53·95	− 6 2·36	51·59	51·59	0·7	0·33	0·0762
2	892 & 916 Gr. 80 „ „ „	Feb. 14 „ 15	0 37	E, W W, E	72 5 52·99 52·99	+ 8 58·74 58·55	51·73 51·54	51·64	0·7	0·38	0·1011
3	916 & 943 Gr. 80 „ „ „	Feb. 14 „ 15	0 47	W, E E, W	72 15 11·58 11·58	− 0 19·80 20·09	51·78 51·49	51·64	0·7	0·38	0·1011
4	946 & 975 Gr. 80	Feb. 15	3 19	W, E	72 14 5·57	+ 0 46·45	52·02	52·02	0·5	0·76	0·2888
5	946 & 992 Gr. 80 „ „ „	Feb. 14 „ 15	3 28	E, W W, E	72 23 13·15 13·15	− 8 21·70 21·24	51·45 51·91	51·68	0·7	0·42	0·1235
6	994 & 1001 Gr. 80 „ „ „	Feb. 14 „ 15	10 6	W, E E, W	72 30 39·66 39·67	− 15 48·76 48·73	50·90 50·94	50·92	1·0	0·34	0·1156
7	1025 & 1037 Gr. 80 „ „ „	Feb. 14 „ 15	2 41	E, W W, E	72 32 14·55 14·55	− 17 22·42 22·90	52·13 51·65	51·89	1·0	0·63	0·3969
8	1057 & 1062 Gr. 80 „ „ „	Feb. 14 „ 15	5 7	W, E E, W	72 34 43·60 43·59	− 19 51·88 51·93	51·72 51·66	51·69	0·7	0·43	0·1294
9	1062 & 1082 Gr. 80 „ „ „	Feb. 14 „ 15	5 8	E, W W, E	72 33 48·90 48·89	− 18 57·25 57·35	51·65 51·54	51·60	0·7	0·34	0·0809
10	1099 & 1116 Gr. 80 „ „ „	Feb. 14 „ 15	12 49	W, E E, W	72 15 11·30 11·30	− 0 21·34 19·61	49·96 51·69	50·83	0·7	0·43	0·1294
11	1155 Gr. 80 „ „	Feb. 14 „ 15	0 0	E, W W, E	72 14 58·90 58·89	− 0 7·65 11·03	51·25 47·86	49·56	0·7	1·70	2·0230
12	1168 & 1181 Gr. 80 „ „ „	Feb. 14 „ 15	4 26	W, E E, W	72 33 2·35 2·34	− 18 10·06 10·58	52·29 51·76	52·03	0·7	0·77	0·4150
13	1181 & 1184 Gr. 80 „ „ „	Feb. 14 „ 15	4 17	E, W W, E	72 23 57·74 57·74	− 9 7·83 6·70	49·91 51·04	50·48	0·7	0·78	0·4259
14	1266 & 1272 Gr. 80 „ „ „	Feb. 14 „ 15	5 38	E, W W, E	72 29 9·18 9·17	− 14 18·65 17·36	50·53 51·81	51·17	1·0	0·09	0·0081
15	1282 & 1303 Gr. 80 „ „ „	Feb. 14 „ 15	9 19	W, E E, W	72 10 54·96 54·95	+ 3 56·48 56·36	51·44 51·31	51·38	1·0	0·12	0·0144

225. Singawaram—*Co-latitude* 72° 14′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
16	1311 Gr. 80 " "	Feb. 14 " 15	0 10	W, E E, W	72 4 59.03 59.02	+ 9 51.28 50.79	50.31 49.81	50.06	1.0	1.20	1.4400
17	1327 & 1350 Gr. 80	Feb. 15	1 21	W, E	72 34 42.38	− 19 49.65	52.73	52.73	0.7	1.47	1.5126
18	1365 & 1395 Gr. 80 " " "	Feb. 14 " 15	0 11	W, E E, W	72 12 58.42 58.41	+ 1 52.40 53.85	50.82 52.26	51.54	0.7	0.28	0.0540
19	1365 & 1411 Gr. 80 " " "	Feb. 14 " 15	0 32	W, E E, W	71 51 49.60 49.59	+ 23 1.30 3.83	50.90 53.42	52.16	0.7	0.90	0.5670
20	1368 & 1395 Gr. 80 " " "	Feb. 14 " 15	0 37	W, E E, W	72 38 31.41 31.40	− 23 39.18 39.03	52.23 52.37	52.30	0.7	1.04	0.7571
21	1411 & 1368 Gr. 80 " " "	Feb. 14 " 15	0 58	E, W W, E	72 17 22.58 22.58	− 2 30.28 29.04	52.30 53.54	52.92	0.7	1.66	1.9289
22	1418 & 1449 Gr. 80	Feb. 15	7 26	W, E	72 32 48.24	− 17 56.28	51.96	51.96	0.7	0.70	0.3430
23	1451 & 1474 Gr. 80 " " "	Feb. 16 " 18	11 33	E, W W, E	72 23 21.72 21.70	− 8 30.39 30.45	51.33 51.25	51.29	0.7	0.03	0.0006
24	1474 & 1480 Gr. 80 " " "	Feb. 16 " 18	11 28	W, E E, W	72 18 41.47 41.46	− 3 50.03 49.88	51.44 51.58	51.51	0.7	0.25	0.0438
25	1490 & 1517 Gr. 80 " " "	Feb. 16 " 18	12 44	E, W W, E	71 45 6.65 6.43	+ 29 44.08 44.08	50.73 50.51	50.62	0.7	0.64	0.2867
26	1517 & 1520 Gr. 80 " " "	Feb. 16 " 18	12 17	W, E E, W	72 12 7.40 7.38	+ 2 40.85 43.89	48.25 51.27	49.76	0.7	1.50	1.5750
27	1554 & 1573 Gr. 80 " " "	Feb 16 " 18	7 44	W, E E, W	72 5 27.89 27.87	+ 9 23.45 23.83	51.34 51.70	51.52	0.7	0.26	0.0473
28	1573 & 1585 Gr. 80 " " "	Feb. 16 " 18	7 29	E, W W, E	72 20 9.13 9.12	− 5 17.85 17.13	51.28 51.99	51.64	0.7	0.38	0.1011
29	1585 & 1596 Gr. 80 " " "	Feb. 16 " 18	7 24	W, E E, W	72 14 24.98 24.97	+ 0 25.93 26.36	50.91 51.33	51.12	0.7	0.14	0.0137
30	1596 & 1554 Gr. 80 " " "	Feb. 16 " 18	7 38	E, W W, E	71 59 43.74 43.72	+ 15 6.73 7.31	50.47 51.03	50.75	0.7	0.51	0.1821
31	1603 & 1617 Gr. 80 " " "	Feb. 16 " 18	3 35	E, W W, E	71 54 39.76 39.75	+ 20 11.07 11.62	50.83 51.37	51.10	1.0	0.16	0.0256
32	1621 & 1628 Gr. 80 " " "	Feb. 16 " 18	8 32	W, E E, W	72 1 48.83 48.82	+ 13 1.74 2.47	50.57 51.29	50.93	1.0	0.33	0.1089
33	1652 & 1666 Gr. 80 " " "	Feb. 16 " 18	5 44	E, W W, E	71 47 8.94 8.95	+ 27 41.37 41.28	50.31 50.23	50.27	1.0	0.99	0.9801
34	1673 & 1681 Gr. 80 " " "	Feb. 16 " 18	2 26	W, E E, W	72 3 27.99 27.99	+ 11 23.35 23.55	51.34 51.54	51.44	1.0	0.18	0.0324

225. Singawaram—*Co-latitude* 72° 14′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
35	1690 & 1695 Gr. 80	Feb. 18	19 44	W, E	72 28 28·09	− 13 36·96	51·13	51·13	0·7	0·13	0·0118
36	1708 & 1717 Gr. 80	Feb. 16	10 18	W, E	72 12 47·47	+ 2 3·78	51·25				
	„ „ „	„ 18		E, W	47·47	4·46	51·93	51·59	1·0	0·33	0·1089
37	1724 & 1732 Gr. 80	Feb. 16	6 20	E, W	72 34 38·06	− 19 46·41	51·65				
	„ „ „	„ 18		W, E	38·09	46·37	51·72	51·69	1·0	0·43	0·1849
38	1743 & 1748 Gr. 80	Feb. 16	16 45	W, E	71 57 27·76	+ 17 22·75	50·51				
	„ „ „	„ 18		E, W	27·77	22·85	50·62	50·57	0·7	0·69	0·3333
39	1743 & 1766 Gr. 80	Feb. 16	17 6	W, E	72 19 25·45	− 4 34·75	50·70				
	„ „ „	„ 18		E, W	25·47	35·29	50·18	50·44	0·7	0·82	0·4707
40	1777 & 1802 Gr. 80	Feb. 16	15 34	E, W	71 54 1·79	+ 20 48·33	50·12				
	„ „ „	„ 18		W, E	1·82	49·54	51·36	50·74	0·7	0·52	0·1893
41	1798 & 1802 Gr. 80	Feb. 16	15 32	E, W	71 52 9·38	+ 22 40·90	50·28				
	„ „ „	„ 18		W, E	9·42	41·42	50·84	50·56	0·7	0·70	0·3430
42	1816 & 1827 Gr. 80	Feb. 16	1 0	W, E	71 59 10·72	+ 15 40·48	51·20				
	„ „ „	„ 18		E, W	10·75	40·25	51·00	51·10	1·0	0·16	0·0256
43	1831 & 1862 Gr. 80	Feb. 16	2 56	E, W	72 7 16·87	+ 7 34·58	51·45				
	„ „ „	„ 18		W, E	16·91	35·19	52·10	51·78	0·7	0·52	0·1893
44	1862 & 1865 Gr. 80	Feb. 16	2 49	W, E	72 0 59·81	+ 13 51·79	51·60				
	„ „ „	„ 18		E, W	59·87	50·96	50·83	51·22	0·7	0·04	0·0011
								Σ P = 34·2		Σ Pvv = 16·2880	

Summary.

No. of pairs 44

No. of observations 83

Mean difference between observations taken E, W and those taken W, E = + 0″·04

Observed Co-latitude (weighted mean) 72° 14′ 51″·26 ± 0″·071

Correction for Height above Sea-level + 0″·03

Final Co-latitude 72° 14′ 51″·29

		°	′	″	″
Astronomical Latitude (A)	=	17	45	8·71	± 0·071
Geodetic Latitude (G)	=	17	45	10·38	
Deflection of plumb-line (A−G)	=	−		1·67	

226. Sironj Base-line N. E. End—*Co-latitude* 65° 51′ +

Latitude	...	24° 9′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	...	77 53	*Mean Height of Barometer*	in. 28·46
Height	...	1481 feet	*Mean Temperature*	51°·7

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1898-99	° ′		° ′ ″	′ ″	″	″			
1	256 & 268 Gr. 80	Dec. 27	15 43	E, W	65 38 19·56	+ 12 44·48	4·04				
	,, ,, ,,	,, 29		W, E	19·60	45·07	4·67	4·36	1·0	0·13	0·0169
2	285 & 288 Gr. 80	Dec. 27	5 9	W, E	66 3 8·69	− 12 4·55	4·14				
	,, ,, ,,	,, 29		E, W	8·75	7·67	1·08	2·61	0·5	1·88	1·7672
3	331 & 334 Gr. 80	Dec. 27	5 24	E, W	65 34 10·69	+ 16 54·42	5·11				
	,, ,, ,,	,, 29		W, E	10·72	54·03	4·75	4·93	1·0	0·44	0·1936
4	350 & 368 Gr. 80	Dec. 27	4 54	W, E	65 40 12·93	+ 10 50·66	3·59				
	,, ,, ,,	,, 29		E, W	12·96	50·44	3·40	3·49	0·7	1·00	0·7000
5	368 & 373 Gr. 80	Dec. 27	4 54	E, W	65 41 1·83	+ 10 1·94	3·77				
	,, ,, ,,	,, 29		W, E	1·86	2·88	4·74	4·26	0·7	0·23	0·0370
6	390 Gr. 80	Dec. 27	0 4	W, E	65 47 20·94	+ 3 44·14	5·08	5·08	0·7	0·59	0·2437
7	394 & 396 Gr. 80	Dec. 27	2 33	E, W	65 55 14·85	− 4 9·33	5·52				
	,, ,, ,,	,, 30		W, E	14·87	8·62	6·25	5·89	0·5	1·40	0·9800
8	403 & 414 Gr. 80	Dec. 27	4 38	W, E	65 47 32·52	+ 3 33·50	6·02				
	,, ,, ,,	Jan. 3		E, W	32·56	31·64	4·20	5·11	1·0	0·62	0·3844
9	418 & 434 Gr. 80	Dec. 27	7 15	E, W	65 42 39·61	+ 8 24·76	4·37				
	,, ,, ,,	Jan. 3		W, E	39·67	24·88	4·55	4·46	1·0	0·03	0·0009
10	455 & 468 Gr. 80	Dec. 28	20 24	E, W	65 54 46·75	− 3 38·61	8·14				
	,, ,, ,,	Jan. 3		W, E	46·71	42·21	4·50	6·32	0·5	1·83	1·6745
11	471 & 475 Gr. 80	Dec. 28	4 41	W, E	65 58 44·53	− 7 42·16	2·37				
	,, ,, ,,	Jan. 3		E, W	44·53	39·21	5·32	3·84	0·5	0·65	0·2113
12	483 & 513 Gr. 80	Dec. 28	25 32	E, W	66 2 0·06	− 10 55·28	4·78				
	,, ,, ,,	Jan. 3		W, E	0·04	54·17	5·87	5·33	0·5	0·84	0·3528
13	518 & 500 Gr. 80	Dec. 28	25 24	W, E	65 53 43·75	− 2 38·12	5·63				
	,, ,, ,,	Jan. 3		E, W	43·74	36·90	6·84	6·23	0·5	1·74	1·5138
14	549 Gr. 80	Dec. 28	0 1	W, E	65 52 18·54	− 1 13·00	5·54	5·54	0·5	1·05	0·5513
15	553 & 562 Gr. 80	Dec. 28	1 3	E, W	66 3 26·70	− 12 21·72	4·98				
	,, ,, ,,	Jan. 3		W, E	26·68	24·17	2·51	3·75	0·5	0·74	0·2738

226. Sironj Base-line N. E. End—*Co-latitude* 65° 51′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898-99	° ′		° ′ ″	′ ″	″	″			
16	577 & 579 Gr. 80	Dec. 28	0 3	W, E	65 53 46·17	− 2 43·14	3·03	3·03	0·5	1·46	1·0658
17	577 & 584 Gr. 80	Jan. 3	0 11	E, W	66 1 32·74	− 10 28·71	4·03	4·03	0·3	0·46	0·0635
18	590 & 577 Gr. 80 " " "	Dec. 28 Jan. 3	0 12	E, W W, E	66 3 0·15 0·12	− 11 56·88 53·88	3·27 6·24	4·75	0·5	0·26	0·0338
19	613 & 620 Gr. 80 " " "	Dec. 28 " 30	11 39	E, W W, E	66 8 41·78 41·76	− 17 37·24 38·39	4·54 3·37	3·96	0·5	0·53	0·1405
20	630 & 648 Gr. 80 " " "	Dec. 28 " 30	2 12	W, E E, W	65 59 10·21 10·19	− 8 6·55 5·31	3·66 4·88	4·27	0·5	0·22	0·0242
21	648 & 633 Gr. 80 " " "	Dec. 28 " 30	2 15	E, W W, E	66 1 15·56 15·54	− 10 11·66 10·98	3·90 4·56	4·23	0·5	0·26	0·0338
22	686 & 704 Gr. 80 " " "	Dec. 26 " 28	1 25	E, W W, E	66 0 37·42 37·40	− 9 33·42 32·89	4·00 4·51	4·25	0·5	0·24	0·0288
23	707 & 686 Gr. 80 " " "	Dec. 26 " 28	1 19	W, E E, W	65 55 5·62 5·60	− 4 1·23 0·55	4·39 5·05	4·72	0·5	0·23	0·0265
24	800 & 846 Gr. 80 " " "	Dec. 26 " 28	8 47	E, W W, E	65 45 40·48 40·46	+ 5 22·11 22·68	2·59 3·14	2·87	1·0	1·62	2·6244
25	869 & 888 Gr. 80 " " "	Dec. 26 " 27	13 2	W, E E, W	65 44 22·80 22·79	+ 6 43·54 39·92	6·34 2·71	4·52	1·0	0·03	0·0009
26	948 & 977 Gr. 80 " " "	Dec. 26 " 27	6 22	W, E E, W	65 56 14·46 14·45	− 5 9·07 11·17	5·39 3·28	4·34	0·5	0·15	0·0113
27	994 & 998 Gr. 80 " " "	Dec. 26 " 27	3 40	E, W W, E	66 4 36·12 36·12	− 13 30·73 32·19	5·39 3·93	4·66	0·5	0·17	0·0145
28	1010 & 1021 Gr. 80 " " "	Dec. 26 " 27	1 47	W, E E, W	65 49 47·74 47·73	+ 1 17·55 16·73	5·29 4·46	4·88	1·0	0·39	0·1521
29	1104 & 1127 Gr. 80 " " "	Dec. 26 " 27	3 55	E, W W, E	65 48 41·68 41·69	+ 2 22·33 22·22	4·01 3·91	3·96	1·0	0·53	0·2809
30	1181 & 1193 Gr. 80 " " "	Dec. 26 " 27	2 10	W, E E, W	65 57 13·06 13·08	− 6 7·99 7·60	5·07 5·48	5·27	0·5	0·78	0·3042
31	1206 & 1240 Gr. 80 " " "	Dec. 26 " 27	3 41	E, W W, E	65 36 18·47 18·49	+ 14 46·81 47·22	5·28 5·71	5·50	1·0	1·01	1·0201
32	1261 & 1272 Gr. 80 " " "	Dec. 27 Jan. 2	12 33	E, W W, E	65 35 32·05 32·14	+ 15 33·86 32·21	5·91 4·35	5·13	1·0	0·64	0·4096
33	1284 & 1297 Gr. 80 " " "	Dec. 27 Jan. 2	7 58	W, E E, W	65 59 12·08 12·23	− 8 8·35 8·20	3·73 4·03	3·88	0·5	0·61	0·1861
34	1842 & 1363 Gr. 80 " " "	Dec. 28 " 29	1 32	E, W W, E	65 52 12·56 12·59	− 1 8·47 4·64	4·09 7·95	6·02	0·5	1·53	1·1705

226. Sironj Base-line N. E. End—*Co-latitude* 65° 51′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
35	1383 & 1390 Gr. 80	Dec. 28	1 59	W, E	66 9 27·49	− 18 24·38	3·11				
	„ „ „	„ 29		E, W	27·53	24·28	3·25	3·18	0·7	1·31	1·2013
36	1395 & 1397 Gr. 80	Dec. 28	6 1	E, W	66 2 45·99	− 11 43·05	2·94				
	„ „ „	„ 29		W, E	46·04	41·90	4·14	3·54	0·8	0·95	0·7220
37	1417 & 1436 Gr. 80	Dec. 28	3 15	E, W	65 58 38·47	− 7 35·45	3·02				
	„ „ „	„ 29		W, E	38·52	32·83	5·69	4·36	0·5	0·13	0·008[illegible]
38	1459 & 1417 Gr. 80	Dec. 28	3 27	W, E	66 11 14·94	− 20 10·04	4·90				
	„ „ „	„ 29		E, W	14·99	9·92	5·07	4·98	0·5	0·49	0·1201
39	1470 & 1474 Gr. 80	Dec. 28	5 19	W, E	66 10 30·17	− 19 25·60	4·57				
	„ „ „	„ 29		E, W	30·23	24·92	5·31	4·94	0·5	0·45	0·1013
40	1483 & 1498 Gr. 80	Dec. 28	8 34	E, W	65 43 16·88	+ 7 46·57	3·45				
	„ „ „	„ 29		W, E	16·94	48·73	5·67	4·56	0·7	0·07	0·0034
41	1498 & 1507 Gr. 80	Dec. 28	8 28	W, E	65 49 27·28	+ 1 37·01	4·29				
	„ „ „	„ 29		E, W	27·34	36·37	3·71	4·00	0·7	0·49	0·1681
42	1520 & 1547 Gr. 80	Dec. 28	5 58	E, W	65 54 21·71	− 3 17·11	4·60				
	„ „ „	„ 29		W, E	21·79	16·81	4·98	4·79	0·5	0·30	0·0450
43	1572 & 1577 Gr. 80	Dec. 28	12 33	E, W	65 42 23·64	+ 8 39·97	3·61				
	„ „ „	„ 29		W, E	23·72	40·79	4·51	4·06	0·7	0·43	0·1294
44	1580 & 1572 Gr. 80	Dec. 28	12 16	W, E	65 59 45·92	− 8 40·49	5·43				
	„ „ „	„ 29		E, W	46·00	41·51	4·49	4·96	0·5	0·47	0·1105
45	159[illegible] & 1617 Gr. 80	Dec. 28	2 22	W, E	65 59 31·91	− 8 28·89	3·02				
	„ „ „	„ 29		E, W	32·00	27·41	4·59	3·80	0·5	0·69	0·2381
46	161[illegible] & 1621 Gr. 80	Dec. 28	2 25	E, W	65 56 13·78	− 5 8·86	4·92				
	„ „	„ 29		W, E	13·88	9·00	4·88	4·90	0·5	0·41	0·0841
47	1632 & 1646 Gr. 80	Dec. 28	11 24	W, E	65 40 18·38	+ 10 45·29	3·67				
	„ „ „	„ 29		E, W	18·49	46·57	5·06	4·37	1·0	0·12	0·0144
								Σ P = 30·5		Σ Pvv = 19·4389	

Summary.

No. of pairs 47
No. of observations 90

Mean difference between observations taken E, W and those taken W, E = − 0″·27

Observed Co-latitude (weighted mean) 65° 51′ 4″·49 ± 0″·080

Correction for Height above Sea-level + 0″·06

Final Co-latitude 65° 51′ 4″·55

		°	′	″	″
Astronomical Latitude (A)	=	24	8	55·45	± 0·080
Geodetic Latitude (G)	=	24	8	53·57	
Deflection of plumb-line (A − G)	=		+	1·88	

227. Sirsa—*Co-latitude* 61° 5′ +

Latitude ...	28° 55′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude ...	78 35	*Mean Height of Barometer*	in. 29·32
Height ...	739 feet	*Mean Temperature*	48°·9

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = p	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	4059 & 15 Gr. 80	Dec. 11	16 21	W, E	60 49 4·50	+ 16 25·34	29·84				
	" " "	" 12		E, W	4·51	25·33	29·84	29·84	1·0	0·14	0·0196
2	38 & 75 Gr. 80	Dec. 11	9 12	E, W	61 3 38·53	+ 1 51·43	29·96				
	" " "	" 12		W, E	38·53	51·31	29·84				
	52 & 75 Gr. 80	" 11	8 51	E, W	61 24 59·32	− 19 29·52	29·80				
	" " "	" 12		W, E	59·32	30·08	29·24	29·71	1·5	0·01	0·0002
3	139 & 160 Gr. 80	Dec. 11	2 18	E, W	61 1 42·97	+ 3 47·60	30·57				
	" " "	" 12		W, E	42·96	46·15	29·11	29·84	1·0	0·14	0·0196
4	170 & 179 Gr. 80	Dec. 11	14 30	W, E	61 5 13·74	+ 0 16·26	30·00				
	" " "	" 12		E, W	13·73	16·52	30·25	30·12	1·0	0·42	0·1764
5	234 & 244 Gr. 80	Dec. 11	12 14	W, E	61 19 29·25	− 13 59·26	29·99				
	" " "	" 12		E, W	29·22	59·05	30·17				
	244 & 273 Gr. 80	" 11	12 0	E, W	61 5 15·20	+ 0 14·69	29·89				
	" " "	" 12		W, E	15·17	15·00	30·17	30·06	1·5	0·36	0·1944
6	300 & 329 Gr. 80	Dec. 13	5 42	E, W	61 11 6·47	− 5 36·48	29·99				
	" " "	" 14		E, W	6·43	35·63	30·80				
	" " "	" 15		W, E	6·40	36·81	29·59				
	326 & 329 Gr. 80	" 13	5 46	E, W	61 14 40·16	9 11·06	29·10				
	" " "	" 14		E, W	40·13	8·78	31·35				
	" " "	" 15		W, E	40·09	10·68	29·41	29·91	1·5	0·21	0·0662
7	334 & 353 Gr. 80	Dec. 13	0 50	W, E	60 59 19·74	+ 6 10·09	29·83				
	" " "	" 14		E, W	19·70	9·86	29·56				
	353 & 368 Gr. 80	" 14	0 32	W, E	61 17 40·76	− 12 11·00	29·76	29·73	1·5	0·03	0·0014
8	376 & 394 Gr. 80	Dec. 13	7 6	E, W	61 22 49·79	− 17 20·08	29·71				
	" " "	" 14		E, W	49·74	19·86	29·88				
	" " "	" 15		W, E	49·70	19·63	30·07	29·93	1·0	0·23	0·0529
9	404 & 412 Gr. 80	Dec. 13	19 34	W, E	60 44 54·01	+ 20 35·03	29·04				
	" " "	" 14		E, W	53·96	35·98	29·94	29·49	1·0	0·21	0·0441
10	434 & 454 Gr. 80	Dec. 13	2 44	E, W	61 11 53·40	− 6 24·05	29·35				
	" " "	" 14		W, E	53·35	23·00	30·35	29·85	1·0	0·15	0·0225
11	460 & 475 Gr. 80	Dec. 13	9 34	W, E	61 5 47·91	− 0 18·36	29·55				
	" " "	" 15		E, W	47·81	18·85	28·96	29·25	1·0	0·45	0·2025
12	513 & 523 Gr. 80	Dec. 13	20 25	W, E	60 54 23·76	+ 11 5·66	29·42				
	" " "	" 14		E, W	23·71	5·79	29·50				
	523 & 528 Gr. 80	" 13	20 15	E, W	61 4 41·00	0 49·00	30·00				
	" " "	" 14		W, E	40·95	48·70	29·65	29·64	1·5	0·06	0·0054

227. Sirsa—*Co-latitude* 61° 5′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
13	563 & 589 Gr. 80	Dec. 13	18 19	W, E	60 50 47·16	+ 14 43·84	31·00				
	" " "	" 14		E, W	47·11	43·01	30·12	30·56	1·0	0·86	0·7396
14	613 & 630 Gr. 80	Dec. 13	6 51	E, W	61 20 31·91	− 15 2·35	29·56				
	" " "	" 14		W, E	31·86	2·26	29·60	29·58	1·0	0·12	0·0144
15	643 & 646 Gr. 80	Dec. 13	9 13	W, E	61 26 13·48	− 20 43·27	30·21				
	" " "	" 14		E. W	13·43	43·45	29·98	30·10	1·0	0·40	0·1600
16	660 & 692 Gr. 80	Dec. 11	11 28	E, W	61 13 45·68	− 8 17·20	28·48				
	" " "	" 13		W, E	45·63	16·12	29·51	29·00	1·0	0·70	0·4900
17	717 & 721 Gr. 80	Dec. 11	13 43	W, E	60 51 50·56	+ 13 38·74	29·30				
	" " "	" 13		E, W	50·46	38·74	29·20	29·25	1·0	0·45	0·2025
18	800 & 808 Gr. 80	Dec. 11	4 4	E, W	61 2 50·75	+ 2 38·54	29·29				
	" " "	" 12		W, E	50·71	39·37	30·08	29·68	1·0	0·02	0·0004
19	833 & 872 Gr. 80	Dec. 11	10 45	E, W	60 44 20·33	+ 21 9·80	30·13				
	" " "	" 12		W, E	20·29	9·40	29·69	29·91	1·0	0·21	0·0441
20	916 & 978 Gr. 80	Dec. 11	10 19	W, E	61 10 0·12	− 4 30·96	29·16				
	" " "	" 12		E, W	0·09	31·11	28·98				
	916 & 984 Gr. 80	" 11	10 18	W, E	61 10 50·69	5 21·63	29·06				
	" " "	" 12		E, W	50·66	20·82	29·84	29·26	1·5	0·44	0·2904
21	998 & 1014 Gr. 80	Dec. 11	8 29	E, W	61 16 7·87	− 10 37·58	30·29				
	" " "	" 12		W, E	7·85	38·55	29·30	29·80	1·0	0·10	0·0100
22	1023 & 1037 Gr. 80	Dec. 11	14 7	W, E	61 6 56·93	− 1 27·60	29·33				
	" " "	" 12		E. W	56·91	27·30	29·61				
	" " "	" 14		W, E	56·87	27·00	29·87	29·60	1·0	0·10	0·0100
23	1149 & 1162 Gr. 80	Dec. 13	15 39	E, W	61 1 36·24	+ 3 53·54	29·78				
	" " "	" 14		W, E	36·24	54·67	30·91				
	1149 & 1184 Gr. 80	" 13	15 39	E, W	61 2 19·57	3 10·05	29·62				
	" " "	" 14		W, E	19·57	10·90	30·47	30·20	1·5	0·50	0·3750
24	1221 & 1240 Gr. 80	Dec. 13	1 11	W, E	60 45 41·48	+ 19 47·73	29·21				
	" " "	" 14		E, W	41·50	48·65	30·15	29·68	1·0	0·02	0·0004
25	1323 & 1328 Gr. 80	Dec. 13	4 31	W, E	60 51 10·09	+ 14 19·09	29·18				
	" " "	" 14		E, W	10·13	19·32	29·45	29·31	1·0	0·39	0·1521
26	1371 & 1397 Gr. 80	Dec. 15	0 57	W, E	60 59 13·48	+ 6 15·90	29·38				
	" " "	" 16		E, W	13·53	14·79	28·32	28·85	1·0	0·85	0·7225
27	1408 & 1428 Gr. 80	Dec. 15	14 29	W, E	60 58 39·07	+ 6 49·97	29·04				
	" " "	" 16		E, W	39·14	50·82	29·96	29·50	1·0	0·20	0·0400
28	1432 & 1450 Gr. 80	Dec. 15	4 22	E, W	61 13 6·49	− 7 37·09	29·40				
	" " "	" 16		E, W	6·56	35·58	30·98	30·19	1·0	0·49	0·2401
29	1495 & 1511 Gr. 80	Dec. 15	4 14	W, E	60 55 56·78	+ 9 32·50	29·28				
	" " "	" 16		E, W	56·87	33·17	30·04				
	1507 & 1511 Gr. 80	" 15	3 54	W, E	61 15 30·76	− 10 2·29	28·47				
	" " "	" 16		E, W	30·85	1·36	29·49	29·32	1·5	0·38	0·2166

227. Sirsa—*Co-latitude* 61° 5′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
30	1529 & 1539 Gr. 80	Dec. 15	6 20	E, W	61 16 45·13	− 11 15·03	30·10				
	" " "	" 16		W, E	45·23	16·19	29·04				
	1529 & 1550 Gr. 80	" 15	6 13	E, W	61 23 40·45	18 11·12	29·33				
	" " "	" 16		W, E	40·56	11·80	28·76	29·31	1·5	0·39	0·2282
31	1567 & 1571 Gr. 80	Dec. 15	5 21	W, E	61 15 5·13	− 9 35·40	29·73				
	" " "	" 16		E, W	5·25	35·34	29·91	29·82	1·0	0·12	0·0144
32	3945 & 3971 Gr. 80	Dec. 11	16 32	E, W	60 55 58·44	+ 9 31·54	29·98				
	" " "	" 12		W, E	58·47	32·26	30·73				
	3945 & 3991 Gr. 80	" 12	16 50	W, E	60 57 30·92	7 58·71	29·63	30·00	1·5	0·30	0·1350
								ΣP = 37·0		ΣPvv = 4·8909	

Summary.

No. of pairs 32
No. of observations 86

Mean difference between observations taken E, W and those taken W, E = + 0″·15

Observed Co-latitude (weighted mean) 61° 5′ 29″·70 ± 0″·044

Correction for Height above Sea-level + 0·03

Final Co-latitude 61° 5′ 29″·73

		°	′	″	
Astronomical Latitude (A)	=	28	54	30·27	± 0·044
Geodetic Latitude (G)	=	28	54	39·64	
Deflection of plumb-line (A − G)	=		−	9·37	

228. Sitapar—*Co-latitude* 68° 35′ +

Latitude	... 21° 25′	*Maximum recorded Height of Barometer*	= 28·975 in.
Longitude	... 80 22	*Minimum* „ „ „	= 28·781
Height	... 1237 feet	*Maximum* „ *Reading of Thermometer*	= 72°·5
Instrument—Zenith Sector No. 2		*Minimum* „ „ „	= 52 ·8

Observer—Lieut. S. G. Burrard, R.E.

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1887			° ′ ″	° ′ ″	″	″	″		
1	240 Gr. 72	Jan. 22	S	W, E	0 3 31·42	68 31 43·41	14·83				
	„ „	„ 23	„	E, W	32·73	43·46	16·19	15·51	. .	0·72	0·5184
2	246 Gr. 72	Jan. 18	N	E, W	1 53 1·24	70 28 18·28	17·04				
	„ „	„ 19	„	W, E	2·37	18·32	15·95				
	„ „	„ 20	„	E, W	1·25	18·37	17·42				
	„ „	„ 21	„	W, E	6·28	18·42	12·14	...	15·56	0·48	0·2304
3	249 Gr. 72	Jan. 22	S	E, W	5 48 45·94	62 46 30·08	16·02				
	„ „	„ 23	„	W, E	46·50	30·12	16·62	16·32	.	0·09	0·0081
4	261 Gr. 72	Jan. 19	N	E, W	5 22 53·96	63 12 23·79	17·75				
	„ „	„ 20	„	W, E	52·98	23·82	16·80				
	„ „	„ 21	„	E, W	53·45	23·86	17·31	17·29	.	1·06	1·1236
5	264 Gr. 72	Jan. 22	S	W, E	6 47 54·07	75 23 9·65	15·58				
	„ „	„ 23	„	E, W	52·23	9·70	17·47	...	16·52	0·48	0·2304
6	268 Gr. 72	Jan. 18	N	E, W	3 32 26·16	72 7 41·56	15·40				
	„ „	„ 19	„	W, E	26·46	41·61	15·15				
	„ „	„ 20	„	E, W	25·58	41·65	16·07				
	„ „	„ 21	„	W, E	26·09	41·70	15·61	. .	15·56	0·48	0·2304
7	270 Gr. 72	Jan. 22	S	E, W	3 50 28·99	72 25 45·98	16·99				
	„ „	„ 23	„	W, E	31·04	46·02	14·98	.	15·99	0·05	0·0025
8	274 Gr. 72	Jan. 18	N	W, E	0 31 32·45	69 6 48·00	15·55				
	„ „	„ 19	„	E, W	31·31	48·03	16·72				
	„ „	„ 20	„	W, E	32·45	48·07	15·62				
	„ „	„ 21	„	E, W	30·82	48·11	17·29	...	16·29	0·25	0·0625
9	286 Gr. 72	Jan. 22	S	W, E	3 58 15·86	72 33 30·64	14·78				
	„ „	„ 23	„	E, W	13·68	30·68	17·00	...	15·89	0·15	0·0225
10	292 Gr. 72	Jan. 18	N	E, W	2 6 52·97	70 42 9·75	16·78				
	„ „	„ 19	„	W, E	54·75	9·78	15·03				
	„ „	„ 20	„	E, W	52·75	9·82	17·07				
	„ „	„ 21	„	W, E	54·56	9·86	15·30	...	16·04	0·00	0·0000
11	297 Gr. 72	Jan. 22	S	E, W	0 47 17·33	69 22 34·80	17·47				
	„ „	„ 23	„	W, E	19·71	34·84	15·13	...	16·30	0·26	0·0676
12	309 Gr. 72	Jan. 18	N	W, E	0 40 28·77	69 15 44·85	16·08				
	„ „	„ 20	„	E, W	27·41	44·91	17·50				
	„ „	„ 21	„	E, W	27·41	44·94	17·53	...	17·04	1·00	1·0000

Note.—The barometer was read every hour, the thermometer every fifteen minutes. For the calculation of refraction a separate value for the pressure and temperature was deduced for each star.

228. Sitapar—*Co-latitude* 68° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	v v
		1887			° ′ ″	° ′ ″	″	″	″		
13	313 Gr. 72	Jan. 22	S	W, E	2 54 34·65	65 40 41·03	15·68				
	,, ,,	,, 23	,,	E, W	36·57	41·05	17·62	16·65	...	0·42	0·1764
14	319 Gr. 72	Jan. 18	N	E, W	12 4 35·09	80 39 51·99	16·90				
	,, ,,	,, 20	,,	W, E	36·58	52·09	15·51				
	,, ,,	,, 21	,,	W, E	36·42	52·15	15·73	...	16·05	0·01	0·0001
15	321 Gr. 72	Jan. 22	S	E, W	1 0 2·75	67 35 15·41	18·16				
	,, ,,	,, 23	,,	W, E	1·12	15·43	16·55	17·35	...	1·12	1·2544
16	328 Gr. 72	Jan. 22	S	W, E	3 57 10·27	72 32 26·33	16·06				
	,, ,,	,, 23	,,	E, W	7·94	26·37	18·43	...	17·24	1·20	1·4400
17	329 Gr. 72	Jan. 18	N	W, E	2 40 15·53	65 55 0·61	16·14				
	,, ,,	,, 20	,,	E, W	15·35	0·65	16·00				
	,, ,,	,, 21	,,	E, W	17·32	0·67	17·99	16·71	...	0·48	0·2304
18	335 Gr. 72	Jan. 18	N	E, W	3 32 59·32	65 2 17·04	16·36				
	,, ,,	,, 20	,,	W, E	59·37	17·06	16·43				
	,, ,,	,, 21	,,	W, E	58·71	17·07	15·78	16·19	...	0·04	0·0016
19	340 Gr. 72	Jan. 19	N	W, E	10 30 59·58	58 4 15·56	15·14				
	,, ,,	,, 22	S	E, W	61·41	15·53	16·94				
	,, ,,	,, 23	,,	W, E	58·89	15·52	14·41	15·50	...	0·73	0·5329
20	345 Gr. 72	Jan. 18	N	W, E	2 20 36·80	66 14 38·22	15·02				
	,, ,,	,, 20	,,	E, W	38·26	38·25	16·51				
	,, ,,	,, 21	,,	E, W	37·59	38·27	15·86	15·80	...	0·43	0·1849
21	349 Gr. 72	Jan. 18	N	E, W	2 20 29·99	66 14 47·11	17·10				
	,, ,,	,, 20	,,	W, E	29·08	47·13	16·21				
	,, ,,	,, 21	,,	W, E	28·47	47·14	15·61	16·31	...	0·08	0·0064
22	355 Gr. 72	Jan. 22	S	W, E	10 8 2·30	58 27 13·04	15·34				
	,, ,,	,, 23	,,	E, W	3·71	13·03	16·74	16·04	...	0·19	0·0361
23	362 Gr. 72	Jan. 18	N	W, E	1 25 57·70	67 9 17·30	15·00				
	,, ,,	,, 20	,,	E, W	58·98	17·32	16·30				
	,, ,,	,, 21	,,	E, W	59·33	17·33	16·66	15·99	...	0·24	0·0576
24	367 Gr. 72	Jan. 19	N	W, E	9 14 39·82	77 49 55·99	16·17				
	,, ,,	,, 22	S	E, W	38·91	56·12	17·21				
	,, ,,	,, 23	,,	W, E	40·41	56·16	15·75	...	16·38	0·34	0·1156
25	373 Gr. 72	Jan. 20	N	W, E	0 21 30·91	68 13 46·15	17·06				
	,, ,,	,, 21	,,	E, W	31·75	46·17	17·92	17·49	...	1·26	1·5876
26	379 Gr. 72	Jan. 18	N	W, E	2 6 16·78	70 41 32·37	15·59				
	,, ,,	,, 20	,,	E, W	15·31	32·41	17·10				
	,, ,,	,, 21	,,	W, E	16·75	32·43	15·68	...	16·12	0·08	0·0064
27	381 Gr. 72	Jan. 22	S	E, W	4 46 18·22	63 48 57·92	16·14				
	,, ,,	,, 23	,,	W, E	17·86	57·91	15·77	15·96	...	0·27	0·0729
28	388 Gr. 72	Jan. 18	N	E, W	6 17 50·36	74 53 7·00	16·64				
	,, ,,	,, 20	,,	W, E	50·65	7·06	16·41				
	,, ,,	,, 21	,,	E, W	50·93	7·09	16·16	...	16·40	0·36	0·1296

228. Sitapar—*Co-latitude* 68° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean by North Star	Seconds of Co-latitude Mean by South Star	v	v v
		1887			° ′ ″	° ′ ″	″	″	″		
29	392 Gr. 72	Jan. 22	S	W, E	1 6 53·72	69 42 7·59	13·87				
	,, ,,	,, 23	,,	E, W	51·06	7·61	16·55	...	15·21	0·83	0·6889
30	401 Gr. 72	Jan. 18	N	W, E	3 56 52·69	64 38 23·01	15·70				
	,, ,,	,, 20	,,	E, W	53·25	23·00	16·25				
	,, ,,	,, 21	,,	W, E	52·22	22·99	15·21	15·72	...	0·51	0·2601
31	409 Gr. 72	Jan. 22	S	E, W	4 13 58·43	72 49 15·68	17·25				
	,, ,,	,, 23	,,	W, E	59·15	15·70	16·55	..	16·90	0·86	0·7396
32	419 Gr. 72	Jan. 20	N	W, E	2 29 8·00	71 4 23·23	15·23				
	,, ,,	,, 21	,,	E, W	6·54	23·25	16·71	...	15·97	0·07	0·0049
33	421 Gr. 72	Jan. 22	S	W, E	5 47 43·56	74 22 59·52	15·96				
	,, ,,	,, 23	,,	E, W	42·23	59·55	17·32	...	16·64	0·60	0·3600
34	429 Gr. 72	Jan. 18	N	W, E	5 7 59·91	73 43 15·36	15·45				
	,, ,,	,, 20	,,	E, W	58·89	15·41	16·52				
	,, ,,	,, 21	,,	W, E	60·74	15·43	14·69	..	15·55	0·49	0·2401
35	434 Gr. 72	Jan. 22	S	E, W	9 7 54·53	77 43 9·98	15·45				
	,, ,,	,, 23	,,	W, E	55·00	10·02	15·02	...	15·24	0·80	0·6400
36	441 Gr. 72	Jan. 18	N	E, W	1 19 30·45	67 15 45·51	15·96				
	,, ,,	,, 20	,,	W, E	30·36	45·50	15·86				
	,, ,,	,, 21	,,	E, W	31·54	45·50	17·04	16·29	...	0·06	0·0036
37	445 Gr. 72	Jan. 22	S	W, E	2 53 6·98	71 28 22·66	15·68				
	,, ,,	,, 23	,,	E, W	4·64	22·67	18·03	...	16·85	0·81	0·6561
38	449 Gr. 72	Jan. 21	N	W, E	2 46 5·14	71 21 20·55	15·41				
	,, ,,	,, 22	S	E, W	4·16	20·56	16·40				
	,, ,,	,, 23	,,	W, E	4·86	20·58	15·72	.	15·84	0·20	0·0400
39	456 Gr. 72	Jan. 22	S	W, E	11 34 21·73	57 0 53·69	15·42				
	,, ,,	,, 23	,,	E, W	22·73	53·64	16·37	15·90	...	0·33	0·1089
40	460 Gr. 72	Jan. 18	N	E, W	3 27 39·59	65 7 37·05	16·64				
	,, ,,	,, 21	,,	W, E	39·29	37·00	16·29	16·46	.	0·23	0·0529
41	468 Gr. 72	Jan. 22	S	E, W	0 0 47·54	68 34 28·66	16·20				
	,, ,,	,, 23	,,	W, E	47·29	28·66	15·95	16·08	...	0·15	0·0225
42	472 Gr. 72	Jan. 18	N	W, E	2 55 20·44	71 30 35·08	14·64				
	,, ,,	,, 21	,,	E, W	18·79	35·11	16·32	...	15·48	0·56	0·3136
43	474 Gr. 72	Jan. 22	S	W, E	1 8 46·32	69 44 1·86	15·54				
	,, ,,	,, 23	,,	E, W	45·71	1·86	16·15	...	15·85	0·19	0·0361
44	498 Gr. 72	Jan. 18	N	E, W	6 25 39·38	62 9 37·04	16·42				
	,, ,,	,, 20	,,	W, E	39·16	36·97	16·13				
	,, ,,	,, 21	,,	W, E	39·09	36·93	16·02	16·19	...	0·04	0·0016
45	500 Gr. 72	Jan. 22	S	E, W	4 8 13·12	72 43 29·69	16·57				
	,, ,,	,, 23	,,	W, E	13·85	29·71	15·86	..	16·21	0·17	0·0289

228. Sitapar—*Co-latitude* 68° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude by each observation	Mean by North Star	Mean by South Star	v	vv
		1887			° ′ ″	° ′ ″	″	″	″		
46	506 Gr. 72	Jan. 18	N	W, E	7 5 49·47	61 29 27·12	16·59				
	" "	" 20	"	E, W	48·52	27·04	15·56				
	" "	" 21	"	E, W	49·83	27·00	16·83	16·33	...	0·10	0·0100
47	519 Gr. 72	Jan. 22	S	W, E	2 54 20·75	71 29 35·56	14·81				
	" "	" 23	"	E, W	18·70	35·57	16·87	...	15·84	0·20	0·0400
48	523 Gr. 72	Jan. 18	N	E, W	2 57 22·22	71 32 37·02	14·80				
	" "	" 20	"	W, E	21·94	37·03	15·09				
	" "	" 21	"	E, W	21·35	37·04	15·69	...	15·19	0·85	0·7225
49	530 Gr. 72	Jan. 22	S	E, W	0 20 31·01	68 55 47·36	16·35	...	16·35	0·31	0·0961
50	541 Gr. 72	Jan. 18	N	W, E	1 11 15·82	67 23 58·70	14·52				
	" "	" 20	"	E, W	17·70	58·68	16·38				
	" "	" 21	"	W, E	16·03	58·66	14·69	15·20	...	1·03	1·0609
51	547 Gr. 72	Jan. 22	S	W, E	6 58 9·25	75 35 26·36	17·11				
	" "	" 23	"	E, W	9·20	26·39	17·19	...	17·15	1·11	1·2321
52	551 Gr. 72	Jan. 18	N	E, W	3 6 50·78	65 28 24·51	15·29				
	" "	" 20	"	W, E	50·24	24·46	14·70				
	" "	" 21	"	E, W	51·53	24·44	15·97	15·32	...	0·91	0·8281
53	559 Gr. 72	Jan. 22	S	E, W	6 10 13·17	62 25 3·38	16·55				
	" "	" 23	"	W, E	12·72	3·33	16·05	16·30	...	0·07	0·0049
54	566 Gr. 72	Jan. 18	N	W, E	14 1 49·01	82 37 4·62	15·61				
	" "	" 20	"	E, W	48·92	4·75	15·83				
	" "	" 21	"	W, E	50·27	4·81	14·54	...	15·33	0·71	0·5041
55	569 Gr. 72	Jan. 22	S	W, E	4 31 26·78	64 3 48·20	14·98				
	" "	" 23	"	E, W	29·27	48·17	17·44	16·21	...	0·02	0·0004
56	579 Gr. 72	Jan. 18	N	E, W	1 51 13·85	66 44 2·43	16·28				
	" "	" 20	"	W, E	13·81	2·39	16·20				
	" "	" 21	"	E, W	14·45	2·37	16·82	16·43	...	0·20	0·0400
57	581 Gr. 72	Jan. 22	S	E, W	2 13 60·59	66 21 16·15	16·74				
	" "	" 23	"	W, E	59·90	16·13	16·03	16·38	...	0·15	0·0225
58	589 Gr. 72	Jan. 18	N	W, E	1 42 58·01	66 51 18·13	16·14				
	" "	" 20	"	E, W	58·21	18·09	16·30				
	" "	" 21	"	W, E	57·36	18·07	15·43	15·96	...	0·27	0·0729
59	590 Gr. 72	Jan. 22	S	W, E	3 1 45·54	65 38 30·45	15·99				
	" "	" 23	"	E, W	46·48	30·43	16·91	16·45	...	0·22	0·0484
60	600 Gr. 72	Jan. 18	N	E, W	1 7 27·32	67 27 49·83	17·15				
	" "	" 20	"	W, E	25·15	49·79	14·94				
	" "	" 21	"	E, W	27·16	49·78	16·94	16·34	...	0·11	0·0121
61	610 Gr. 72	Jan. 22	S	E, W	1 9 21·59	67 25 54·98	16·57				
	" "	" 23	"	W, E	20·46	54·97	15·43	16·00	...	0·23	0·0529
62	618 Gr. 72	Jan. 20	N	E, W	0 53 24·99	69 8 40·46	15·47				
	" "	" 21	"	W, E	24·53	40·45	15·92	...	15·70	0·34	0·1156

228. Sitapar—*Co-latitude* 68° 35′ +

Serial No. of star	Star Observed	Date	Position of Azimuthal stud	Positions of Telescope during Observation	Observed Zenith Distance	N.P.D.	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean by North Star	Seconds of Co-latitude: Mean by South Star	v	vv
		1887			° ′ ″	° ′ ″	″	″	″		
63	623 Gr. 72	Jan. 22	S	W, E	1 7 57·45	69 43 11·55	14·10				
	" "	" 23	"	E, W	55·25	11·54	16·29	...	15·20	0·84	0·7056
64	645 Gr. 72	Jan. 18	N	E, W	4 55 12·60	73 30 28·57	15·97				
	" "	" 20	"	W, E	14·37	28·60	14·23				
	" "	" 21	"	E, W	12·57	28·62	16·05	...	15·42	0·62	0·3844
65	649 Gr. 72	Jan. 22	S	E, W	6 56 51·21	61 38 26·09	17·30				
	" "	" 23	"	W, E	49·72	26·04	15·76	16·53	.	0·30	0·0900
								Σ vv by N. Stars = 8·4840			
								Σ vv by S Stars = 11·0866			

Summary.

No. of North Stars 32 No. of South Stars 33

No. of observations 166

	°	′	″	″
Co-latitude by North Stars	68	35	16·225	± 0·062
" " South "	68	35	16·039	± 0·069
Mean Co-latitude	68	35	16·132	± 0·046
Correction for Height above Sea-level		+	0·04	

Final Co-latitude 68° 35′ 16″·172

		°	′	″	″
Astronomical Latitude (A)	=	21	24	43·828	± 0·046
Geodetic Latitude (G)	=	21	24	50·54	
Deflection of plumb-line (A − G)	=		−	6·71	

229. Sonada—*Co-latitude* 66° 52′ +

Latitude	... 23° 7′	*Instrument*—Zenith Sector No. 1 used as Zenith Telescope	
Longitude	... 72 48	*Mean Height of Barometer*	29·70 in.
Height	... 250 feet	*Mean Temperature*	64°·0

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
1	549 & 581 Gr. 80	Feb. 5	0 38	W, E	66 43 40·68	+ 9 4·51	45·19				
	" " "	" 6		E, W	40·72	4·67	45·39				
	" " "	" 7		W, E	40·75	4·51	45·26	45·28	0·8	0·90	0·6480
2	549 & 558 Gr. 80	Feb. 5	0 38	W, E	66 31 1·05	+ 21 45·23	46·28				
	" " "	" 6		E, W	1·08	45·06	46·14				
	" " "	" 7		W, E	1·11	44·41	45·52	45·98	0·8	1·60	2·0480
3	576 Gr. 80 & 360 Gr. 72	Feb. 5	0 57	E, W	67 1 30·11	− 8 45·48	44·63				
	" " " "	" 6		W, E	30·13	45·15	44·98				
	" " " "	" 7		E, W	30·15	45·36	44·79	44·80	1·2	0·42	0·2117
4	579 & 630 Gr. 80	Feb. 5	0 57	E, W	67 5 12·36	− 12 28·40	43·96				
	" " "	" 6		W, E	12·39	27·67	44·72	44·34	0·7	0·04	0·0011
5	583 & 630 Gr. 80	Feb. 5	0 57	E, W	67 12 39·61	− 19 54·91	44·70				
	" " "	" 6		W, E	39·63	54·91	44·72	44·71	0·7	0·33	0·0762
6	584 & 633 Gr. 80	Feb. 6	0 57	W, E	67 15 3·91	− 22 20·09	43·82	43·82	0·5	0·56	0·1568
7	590 & 633 Gr. 80	Feb. 6	0 57	W, E	67 16 30·62	− 23 46·45	44·17	44·17	0·5	0·21	0·0221
8	648 & 646 Gr. 80	Feb. 5	3 26	E, W	67 14 3·41	− 21 20·36	43·05				
	" " "	" 6		W, E	3·43	19·54	43·89				
	" " "	" 7		E, W	3·45	20·03	43·42	43·45	1·2	0·93	1·0379
9	406 Gr. 72 & 700 Gr. 80	Feb. 5	1 3	W, E	66 56 47·29	− 4 4·39	42·90				
	" " " "	" 6		E, W	47·30	3·15	44·15				
	" " " "	" 7		W, E	47·31	3·40	43·91	43·65	1·2	0·73	0·6395
10	694 & 701 Gr. 80	Feb. 5	1 3	W, E	66 59 41·67	− 6 57·73	43·94				
	" " "	" 6		E, W	41·68	57·89	43·79				
	" " "	" 7		W, E	41·69	56·98	44·71	44·15	1·2	0·23	0·0635
11	898 & 891 Gr. 80	Feb. 6	5 37	E, W	67 5 51·02	− 13 7·03	43·99				
	" " "	" 7		W, E	51·01	7·42	43·59	43·79	0·7	0·59	0·2437
12	808 & 892 Gr. 80	Feb. 5	5 37	W, E	67 5 51·79	− 13 9·02	42·77				
	" " "	" 6		E, W	51·78	8·16	43·62				
	" " "	" 7		W, E	51·77	8·28	43·49	43·29	0·8	1·09	0·9505
13	927 & 966 Gr. 80	Feb. 5	0 41	W, E	66 42 39·16	+ 10 5·05	44·21				
	" " "	" 6		E, W	39·14	6·58	45·72				
	" " "	" 7		W, E	39·12	5·78	44·90	44·94	1·2	0·56	0·3763

229. Sonada—*Co-latitude* 66° 52′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
14	969 & 982 Gr. 80	Feb. 5	32 46	E, W	66 48 59·69	+ 3 45·05	44·74				
	,, ,, ,,	,, 6		W, E	59·68	45·41	45·09				
	,, ,, ,,	,, 7		E, W	59·66	44·83	44·49	44·77	0·8	0·39	0·1217
15	989 & 982 Gr. 80	Feb. 5	32 46	E, W	67 0 40·73	− 7 56·38	44·35				
	,, ,, ,,	,, 6		W, E	40·71	55·69	45·02				
	,, ,, ,,	,, 7		E, W	40·69	56·90	43·79	44·39	0·8	0·01	0·0001
16	1010 & 998 Gr. 80	Feb. 5	2 50	W, E	66 53 59·75	− 1 16·13	43·62				
	,, ,, ,,	,, 6		E, W	59·73	14·83	44·90				
	,, ,, ,,	,, 7		W, E	59·71	14·92	44·79	44·44	1·2	0·06	0·0043
17	1026 Gr. 80	Feb. 5	0 9	W, E	66 43 45·46	+ 9 0·42	45·88				
	,, ,,	,, 6		E, W	45·44	8 57·93	43·37				
	,, ,,	,, 7		W, E	45·42	57·49	42·91	44·05	0·8	0·33	0·0871
18	1026 & 1043 Gr. 80	Feb. 5	0 5	E, W	66 47 54·56	+ 4 50·83	45·39				
	,, ,, ,,	,, 6		W, E	54·53	48·25	42·78				
	,, ,, ,,	,, 7		E, W	54·51	49·47	43·98	44·05	0·8	0·33	0·0871
19	1043 Gr. 80	Feb. 5	0 1	E, W	66 52 3·66	+ 0 41·84	45·50				
	,, ,,	,, 6		W, E	3·63	40·05	43·68				
	,, ,,	,, 7		E, W	3·61	41·99	45·60	44·93	0·8	0·45	0·1620
20	1043 & 1052 Gr. 80	Feb. 5	0 6	W, E	66 58 0·35	− 5 16·21	44·14				
	,, ,, ,,	,, 6		E, W	0·33	16·01	44·32				
	,, ,, ,,	,, 7		W, E	0·30	17·00	43·30	43·92	1·2	0·46	0·2539
21	1052 Gr. 80	Feb. 5	0 11	W, E	67 3 57·05	− 11 14·56	42·49				
	,, ,,	,, 6		E, W	57·03	13·11	43·92				
	,, ,,	,, 7		W, E	57·00	13·73	43·27	43·23	1·2	1·15	1·5870
22	1070 & 1057 Gr. 80	Feb. 6	0 24	E, W	67 4 15·10	− 11 30·30	44·80				
	,, ,, ,,	,, 7		W, E	15·08	30·86	44·22	44·51	0·7	0·13	0·0118
23	1070 & 1082 Gr. 80	Feb. 6	0 24	E, W	67 3 19·77	− 10 35·79	43·98				
	,, ,, ,,	,, 7		W, E	19·74	36·48	43·26	43·62	0·7	0·76	0·4043
24	613 Gr. 72 & 1097 Gr. 80	Feb. 6	1 55	W, E	67 1 21·49	− 8 35·93	45·56				
	,, ,, ,, ,,	,, 7		E, W	21·46	35·32	46·14	45·85	1·0	1·47	2·1609
25	639 Gr. 72 & 1098 Gr. 80	Feb. 6	1 55	W, E	67 13 53·25	− 21 8·02	45·23				
	,, ,, ,, ,,	,, 7		E, W	53·22	10·90	42·32	43·77	0·7	0·61	0·2605
26	1159 & 1098 Gr. 80	Feb. 6	1 55	W, E	66 57 9·19	− 4 25·04	44·15				
	,, ,, ,,	,, 7		E, W	9·16	26·89	42·27	43·21	0·7	1·17	0·9582
27	1163 & 1175 Gr. 80	Feb. 6	20 34	W, E	66 53 31·35	− 0 45·69	45·66				
	,, ,, ,,	,, 7		E, W	31·32	45·88	45·44	45·55	1·0	1·17	1·3689
28	1193 & 1206 Gr. 80	Feb. 5	2 45	W, E	66 31 27·39	+ 21 17·40	44·79				
	,, ,, ,,	,, 6		E, W	27·36	17·73	45·09				
	,, ,, ,,	,, 7		W, E	27·32	17·49	44·81	44·90	1·2	0·52	0·3245
29	1221 & 1218 Gr. 80	Feb. 5	7 10	W, E	66 44 15·78	+ 8 29·32	45·10				
	,, ,, ,,	,, 6		E, W	15·75	28·89	44·64				
	,, ,, ,,	,, 7		W, E	15·72	28·04	43·76	44·50	1·2	0·12	0·0173

229. Sonada—*Co-latitude* 66° 52′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893	° ′		° ′ ″	′ ″	″	″			
30	1227 & 1256 Gr. 80	Feb. 5	1 4	W, E	66 45 19·59	+ 7 25·33	44·92				
	" " "	" 6		E, W	19·56	24·77	44·33				
	" " "	" 7		W, E	19·52	25·32	44·84	44·70	1·2	0·32	0·1229
								Σ P = 27·5		ΣPvv = 14·4078	

Summary.

No. of pairs 30
No. of observations 77

Mean difference between observations taken E, W and those taken W, E = − 0″·26

Observed Co-latitude (weighted mean) 66° 52′ 44″·38 ± 0″·091

Correction for Height above Sea-level + 0″·01

Final Co-latitude 66° 52′ 44″·39

		°	′	″	″
Astronomical Latitude (A)	=	23	7	15·61	± 0·091
Geodetic Latitude (G)	=	23	7	19·89	
Deflection of plumb-line (A−G)	=		−	4·28	

230. St. Thomas's Mount—*Co-latitude* 76° 59′ +

Latitude	... 13° 0′	*Instrument*—Zenith Telescope	
Longitude	... 80 14	*Mean Height of Barometer*	in. 29·86
Height	... 250 feet	*Mean Temperature*	72°·3

Observer—Lieut. G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1890	° ′		° ′ ″	′ ″	″	″			
1	242 & 248 Gr. 80	Dec. 21	1 15	E, W	77 9 23·75	− 9 43·45	40·3				
	,, ,, ,,	,, 22		W, E	23·79	41·82	42·0	41·1	1·0	1·7	2·89
2	800 Cape 80 & 326 Gr. 80	Dec. 21	10 22	E, W	77 24 30·51	− 24 52·52	38·0				
	,, ,, ,, ,,	,, 22		W, E	30·54	50·83	39·7				
	,, ,, ,, ,,	,, 24		W, E	30·62	50·52	40·1	39·3	1·2	0·1	0·01
3	347 & 349 Gr. 80	Dec. 21	19 53	W, E	77 2 12·20	− 2 32·68	39·5				
	,, ,, ,,	,, 22		E, W	12·23	33·36	38·9				
	,, ,, ,,	,, 24		E, W	12·28	34·06	38·2	38·9	1·2	0·5	0·30
4	956 Cape 80 & 368 Gr. 80	Dec. 21	16 14	E, W	77 2 44·66	− 3 6·75	37·9				
	,, ,, ,, ,,	,, 22		W, E	44·64	5·36	39·3	38·6	1·0	0·8	0·64
5	1008 Cape 80 & 389 Gr. 80	Dec. 21	1 17	W, E	76 44 13·60	+ 15 25·69	39·3				
	,, ,, ,, ,,	,, 22		E, W	13·63	25·29	38·9				
	,, ,, ,, ,,	,, 23		W, E	13·66	25·22	38·9				
	,, ,, ,, ,,	,, 24		E, W	13·69	25·68	39·4	39·1	1·3	0·3	0·13
6	405 & 409 Gr. 80	Dec. 21	2 17	E, W	77 26 12·72	− 26 34·75	38·0				
	,, ,, ,,	,, 22		W, E	12·75	32·02	40·7				
	,, ,, ,,	,, 23		E, W	12·78	33·77	39·0				
	,, ,, ,,	,, 24		W, E	12·82	33·47	39·4	39·3	1·3	0·1	0·01
7	417 & 433 Gr. 80	Dec. 22	4 57	E, W	77 6 51·32	− 7 12·11	39·2				
	,, ,, ,,	,, 23		W, E	51·36	12·20	39·2	39·2	1·0	0·2	0·04
8	449 & 471 Gr. 80	Dec. 21	15 46	E, W	77 7 10·45	− 7 32·17	38·3				
	,, ,, ,,	,, 22		W, E	10·47	29·97	40·5				
	,, ,, ,,	,, 24		W, E	10·53	32·08	38·5	39·1	1·2	0·3	0·11
9	511 & 531 Gr. 80	Dec. 21	9 34	W, E	77 8 41·40	− 9 1·41	40·0				
	,, ,, ,,	,, 22		E, W	41·43	1·51	39·9				
	,, ,, ,,	,, 23		W, E	41·46	1·88	39·6				
	,, ,, ,,	,, 24		E, W	41·49	2·14	39·4	39·7	1·3	0·3	0·12
10	548 Gr. 80 & 74 Dy. 75	Dec. 22	18 23	W, E	77 4 1·39	− 4 20·56	40·8				
	,, ,, ,, ,,	,, 23		E, W	1·42	23·12	38·3				
	,, ,, ,, ,,	,, 24		W, E	1·44	20·96	40·5	39·8	1·2	0·4	0·19
11	561 & 576 Gr. 80	Dec. 21	10 32	W, E	76 45 50·37	+ 13 49·69	40·1				
	,, ,, ,,	,, 22		E, W	50·41	49·21	39·6				
	,, ,, ,,	,, 23		W, E	50·44	50·06	40·5				
	,, ,, ,,	,, 24		E, W	50·47	49·85	40·3	40·1	1·3	0·7	0·64

230. St. Thomas's Mount—*Co-latitude* 76° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1890	° ′		° ′ ″	′ ″	″	″			
12	626 & 637 Gr. 80	Dec. 21	14 35	E, W	77 16 29·95	− 16 50·00	40·0				
	” ” ”	” 22		W, E	29·98	50·28	39·7				
	” ” ”	” 24		W, E	30·04	50·81	39·2	39·6	1·2	0·2	0·05
13	646 & 661 Gr. 80	Dec. 22	5 56	W, E	76 37 16·15	+ 22 23·82	40·0				
	” ” ”	” 24		E, W	16·21	24·58	40·8	40·4	1·0	1·0	1·00
14	528 Gr. 64 & 692 Gr. 80	Dec. 21	4 20	W, E	77 2 50·02	− 3 10·84	39·2				
	” ” ” ”	” 22		E, W	50·05	11·42	38·6				
	” ” ” ”	” 24		W, E	50·12	11·49	38·6	38·8	1·2	0·6	0·43
15	717 Gr. 80 & 574 Gr. 64	Dec. 21	2 44	E, W	77 19 55·47	− 20 14·92	40·6				
	” ” ” ”	” 22		W, E	55·50	15·17	40·3				
	” ” ” ”	” 23		W, E	55·54	15·82	39·7	40·2	1·2	0·8	0·77
16	727 & 749 Gr. 80	Dec. 27	1 19	E, W	76 42 3·91	+ 17 36·20	40·1				
	” ” ”	” 30		W, E	4·00	36·00	40·0	40·0	1·0	0·6	0·36
17	740 & 792 Gr. 80	Dec. 21	0 53	W, E	76 49 11·33	+ 10 26·96	38·3				
	” ” ”	” 22		E, W	11·37	28·48	39·9				
	” ” ”	” 23		E, W	11·40	28·11	39·5				
	” ” ”	” 24		W, E	11·46	28·11	39·6	39·3	1·3	0·1	0·01
18	590 Gr. 64 & 796 Gr. 80	Dec. 27	10 47	W, E	76 53 42·34	+ 5 55·90	38·2				
	” ” ” ”	” 29		W, E	42·41	57·53	39·9				
	” ” ” ”	” 30		E, W	42·45	56·25	38·7	38·9	1·2	0·5	0·30
19	811 & 836 Gr. 80	Dec. 27	11 17	W, E	77 9 59·28	− 10 19·78	39·5				
	” ” ”	” 28		E, W	59·32	20·33	39·0				
	” ” ”	” 29		W, E	59·35	21·02	38·3				
	” ” ”	” 30		E, W	59·38	19·55	39·8	39·2	1·3	0·2	0·05
20	95 Dy. 75 & 869 Gr. 80	Dec. 21	3 1	W, E	76 45 53·22	+ 13 47·47	40·7				
	” ” ” ”	” 23		E, W	53·30	46·75	40·1				
	” ” ” ”	” 24		W, E	53·34	49·17	42·5	41·1	1·2	1·7	3·47
21	874 & 895 Gr. 80	Dec. 21	20 47	E, W	77 8 16·80	− 8 37·15	39·7				
	” ” ”	” 23		W, E	16·89	38·04	38·9	39·3	1·0	0·1	0·01
22	2358 Cape 80 & 902 Gr. 80	Dec. 27	9 13	E, W	77 21 31·13	− 21 52·61	38·5				
	” ” ” ”	” 28		W, E	31·17	52·17	39·0				
	” ” ” ”	” 29		E, W	31·21	51·70	39·5				
	” ” ” ”	” 30		W, E	31·25	52·28	39·0	39·0	1·3	0·4	0·21
23	513 Gr. 72 & 930 Gr. 80	Dec. 22	2 57	E, W	77 10 41·04	− 11 3·64	37·4				
	” ” ” ”	” 23		E, W	41·08	3·48	37·6	37·5	1·0	1·9	3·61
24	915 & 935 Gr. 80	Dec. 27	19 6	W, E	76 58 54·03	+ 0 44·65	38·7				
	” ” ”	” 29		W, E	54·11	45·11	39·2				
	” ” ”	” 30		E, W	54·15	44·43	38·6	38·8	1·2	0·6	0·43
25	946 & 955 Gr. 80	Dec. 27	8 31	E, W	77 25 57·01	− 26 17·86	39·2				
	” ” ”	” 29		E, W	57·11	18·96	38·2				
	” ” ”	” 30		W, E	57·15	18·31	38·8	38·7	1·2	0·7	0·59

230. St. Thomas's Mount—*Co-latitude* 76° 59′ +

Serial No of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1890	° ′		° ′ ″	′ ″	″	″			
26	964 & 994 Gr. 80	Dec. 27	14 47	W, E	77 12 25·58	− 12 46·04	39·5				
	,, ,, ,,	,, 28		E, W	25·62	45·60	40·0				
	,, ,, ,,	,, 29		W, E	25·67	46·85	38·8				
	,, ,, ,,	,, 30		E, W	25·71	45·97	39·7	39·5	1·3	0·1	0·01
27	1014 & 1040 Gr. 80	Dec. 27	24 11	E, W	76 58 42·67	+ 0 56·44	39·1				
	,, ,, ,,	,, 28		W, E	42·72	55·13	37·9				
	,, ,, ,,	,, 29		E, W	42·76	55·78	38·5				
	,, ,, ,,	,, 30		W, E	42·81	56·52	39·3	38·7	1·3	0·7	0·64
28	1040 Gr 80 & 2868 Cape 80	Dec. 27	19 29	W, E	76 45 43·63	+ 13 55·56	39·2				
	,, ,, ,, ,,	,, 28		E, W	43·68	55·53	39·2				
	,, ,, ,, ,,	,, 29		W, E	43·73	54·98	38·7				
	,, ,, ,, ,,	,, 30		E, W	43·78	54·60	38·4	38·9	1·3	0·5	0·33
29	1099 & 1105 Gr. 80	Dec 27	17 38	E, W	77 4 2·29	− 4 24·09	38·2				
	,, ,, ,,	,, 28		W, E	2·34	23·53	38·8	38·5	1·0	0·9	0·81
30	637 Gr. 72 & 1155 Gr. 80	Dec. 27	5 2	W, E	77 17 43·87	− 18 4·20	39·7				
	,, ,, ,, ,,	,, 28		E, W	43·93	3·59	40·3				
	,, ,, ,, ,,	,, 29		W, E	43·99	4·53	39·5				
	,, ,, ,, ,,	,, 30		E, W	44·06	5·82	38·2	39·4	0·9	0·0	0·00
31	1155 & 1173 Gr. 80	Dec. 30	4 48	W, E	77 2 48·61	− 3 9·75	38·9	38·9	0·5	0·5	0·13
32	1193 Gr. 80 & 901 Gr. 64	Dec. 28	13 11	W, E	76 56 56·66	+ 2 43·05	39·7				
	,, ,, ,, ,,	,, 30		W, E	56·80	43·20	40·0				
	1193 & 1232 Gr. 80	,, 29	13 16	E, W	77 2 38·37	− 2 58·21	40·2	40·0	1·0	0·6	0·36
33	1233 & 1285 Gr. 80	Dec. 27	3 36	W, E	77 15 17·77	− 15 39·13	38·6				
	,, ,, ,,	,, 29		W, E	17·92	38·40	39·5				
	,, ,, ,,	,, 30		E, W	18·00	39·01	39·0	39·0	1·2	0·4	0·19
34	1296 Gr 80 & 764 Gr. 72	Dec. 27	2 25	E, W	76 32 46·48	+ 26 52·14	38·6				
	,, ,, ,, ,,	,, 28		W, E	46·56	51·81	38·4				
	,, ,, ,, ,,	,, 29		E, W	46·64	52·33	39·0				
	,, ,, ,, ,,	,, 30		W, E	46·72	51·47	38·2	38·5	1·3	0·9	1·05
35	1370 & 1378 Gr. 80	Dec. 27	10 10	W, E	77 12 34·33	− 12 53·50	40·8				
	,, ,, ,,	,, 28		E, W	34·42	55·09	39·3				
	,, ,, ,,	,, 29		W, E	34·52	54·73	39·8				
	,, ,, ,,	,, 30		E, W	34·61	54·45	40·1	40·0	1·3	0·6	0·47
36	1397 & 1420 Gr. 80	Dec. 27	16 46	E, W	76 47 0·24	+ 12 38·86	39·1				
	,, ,, ,,	,, 28		W, E	0·34	38·53	38·9				
	,, ,, ,,	,, 29		E, W	0·43	38·13	38·6				
	,, ,, ,,	,, 30		W, E	0·53	38·34	38·9	38·9	1·3	0·5	0·33
37	1442 & 1451 Gr. 80	Dec. 27	6 57	W, E	76 58 31·56	+ 1 7·12	38·7				
	,, ,, ,,	,, 28		E, W	31·67	8·62	40·3				
	,, ,, ,,	,, 29		W, E	31·78	7·05	38·8				
	,, ,, ,,	,, 30		E, W	31·88	6·03	37·9	38·9	1·3	0·5	0·33
38	1470 & 1477 Gr. 80	Dec. 27	5 53	E, W	77 18 46·77	− 19 7·26	39·5				
	,, ,, ,,	,, 28		W, E	46·88	6·56	40·3				
	,, ,, ,,	,, 29		E, W	47·00	5·73	41·3	40·4	1·2	1·0	1·20

230. St. Thomas's Mount—*Co-latitude* 76° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1890	° ′		° ′ ″	′ ″	″	″			
39	1487 & 1495 Gr. 80	Dec. 27	20 3	W, E	76 43 9·01	+ 16 31·80	40·8				
	,, ,, ,,	,, 28		E, W	9·12	30·33	39·5				
	,, ,, ,,	,, 29		W, E	9·23	30·71	39·9				
	,, ,, ,,	,, 30		E, W	9·35	30·30	39·7	39·9	1·3	0·5	0·33
								Σ P = 45·5		Σ Pvv = 23·54	

Summary.

No. of pairs 39

No. of observations 123

Mean difference between observations taken E, W and those taken W, E = − 0″·31

Observed Co-latitude (weighted mean) 76° 59′ 39″·35 ± 0″·077

Correction for Height above Sea-level + 0″·01

Final Co-latitude 76° 59′ 39″·36

		°	′	″		″
Astronomical Latitude (A)	=	13	0	20·64	±	0·077
Geodetic Latitude (G)	=	13	0	14·79		
Deflection of plumb-line (A−G)	=		+	5·85		

231. Surantal—*Co-latitude* 65° 45′ +

Latitude ... 24° 14′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 77 43 *Mean Height of Barometer* 28·11 in.

Height ... 1802 feet *Mean Temperature* 59°·9

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	403 & 414 Gr. 80	Jan. 22	4 38	E, W	65 47 33·09	− 1 53·64	39·45				
	" " "	" 23		W, E	33·13	53·87	39·26	39·36	1·0	0·79	0·6241
2	418 & 434 Gr. 80	Jan. 22	7 15	W, E	65 42 40·13	+ 2 57·57	37·70				
	" " "	" 23		E, W	40·16	57·72	37·88	37·79	1·0	0·78	0·6084
3	455 & 468 Gr. 80	Jan. 22	20 24	E, W	65 54 47·01	− 9 5·63	41·38				
	" " "	" 23		W, E	47·03	11·20	35·83	38·60	1·0	0·03	0·0009
4	471 & 475 Gr. 80	Jan. 22	4 41	W, E	65 58 44·89	− 13 6·81	38·08				
	" " "	" 23		E, W	44·91	6·71	38·20	38·14	1·0	0·43	0·1849
5	483 & 513 Gr. 80	Jan. 22	25 33	E, W	66 2 0·20	− 16 19·88	40·32				
	" " "	" 23		W, E	0·23	21·62	38·61	39·47	0·7	0·90	0·5670
6	513 & 500 Gr. 80	Jan. 22	25 24	W, E	65 53 43·91	− 8 4·57	39·34	39·34	0·5	0·77	0·2965
7	517 & 549 Gr. 80	Jan. 22	0 8	W, E	65 45 5·61	+ 0 33·78	39·39				
	" " "	" 23		E, W	5·13	33·97	39·10	39·24	1·0	0·67	0·4489
8	562 & 576 Gr. 80	Jan. 22	0 36	E, W	65 35 53·27	+ 9 44·02	37·29				
	" " "	" 23		W, E	53·29	45·26	38·55	37·92	0·7	0·65	0·2958
9	584 & 562 Gr. 80	Jan. 22	0 37	W, E	65 35 58·35	+ 9 38·15	36·50				
	" " "	" 23		E, W	58·37	39·81	38·18	37·34	0·7	1·23	1·0590
10	602 & 603 Gr. 80	Jan. 22	7 17	W, E	65 41 33·37	+ 4 5·74	39·11				
	" " "	" 23		E, W	33·38	4·90	38·28	38·70	1·0	0·13	0·0169
11	630 & 648 Gr. 80	Jan. 22	2 13	E, W	65 59 10·23	− 13 31·40	38·83				
	" " "	" 23		W, E	10·24	32·59	37·65	38·24	0·7	0·33	0·0762
12	648 & 633 Gr. 80	Jan. 22	2 15	W, E	66 1 15·56	− 15 36·63	38·93				
	" " "	" 23		E, W	15·57	38·03	37·54	38·23	0·7	0·34	0·0809
13	677 & 681 Gr. 80	Jan. 22	2 47	W, E	65 40 42·92	+ 4 56·19	39·11				
	" " "	" 23		E, W	42·91	56·09	39·00	39·06	1·0	0·49	0·2401
14	686 & 704 Gr. 80	Jan. 22	1 24	E, W	66 0 37·32	− 14 58·45	38·87				
	" " "	" 23		W, E	37·33	57·55	39·78	39·32	0·7	0·75	0·3938
15	707 & 686 Gr. 80	Jan. 22	1 19	W, E	65 55 5·52	− 9 26·34	39·18				
	" " "	" 23		E, W	5·53	25·93	39·60	39·39	0·7	0·82	0·4707

231. Surantal—*Co-latitude* 65° 45′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
16	721 & 789 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	18 43	E, W W, E	65 51 28·69 28·69	− 5 51·05 49·49	37·64 39·20	38·42	1·0	0·15	0·0225
17	808 & 836 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	0 23	W, E E, W	65 29 7·90 7·89	+ 16 30·21 31·28	38·11 39·17	38·64	1·0	0·07	0·0049
18	846 & 861 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	8 35	E, W W, E	65 58 45·28 45·27	− 13 7·17 8·20	38·11 37·07	37·59	1·0	0·98	0·9604
19	869 & 888 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	13 2	W, E E, W	65 44 22·50 22·49	+ 1 15·99 17·06	38·49 39·55	39·02	1·0	0·45	0·2025
20	944 Gr. 80 & o Aurigæ ,, ,, ,,	Jan. 24 ,, 25	25 32	E, W W, E	65 44 29·49 29·48	+ 1 9·84 9·93	39·33 39·41	39·37	1·0	0·80	0·6400
21	994 & 998 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	3 40	W, E E, W	66 4 35·92 35·92	− 18 57·68 56·84	38·24 39·08	38·66	1·0	0·09	0·0081
22	1010 & 1021 Gr. 80	Jan. 25	1 46	W, E	65 49 47·50	− 4 7·23	40·27	40·27	0·7	1·70	2·0230
23	1098 & 1127 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	3 38	E, W W, E	65 31 26·24 26·22	+ 14 12·04 12·22	38·28 38·44	38·36	0·7	0·21	0·0309
24	1127 & 1104 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	3 55	W, E E, W	65 48 41·59 41·58	− 3 2·92 3·61	38·67 37·97	38·32	0·7	0·25	0·0438
25	1181 & 1193 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	2 10	W, E E, W	65 57 13·11 13·09	− 11 35·82 34·56	37·29 38·53	37·91	1·0	0·66	0·4356
26	1206 & 1240 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	3 41	E, W W, E	65 36 18·56 18·54	+ 9 18·32 21·37	36·88 39·91	38·40	1·0	0·17	0·0289
27	1261 & 1272 Gr. 80	Jan. 22	12 33	W, E	65 35 32·18	+ 10 4·29	36·47	36·47	0·7	2·10	3·0870
28	1284 & 1297 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	7 59	E, W W, E	65 59 12·34 12·33	− 13 34·16 33·68	38·18 38·65	38·41	1·0	0·16	0·0256
29	1300 & 1311 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	6 38	W, E E, W	65 27 32·28 32·27	+ 18 5·99 5·88	38·27 38·15	38·21	1·0	0·36	0·1296
30	1342 & 1363 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	1 33	W, E E, W	65 52 12·96 12·95	− 6 34·45 34·30	38·51 38·65	38·58	0·7	0·01	0·0001
31	1363 & 1378 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	1 23	E, W W, E	65 42 20·01 20·01	+ 3 18·14 20·26	38·15 40·27	39·21	0·7	0·64	0·2867
32	1378 & 1390 Gr. 80	Jan. 23	1 27	E, W	65 38 0·06	+ 7 39·73	39·79	39·79	0·5	1·22	0·7442
33	1390 & 1342 Gr. 80	Jan. 23	1 37	W, E	65 47 53·00	− 2 14·83	38·17	38·17	0·5	0·40	0·0800
34	1397 & 1411 Gr. 80 ,, ,, ,,	Jan. 22 ,, 23	5 39	E, W W, E	65 41 39·74 39·74	+ 3 58·74 4 0·91	38·48 40·65	39·57	1·0	1·00	1·0000

231. Surantal—*Co-latitude* 65° 45′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
35	1414 & 1436 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	3 43	E, W W, E	65 29 49·93 49·93	+ 15 48·42 46·55	38·35 36·48	37·41	1·0	1·16	1·3456
36	1431 & 1474 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	4 37	W, E E, W	65 29 13·57 13·56	+ 16 25·09 24 52	38·66 38·08	38·37	1·0	0·20	0·0400
37	1482 & 1483 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	8 34	E, W W, E	65 42 50·39 50·38	+ 2 48·91 47·66	39·30 38·04	38·67	0·7	0·10	0·0070
38	1483 & 1500 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	8 27	W, E E, W	65 35 31·31 31·31	+ 10 5·92 7·14	37·23 38·45	37·84	0·7	0·73	0·3730
39	1500 & 1507 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	8 20	E, W W, E	65 41 41·78 41·78	+ 3 56·39 55·99	38·17 37·77	37·97	0·7	0·60	0·2520
40	1507 & 1482 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	8 28	W, E E, W	65 49 0·86 0·86	− 3 20·62 23·50	40·24 37·36	38·80	0·7	0·23	0·0370
41	1524 & 1555 Gr 80 ,, ,, ,,	Jan. 24 ,, 25	2 5	W, E E, W	65 28 4·14 4·14	+ 17 34·36 32·48	38·50 36·62	37·56	1·0	1·01	1·0201
42	1572 & 1577 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	12 33	E, W W, E	65 42 25·07 25·09	+ 3 13·93 14·70	39·00 39·79	39·40	0·7	0·83	0·4822
43	1580 & 1572 Gr. 80 ,, ,, ,,	Jan. 24 ,, 25	12 16	W, E E, W	65 59 47·44 47·46	− 14 6·59 7·67	40·85 39·79	40·32	0·7	1·75	2·1438
									Σ P = 35·8		Σ Pvv = 20·8186

Summary.

No. of pairs 43
No. of observations 81

Mean difference between observations taken E, W and those taken W, E = 0″·00

Observed Co-latitude (weighted mean) 65° 45′ 38″·57 ± 0″·080

Correction for Height above Sea-level + 0″·07

Final Co-latitude 65° 45′ 38″·64

		°	′	″	″
Astronomical Latitude (A)	=	24	14	21·36	± 0·080
Geodetic Latitude (G)	=	24	14	20·42	
Deflection of plumb-line (A − G)	=		+	0·94	

232. Telu—*Co-latitude* 61° 3′ +

Latitude ... 28° 56′ — *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 72 17 — *Mean Height of Barometer* 29·48 in.

Height ... 470 feet — *Mean Temperature* 58°·1

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893-94	° ′		° ′ ″	′ ″	″	″			
1	353 & 368 Gr. 80	Dec. 28	0 32	E, W	61 19 20·65	− 15 32·96	47·69	47·69	0·7	0·12	0·0101
2	361 & 369 Gr. 80	Dec. 29	20 55	E, W	61 6 19·59	− 2 31·81	47·78	47·78	0·7	0·21	0·0309
3	376 & 394 Gr. 80	Dec. 29	7 6	W, E	61 24 25·68	− 20 37·87	47·81	47·81	0·7	0·24	0·0403
4	382 & 388 Gr. 80 " " "	Dec. 28 Jan. 3	5 1	W, E E, W	60 47 28·72 28·61	+ 16 19·45 18·36	48·17 46·97	47·57	0·7	0·00	0·0000
5	382 & 390 Gr. 80 " " "	Dec. 28 Jan. 3	5 1	W, E E, W	60 47 29·90 29·78	+ 16 19·03 17·34	48·93 47·12	48·02	0·7	0·45	0·1418
6	383 & 388 Gr. 80 " " "	Dec. 28 Jan. 3	5 2	W, E E, W	60 46 22·79 22·68	+ 17 25·96 23·78	48·75 46·46	47·60	0·7	0·03	0·0006
7	383 & 390 Gr. 80 " " "	Dec. 28 Jan. 3	5 2	W, E E, W	60 46 23·96 23·85	+ 17 25·53 22·75	49·49 46·60	48·04	0·7	0·47	0·1546
8	401 & 417 Gr. 80 " " "	Dec. 28 Jan. 3	10 58	E, W W, E	61 12 12·04 11·92	− 8 26·33 23·57	45·71 48·35	47·03	1·0	0·54	0·2916
9	403 & 428 Gr. 80 " " " " " "	Dec. 29 " 31 Jan. 1	9 11	E, W W, E W, E	61 15 52·13 52·09 52·07	− 12 4·35 3·69 5·66	47·78 48·40 46·41	47·53	1·2	0·04	0·0019
10	419 & 434 Gr. 80 " " "	Dec. 28 Jan. 3	2 21	W, E E, W	60 49 53·77 53·61	+ 13 53·48 54·41	47·25 48·02	47·63	1·0	0·06	0·0036
11	432 & 498 Gr. 80	Dec. 31	11 15	E, W	61 9 0·44	− 5 12·42	48·02	48·02	0·5	0·45	0·1013
12	450 & 475 Gr. 80 " " "	Dec. 28 Jan. 3	9 34	E, W W, E	61 6 18·71 18·54	− 2 30·87 30·82	47·84 47·72	47·78	0·7	0·21	0·0309
13	460 & 475 Gr. 80 " " "	Dec. 28 Jan. 3	9 33	E, W W, E	61 7 9·59 9·41	− 3 23·47 21·12	46·12 48·29	47·20	0·7	0·37	0·0958
14	467 & 492 Gr. 80 " " "	Dec. 31 Jan. 1	11 19	E, W W, E	61 12 55·63 55·60	− 9 7·14 8·37	48·49 47·23	47·86	0·7	0·29	0·0589
15	467 & 493 Gr. 80 " " "	Dec. 31 Jan. 1	11 19	E, W W, E	61 12 53·69 53·66	− 9 6·01 6·75	47·68 46·91	47·29	0·7	0·28	0·0549

232. Telu—*Co-latitude* 61° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1893-94	° ′		° ′ ″	′ ″	″	″			
16	499 & 517 Gr. 80 " " "	Dec. 28 Jan. 3	4 45	W, E E, W	60 54 19·93 19·72	+ 9 27·55 27 85	47·48 47·57	47 52	1·0	0·05	0·0025
17	513 & 523 Gr. 80 " " "	Dec. 29 Jan. 1	20 25	E, W W, E	60 55 38·71 38·61	+ 8 9·31 9·93	48·02 48·54	48·28	0 7	0·71	0·3529
18	523 & 528 Gr. 80 " " " " " "	Dec. 29 " 31 Jan. 1	20 15	W, E E, W E, W	61 5 54·72 54·65 54 61	− 2 6·64 6·38 7·13	48 08 48 30 47·48	47·95	0·8	0 38	0·1155
19	525 & 526 Gr. 80 " " "	Dec 28 Jan. 3	19 40	E, W W, E	60 58 9·12 8·89	+ 5 39·12 39·12	48·24 48·01	48·12	1·0	0·55	0·3025
20	543 & 556 Gr. 80 " " "	Dec. 28 Jan. 3	34 10	W, E E, W	61 16 49·01 48·75	− 13 2·16 1·00	46·85 47·75	47·30	1·0	0·27	0·0729
21	563 & 589 Gr. 80	Dec. 29	18 19	E, W	60 51 52·23	+ 11 55·92	48·15	48·15	0·7	0·58	0·2355
22	575 & 585 Gr. 80	Dec. 28	41 43	E, W	60 42 43·14	+ 21 5·21	48·35	48·35	0·7	0·78	0·4259
23	603 & 648 Gr. 80	Jan. 3	2 41	E, W	61 6 37·77	− 2 50·00	47·77	47 77	0·7	0·20	0·0280
24	613 & 633 Gr. 80	Dec 29	6 53	E, W	61 23 33·72	− 19 46·90	46·82	46·82	0·7	0·75	0·3938
25	660 & 703 Gr. 80	Dec. 29	11 16	E, W	61 2 48·96	+ 0 59·10	48·06	48·06	0·7	0·49	0·1681
26	680 & 720 Gr. 80 " " "	Dec. 28 Jan. 3	13 44	E, W W, E	60 54 28·56 28·26	+ 9 18·30 19·60	46·86 47·86	47·36	0·7	0·21	0·0309
27	680 & 721 Gr. 80 " " "	Dec. 28 Jan. 3	13 45	E, W W, E	60 53 34·24 33·93	+ 10 13·61 12·57	47·85 46·50	47·17	0·7	0·40	0·1120
28	713 & 720 Gr. 80 " " "	Dec. 28 Jan. 3	13 33	E, W W, E	60 43 49·37 49 06	+ 19 57·19 58·70	46·56 47·76	47·16	0·7	0·41	0·1177
29	713 & 721 Gr 80 " " "	Dec 28 Jan. 3	13 34	E, W W, E	60 42 55·05 54·74	+ 20 52·51 51·67	47·56 46·41	46·98	0·7	0·59	0·2437
30	717 & 720 Gr. 80 " " "	Dec. 28 Jan. 3	13 43	E, W W, E	60 53 26·29 25·99	+ 10 20·83 22·23	47·12 48·22	47·67	0·7	0·10	0·0070
31	717 & 721 Gr. 80 " " "	Dec. 28 Jan. 3	13 44	E, W W, E	60 52 31·97 31·67	+ 11 16·14 15·20	48·11 46·87	47·49	0·7	0·08	0·0045
32	719 & 720 Gr. 80 " " "	Dec. 28 Jan. 3	13 41	E, W W, E	60 51 47·49 47·19	+ 11 58·10 12 1·02	45·59 48·21	46·90	0·7	0·67	0·3142
33	719 & 721 Gr. 80 " " "	Dec. 28 Jan. 3	13 42	E, W W, E	60 50 53·16 52·86	+ 12 53·42 53 99	46·58 46·85	46·71	0·7	0·86	0·5177
34	739 & 784 Gr. 80 " " "	Dec. 28 Jan. 3	13 18	W, E E, W	60 53 0·36 0·04	+ 10 47·67 46·66	48 03 46·70	47·36	0·7	0·21	0·0309

232. Telu—*Co-latitude* 61° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1893-94	° ′		° ′ ″	′ ″	″	″			
35	742 & 784 Gr. 80 „ „ „	Dec. 28 Jan. 3	13 21	W, E E, W	60 56 23·86 23·55	+ 7 23·59 24·73	47·45 48·28	47·86	0·7	0·29	0·0589
36	744 & 751 Gr. 80 „ „ „	Dec. 29 Jan. 1	21 3	W, E E, W	61 16 54·56 54·43	− 13 7·67 7·05	46·89 47·38	47·13	1·0	0·44	0·1936
37	764 & 796 Gr. 80	Dec. 29	26 33	E, W	61 7 28·28	− 3 40·22	48·06	48·06	0·5	0·49	0·1201
38	764 & 798 Gr. 80	Dec. 29	26 35	E, W	61 9 26·65	− 5 39·85	46·80	46·80	0·5	0·77	0·2965
39	792 & 793 Gr. 80 „ „ „	Dec. 28 Jan. 3	14 55	E, W W, E	61 0 59·26 58·96	+ 2 47·97 49·06	47·23 48·02	47·62	1·0	0·05	0·0025
40	800 & 808 Gr. 80 „ „ „	Dec. 28 Jan. 3	4 4	W, E E, W	61 3 17·95 17·64	+ 0 28·37 29·58	46·32 47·22	46·77	1·0	0·80	0·6400
41	809 & 829 Gr. 80	Dec. 29	9 3	W, E	61 18 8·59	− 14 20·85	47·74	47·74	0·7	0·17	0·0202
42	810 & 833 Gr. 80 „ „ „	Dec. 28 Jan. 3	10 30	E, W W, E	60 59 56·46 56·15	+ 3 51·00 51·04	47·46 47·19	47·32	1·0	0·25	0·0625
43	838 & 869 Gr. 80	Dec. 29	17 49	E, W	60 58 15·72	+ 5 32·45	48·17	48·17	0·7	0·60	0·2520
44	851 & 882 Gr. 80 „ „ „	Dec. 28 Jan. 3	9 20	W, E E, W	60 57 53·13 52·83	+ 5 54·56 55·55	47·69 48·38	48·03	1·0	0·46	0·2116
								Σ P = 33·8		Σ Pvv = 6·3513	

Summary.

No. of pairs 44
No. of observations 77

Mean difference between observations taken E, W and those taken W, E = − 0″·21

Observed Co-latitude (weighted mean) 61° 3′ 47″·57 ± 0″·045

Correction for Height above Sea-level + 0″·02

Final Co-latitude 61° 3′ 47″·59

		°	′	″	
Astronomical Latitude (A)	=	28	56	12·41	± 0·045
Geodetic Latitude (G)	=	28	56	11·34	
Deflection of plumb-line (A−G)	=		+	1·07	

233. Thob—*Co-latitude* 63° 56′ +

Latitude ... 26° 3′ — *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 72 25 — *Mean Height of Barometer* in 29·25

Height ... 856 feet — *Mean Temperature* 69°·0

Observer—Captain S. G. Burrard, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
1	38 & 24 Gr. 80	Dec. 25	11 45	W, E	63 39 38·88	+ 17 18·08	56·96				
	,, ,, ,,	,, 26		E, W	38·94	17·31	56·25				
	,, ,, ,,	,, 27		W, E	38·99	18·06	57·05	56·75	1·2	0·31	0·1153
2	42 & 46 Gr. 80	Dec. 26	10 16	E, W	64 4 27·41	− 7 31·00	56·41				
	,, ,, ,,	,, 27		W, E	27·47	30·83	56·64	56·52	1·0	0·54	0·2916
3	56 & 61 Gr. 80	Dec. 25	26 33	E, W	64 5 35·18	− 8 37·78	57·40				
	,, ,, ,,	,, 26		W, E	35·22	38·86	56·36				
	,, ,, ,,	,, 27		E, W	35·26	39·06	56·20	56·65	1·2	0·41	0·2017
4	85 & 75 Gr. 80	Dec. 25	6 43	E, W	63 34 51·55	+ 22 6·63	58·18				
	,, ,, ,,	,, 26		W, E	51·59	4·32	55·91				
	,, ,, ,,	,, 27		E, W	51·64	5·61	57·25	57·11	1·2	0·05	0·0030
5	92 & 114 Gr. 80	Dec. 25	2 31	E, W	63 47 26·56	+ 9 30·35	56·91				
	,, ,, ,,	,, 26		W, E	26·60	32·21	58·81				
	,, ,, ,,	,, 27		E, W	26·64	31·23	57·87	57·86	1·2	0·80	0·7680
6	148 & 137 Gr. 80	Dec. 25	2 41	E, W	64 16 2·19	− 19 7·21	54·98				
	,, ,, ,,	,, 26		W, E	2·23	5·40	56·83				
	,, ,, ,,	,, 27		E, W	2·27	4·76	57·51	56·44	1·2	0·62	0·4613
7	185 & 168 Gr. 80	Dec. 25	20 48	W, E	64 7 17·91	− 10 19·93	57·98				
	,, ,, ,,	,, 26		E, W	17·93	20·97	56·96				
	,, ,, ,,	,, 27		W, E	17·96	20·01	57·95	57·63	1·2	0·57	0·3899
8	210 & 199 Gr. 80	Dec. 25	18 55	E, W	64 0 35·34	− 3 37·17	58·17				
	,, ,, ,,	,, 26		W, E	35·35	38·73	56·62				
	,, ,, ,,	,, 27		E, W	35·37	37·34	58·03	57·61	0·8	0·55	0·2420
9	210 & 200 Gr. 80	Dec. 25	18 55	E, W	64 0 30·02	− 3 32·54	57·48				
	,, ,, ,,	,, 26		W, E	30·03	33·63	56·40				
	,, ,, ,,	,, 27		E, W	30·05	32·50	57·55	57·14	0·8	0·08	0·0051
10	222 & 199 Gr. 80	Dec. 25	18 55	E, W	64 3 59·73	− 7 3·67	56·06				
	,, ,, ,,	,, 26		W, E	59·74	2·51	57·23				
	,, ,, ,,	,, 27		E, W	59·76	3·75	56·01	56·43	0·8	0·63	0·3175
11	222 & 200 Gr. 80	Dec. 25	18 55	E, W	64 3 54·41	− 6 59·10	55·31				
	,, ,, ,,	,, 26		W, E	54·42	57·47	56·95				
	,, ,, ,,	,, 27		E, W	54·43	59·02	55·41	55·89	0·8	1·17	1·0951
12	244 & 248 Gr. 80	Dec. 25	14 38	E, W	63 45 57·58	+ 11 0·09	57·67				
	,, ,, ,,	,, 26		W, E	57·59	10 59·28	56·87				
	,, ,, ,,	,, 27		E, W	57·59	59·58	57·17	57·24	1·2	0·18	0·0389

233. Thob—*Co-latitude* 63° 56′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1892	° ′		° ′ ″	′ ″	″	″			
13	269 & 283 Gr. 80	Dec. 26	37 6	E, W	63 46 6·12	+ 10 51·10	57·22				
	" " "	" 27		W, E	6·12	51·19	57·31	57·26	1·0	0·20	0·0400
14	285 & 295 Gr. 80	Dec. 25	3 0	E, W	63 56 35·42	+ 0 22·90	58·32				
	" " "	" 26		W, E	35·42	21·34	56·76				
	" " "	" 27		E, W	35·42	19·71	55·13	56·74	0·8	0·32	0·0819
15	285 & 300 Gr. 80	Dec. 25	3 0	E, W	63 55 56·40	+ 1 1·38	57·78				
	" " "	" 26		W, E	56·40	0·64	57·04	57·41	0·7	0·35	0·0858
16	285 & 301 Gr. 80	Dec. 25	3 0	E, W	63 55 43·59	+ 1 14·25	57·84				
	" " "	" 26		W, E	43·60	13·09	56·69	57·26	0·7	0·20	0·0280
17	334 & 326 Gr. 80	Dec. 25	3 26	E, W	63 37 8·80	+ 19 48·65	57·45				
	" " "	" 26		W, E	8·79	48·73	57·52				
	" " "	" 27		E, W	8·79	49·54	58·33	57·77	0·8	0·71	0·4033
18	335 & 326 Gr. 80	Dec. 25	3 26	E, W	63 37 8·71	+ 19 49·38	58·09				
	" " "	" 26		W, E	8·71	48·59	57·30	57·69	0·7	0·63	0·2778
19	382 & 374 Gr. 80	Dec. 25	8 30	E, W	64 16 20·73	− 19 24·34	56·39				
	" " "	" 26		W, E	20·72	24·72	56·00				
	" " "	" 27		E, W	20·71	25·23	55·48	55·96	1·2	1·10	1·4520
20	406 & 388 Gr. 80	Dec. 25	1 32	W, E	64 16 52·54	− 19 53·27	59·27				
	" " "	" 26		E, W	52·53	57·49	55·04				
	" " "	" 27		W, E	52·52	55·99	56·53	56·95	0·8	0·11	0·0097
21	406 & 390 Gr. 80	Dec. 25	1 32	W, E	64 16 53·71	− 19 54·94	58·77				
	" " "	" 26		E, W	53·69	58·53	55·16				
	" " "	" 27		W, E	53·68	57·09	56·59	56·84	0·8	0·22	0·0387
22	428 & 425 Gr. 80	Dec. 26	11 38	W, E	63 43 36·28	+ 13 20·54	56·82	56·82	0·7	0·24	0·0403
23	434 & 444 Gr. 80	Dec. 25	5 18	E, W	63 47 24·69	+ 9 33·16	57·85				
	" " "	" 26		W, E	24·58	33·38	57·96				
	" " "	" 27		E, W	24·48	32·77	57·25	57·69	1·2	0·63	0·4763
24	454 Gr. 80	Dec. 25	0 1	W, E	63 57 33·31	− 0 34·95	58·36				
	" "	" 26		E, W	33·29	34·62	58·67				
	" "	" 27		W, E	33·26	36·91	56·35	57·79	1·2	0·73	0·6395
								Σ P =	23·2	Σ Pvv =	7·5027

Summary.

No. of pairs 24
No. of observations 65

Mean difference between observations taken E, W and those taken W, E = − 0″·50

Observed Co-latitude (weighted mean) 63° 56′ 57″·06 ± 0″·080

Correction for Height above Sea-level + 0″·04

Final Co-latitude 63° 56′ 57″·10

		°	′	″	″
Astronomical Latitude (A)	=	26	3	2·90	± 0·080
Geodetic Latitude (G)	=	26	3	5·85	
Deflection of plumb-line (A − G)	=		−	2·95	

234. Tinsia—*Co-latitude* 65° 53′ +

Latitude ... 24° 6′ *Instrument*—Zenith Sector No. 1 used as Zenith Telescope

Longitude ... 77 21 *Mean Height of Barometer* 28·14 in

Height ... 1776 feet *Mean Temperature* 65°·9

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
1	630 & 648 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	2 13	E, W W, E	65 59 10·74 10·81	− 5 39·15 40·72	31·59 30·09	30·84	0·7	0·04	0·0011
2	648 & 633 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	2 15	W, E E, W	66 1 16·08 16·15	− 7 44·60 45·31	31·48 30·84	31·16	0·7	0·28	0·0549
3	686 & 704 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	1 24	W, E E, W	66 0 37·70 37·75	− 7 7·97 8·46	29·73 29·29	29·51	0·7	1·37	1·3138
4	707 & 686 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	1 19	E, W W, E	65 55 5·90 5·95	− 1 35·25 36·91	30·65 29·04	29·84	0·7	1·04	0·7571
5	721 & 789 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	18 43	E, W W, E	65 51 28·94 28·99	+ 2 3·25 0·73	32·19 29·72	30·96	1·0	0·08	0·0064
6	846 & 861 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	8 33	E, W W, E	65 58 45·28 45·30	− 5 14·42 14·04	30·86 31·26	31·06	1·0	0·18	0·0324
7	869 & 888 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	13 2	W, E E, W	65 44 22·43 22·44	+ 9 9·42 8·09	31·85 30·53	31·19	1·0	0·31	0·0961
8	948 & 977 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	6 23	E, W W, E	65 56 14·08 14·08	− 2 43·82 45·62	30·26 28·46	29·36	1·0	1·52	2·3104
9	994 & 998 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	3 40	W, E E, W	66 4 35·73 35·72	− 11 4·19 5·13	31·54 30·59	31·07	1·0	0·19	0·0361
10	1010 & 1021 Gr. 80 ,, ,, ,,	Feb. 14 ,, 16	1 47	E, W W, E	65 49 47·25 47·23	+ 3 44·57 43·61	31·82 30·84	31·33	1·0	0·45	0·2025
11	1206 & 1240 Gr. 80 ,, ,, ,,	Feb. 13 ,, 15	3 41	W, E E, W	65 36 18·02 17·96	+ 17 11·44 13·75	29·46 31·71	30·59	1·0	0·29	0·0841
12	1261 & 1272 Gr. 80 ,, ,, ,,	Feb. 13 ,, 15	12 33	E, W W, E	65 35 31·69 31·64	+ 17 59·11 58·85	30·80 30·49	30·64	1·0	0·24	0·0576

234. Tinsia—*Co-latitude* 65° 53′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
13	1342 & 1363 Gr. 80	Feb. 13	1 33	W, E	65 52 12·50	+ 1 19·73	32·23				
	„ „ „	„ 15		E. W	12·44	18·11	30·55	31·39	1·0	0·51	0·2601
14	1373 & 1390 Gr. 80	Feb. 13	1 44	E. W	65 55 5·39	− 1 34·02	31·37				
	„ „ „	„ 15		W, E	5·33	34·68	30·65	31·01	0·7	0·13	0·0118
15	1390 & 1378 Gr. 80	Feb. 13	1 27	W, E	65 37 59·59	+ 15 32·21	31·80				
	„ „ „	„ 15		E, W	59·53	31·07	30·60	31·20	0·7	0·32	0·0717
16	1397 & 1411 Gr. 80	Feb. 13	5 39	W, E	65 41 39·28	+ 11 51·54	30·82				
	„ „ „	„ 15		E, W	39·21	50·83	30·04	30·43	1·0	0·45	0·2025
17	1470 & 1474 Gr. 80	Feb. 14	5 18	E, W	66 10 30·71	− 16 59·30	31·41				
	„ „ „	„ 16		W, E	30·64	17 0·01	30·63	31·02	1·0	0·14	0·0196
18	1483 & 1498 Gr. 80	Feb. 14	8 35	W, E	65 43 17·47	+ 10 14·12	31·59				
	„ „ „	„ 16		E, W	17·41	14·10	31·51	31·55	0·7	0·67	0·3142
19	1498 & *1507 Gr. 80	Feb. 14	8 28	E, W	65 49 27·96	+ 4 3·53	31·49				
	„ „ „	„ 16		W, E	27·90	2·75	30·65	31·07	0·7	0·19	0·0253
20	1520 & 1547 Gr. 80	Feb. 14	5 58	E, W	65 54 22·60	− 0 52·22	30·38				
	„ „ „	„ 16		W, E	22·53	52·78	29·75	30·06	1·0	0·82	0·6724
21	1572 & 1577 Gr. 80	Feb. 14	12 33	E, W	65 42 24·86	+ 11 5·46	30·32				
	„ „ „	„ 16		W, E	24·80	7·41	32·21	31·27	0·7	0·39	0·1065
22	1580 & 1572 Gr. 80	Feb. 14	12 16	W, E	65 59 47·25	− 6 15·63	31·62				
	„ „ „	„ 16		E, W	47·20	15·07	32·13	31·88	0·7	1·00	0·7000
23	1595 & 1617 Gr. 80	Feb. 14	2 22	W, E	65 59 33·40	− 6 1·23	32·17				
	„ „ „	„ 16		E, W	33·34	1·64	31·70	31·93	0·7	1·05	0·7718
24	1617 & 1621 Gr. 80	Feb. 14	2 25	E, W	65 56 15·38	− 2 44·03	31·35				
	„ „ „	„ 16		W, E	15·32	44·88	30·44	30·90	0·7	0·02	0·0003
25	1632 & 1646 Gr. 80	Feb. 14	11 25	W, E	65 40 20·18	+ 13 11·65	31·83				
	„ „ „	„ 16		E, W	20·13	10·26	30·39	31·11	0·7	0·23	0·0370
26	1646 & 1652 Gr. 80	Feb. 14	11 39	E, W	65 54 18·54	− 0 44·61	33·93				
	„ „ „	„ 16		W, E	18·49	47·25	31·24	32·58	0·7	1·70	2·0230
27	1652 & 1686 Gr. 80	Feb. 14	11 45	W, E	65 48 14·50	+ 5 15·18	29·68				
	„ „ „	„ 16		E, W	14·45	15·87	30·32	30·00	0·7	0·88	0·5421

234. Tinsia—*Co-latitude* 65° 53′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1899	° ′		° ′ ″	′ ″	″	″			
28	1706 & 1632 Gr. 80 " " "	Feb. 14 " 16	11 18	E, W W, E	65 47 11·78 11·74	+ 6 16·47 19·09	28·25 30·83	29·54	0·7	1·34	1·2569
29	1714 & 1728 Gr. 80 " " "	Feb. 14 " 16	7 17	E, W W, E	66 4 15·08 15·03	− 10 43·90 43·04	31·18 31·99	31·58	1·0	0·70	0·4900
30	1730 & 1733 Gr. 80 " " "	Feb. 14 " 15	4 33	W, E E, W	66 2 21·24 21·22	− 8 49·50 50·70	31·74 30·52	31·13	1·0	0·25	0·0625
31	1751 & 1759 Gr. 80 " " "	Feb. 14 " 15	17 10	W, E E, W	66 11 52·93 52·92	− 18 19·56 24·03	33·37 28·89	31·13	1·0	0·25	0·0625
32	1780 & 1794 Gr. 80 " " "	Feb. 14 " 15	0 47	E, W W, E	65 34 46·29 46·28	+ 18 43·74 44·53	30·03 30·81	30·42	1·0	0·46	0·2116
33	1817 & 1843 Gr. 80 " " "	Feb. 14 " 15	20 19	W, E E, W	66 7 50·61 50·60	− 14 19·69 20·55	30·92 30·05	30·49	0·7	0·39	0·1065
34	1643 & 1819 Gr. 80 " " "	Feb. 14 " 15	20 23	E, W W, E	66 12 22·55 22·54	− 18 51·23 51·28	31·32 31·26	31·29	0·7	0·41	0·1177
35	1846 & 1867 Gr. 80 " " "	Feb. 13 " 15	21 40	E, W W, E	66 0 17·12 17·09	− 6 46·40 46·35	30·72 30·74	30·73	1·0	0·15	0·0225
									ΣP = 29·6	ΣPvv = 13·0410	

Summary.

No. of pairs 35
No. of observations 70

Mean difference between observations taken E, W and those taken W, E = − 0″·09

Observed Co-latitude (weighted mean) 65° 53′ 30″·88 ± 0″·077

Correction for Height above Sea-level + 0″·07

Final Co-latitude 65° 53′ 30″·95

		°	′	″	″
Astronomical Latitude (A)	=	24	6	29·05	± 0·077
Geodetic Latitude (G)	=	24	6	27·97	
Deflection of plumb-line (A−G)	=		+	1·08	

235. Tonglu—*Co-latitude* 62° 58′ +

Latitude	...	27° 2′	*Instrument*—Zenith Telescope	
Longitude	...	88 8	*Mean Height of Barometer*	in. 20·70
Height	...	10073 feet	*Mean Temperature*	36°·2

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude: by each observation	Seconds of Co-latitude: Mean	Weight = P	v	P v v
		1902	° ′		° ′ ″	′ ″	″	″			
1	387 & 391 Newcomb	Mar. 4	17 39	E, W	62 42 32·40	+ 16 16·11	48·52	48·52	0·7	0·24	0·0403
2	394 & 413 Newcomb	Mar. 4	22 35	E, W	63 15 1·76	− 16 13·49	48·27	48·27	0·4	0·01	0·0000
3	418 & 415 Newcomb	Mar. 4	22 21	W, E	63 0 40·70	− 1 52·92	47·78	47·78	0·4	0·50	0·1000
4	430 & 432 Newcomb	Mar. 4	16 51	W, E	63 10 16·31	− 11 28·84	47·47	47·47	0·7	0·81	0·4593
5	440 & 454 Newcomb	Mar. 4	6 41	W, E	62 36 18·91	+ 22 30·04	48·95	48·95	0·7	0·67	0·3142
6	468 & 482 Newcomb " " "	Mar. 3 " 4	14 26	E, W W, E	63 22 8·85 8·83	− 23 21·05 21·63	47·80 47·20	47·50	1·0	0·78	0·6084
7	492 & 506 Newcomb " " "	Mar. 3 " 4	21 11	W, E E, W	63 21 19·81 19·76	− 22 31·70 30·82	48·11 48·94	48·53	1·0	0·25	0·0625
8	515 & 517 Newcomb " " "	Mar. 3 " 4	1 12	E, W W, E	63 8 16·07 16·04	− 9 27·37 27·56	48·70 48·48	48·59	1·0	0·31	0·0961
9	529 & 533 Newcomb " " "	Mar. 3 " 4	17 1	W, E E, W	63 30 28·90 28·85	− 31 40·37 40·87	48·53 47·98	48·26	1·0	0·02	0·0004
10	544 Newc. & 1450 Gr. 80 " " " "	Mar. 3 " 4	6 12	E, W W, E	63 2 39·61 39·54	− 3 50·88 51·63	48·73 47·91	48·32	1·0	0·04	0·0016
11	567 & 569 Newcomb " " "	Mar. 3 " 4	21 4	E, W W, E	62 37 51·43 51·36	+ 20 57·06 57·35	48·49 48·71	48·60	1·0	0·32	0·1024
									ΣP = 8·9		ΣPvv = 1·7852

Summary.

No. of pairs 11
No. of observations 17

Mean difference between observations taken E, W and those taken W, E = + 0″·30

Observed Co-latitude (weighted mean)	62° 58′ 48″·28	± 0″·096
Correction for Height above Sea-level	+ 0″·42	

Final Co-latitude 62° 58′ 48″·70

		°	′	″	″
Astronomical Latitude (A)	=	27	1	11·30	± 0·096
Geodetic Latitude (G)	=	27	1	53·54	
Deflection of plumb-line (A−G)	=		−	42·24	

236. Vanakonda—*Co-latitude* 72° 23′ +

Latitude	... 17° 36′	*Instrument*—Zenith Telescope	
Longitude	... 79 25	*Mean Height of Barometer*	in. 28·42
Height	... 1664 feet	*Mean Temperature*	67°·8

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	646 & 664 Gr. 80	Jan. 21	2 6	W, E	72 45 56 94	− 21 56·75	60·19	60·19	0·7	0·48	0·1613
2	677 & 682 Gr. 80	Jan. 17	3 53	W, E	72 20 58·28	+ 3 2·66	60·94				
	„ „ „	„ 21		E, W	58·35	0·88	59·23	60·09	1·0	0·38	0·1444
3	686 & 696 Gr. 80	Jan. 17	8 5	E, W	72 42 4·84	− 18 4·88	59·96				
	„ „ „	„ 21		W. E	4·91	4 91	60·00	59·98	1·0	0·27	0·0729
4	712 & 719 Gr. 80	Jan. 17	1 44	W, E	72 47 41·34	− 23 40·61	60·73				
	„ „ „	„ 21		E, W	41·41	40·71	60·70	60·72	0·7	1·01	0·7141
5	712 & 734 Gr. 80	Jan. 17	1 19	W, E	72 22 38·14	+ 1 21·70	59·84				
	„ „ „	„ 21		E, W	38·20	21·15	59 35	59·60	0·7	0·11	0·0085
6	740 & 754 Gr. 80	Jan. 17	5 14	E, W	72 28 19·87	− 4 18·79	61·08				
	„ „ „	„ 21		W, E	19·92	19·98	59·94	60·51	0·7	0·80	0·4480
7	749 & 754 Gr. 80	Jan. 17	5 23	E, W	72 37 35·64	− 13 34·63	61·01				
	„ „ „	„ 21		W, E	35·70	35·73	59·97	60·49	0·7	0·78	0·4259
8	796 & 800 Gr. 80	Jan. 17	15 20	W, E	72 19 56·48	+ 4 1·54	58·02				
	„ „ „	„ 21		E, W	56·51	2·71	59·22	58·62	0·7	1·09	0·8317
9	800 & 811 Gr. 80	Jan. 17	15 45	E, W	72 43 23·58	− 19 23·89	59·69				
	„ „ „	„ 21		W, E	23·62	24·03	59·59	59·64	0·7	0·07	0·0034
10	816 & 840 Gr. 80	Jan. 17	23 4	W, E	72 8 56·78	+ 15 4·24	61·02				
	„ „ „	„ 21		E, W	56·83	1·61	58·44	59·73	0·7	0·02	0·0003
11	828 & 840 Gr. 80	Jan. 17	23 9	W, E	72 3 50·80	+ 20 10·07	60·87				
	„ „ „	„ 21		E, W	50·84	8·19	59·03	59·95	0·7	0·24	0·0403
12	856 & 861 Gr. 80	Jan. 17	14 55	E, W	72 20 53·69	+ 3 5·39	59·08				
	„ „ „	„ 21		W, E	53·74	6·15	59·89	59·49	1·0	0·22	0·0484

236. Vanakonda—*Co-latitude* 72° 23′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = p	v	P v v
							by each observation	Mean			
		1894	° ′		° ′ ″	′ ″	″	″			
13	888 & 896 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	19 54	W, E E, W	72 36 7·75 7·80	− 12 9·18 8·35	58·57 59·45	59·01	1·0	0·70	0·4900
14	916 & 943 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	0 47	E, W W, E	72 15 11·35 11·39	+ 8 48·25 48·67	59·60 60·06	59·83	1·0	0·12	0·0144
15	948 & 955 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	13 11	W, E E, W	72 45 9·63 9·68	− 21 10·54 10·85	59·09 58·83	58·96	1·0	0·75	0·5625
16	977 Gr. 80 ,, ,,	Jan. 17 ,, 21	0 5	E, W W, E	72 18 32·07 32·11	+ 5 26·80 27·94	58·87 60·05	59·46	1·0	0·25	0·0625
17	992 & 998 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	3 3	W, E E, W	72 47 51·72 51·78	− 23 51·52 50·37	60·20 61·41	60·81	1·0	1·10	1·2100
18	1023 & 1037 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	2 28	E, W W, E	72 45 41·83 41·90	− 21 42·45 41·62	59·38 60·28	59·83	0·7	0·12	0·0101
19	1025 & 1037 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	2 41	E, W W, E	72 32 14·33 14·39	− 8 15·67 13·69	58·66 60·70	59·68	0·7	0·03	0·0006
20	1052 & 1062 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	5 19	W, E E, W	72 22 52·86 52·92	+ 1 6·82 6·54	59·68 59·46	59·57	0·7	0·14	0·0137
21	1063 & 1082 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	5 8	E, W W, E	72 33 48·67 48·73	− 9 49·62 49·17	59·05 59·56	59·31	0·7	0·40	0·1120
22	1099 & 1116 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	12 49	W, E E, W	72 15 11·15 11·21	+ 8 47·63 47·65	58·78 58·86	58·82	1·0	0·89	0·7921
23	1139 & 1155 Gr. 80 ,, ,, ,,	Jan. 17 ,, 21	0 38	E, W W, E	72 52 45·17 45·26	− 28 44·61 45·59	60·56 59·67	60·12	1·0	0·41	0·1681
24	1162 & 1181 Gr. 80	Jan. 17	4 17	W, E	72 23 17·08	+ 0 43·28	60·36	60·36	0·5	0·65	0·2113
25	1181 & 1184 Gr. 80	Jan. 17	4 17	E, W	72 23 57·54	+ 0 2·05	59·59	59·59	0·5	0·12	0·0072
26	1327 & 1350 Gr. 80 ,, ,, ,,	Jan. 19 ,, 20	1 21	W, E E, W	72 34 42·07 42·10	− 10 42·45 42·09	59·62 60·01	59·82	1·0	0·11	0·0121
27	1365 & 1368 Gr. 80 ,, ,, ,,	Jan. 19 ,, 20	0 26	E, W W, E	72 49 33·71 33·75	− 25 31·71 34·39	62·00 59·36	60·68	1·0	0·97	0·9409

236. Vanakonda—*Co-latitude* 72° 23′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
28	1390 & 1402 Gr. 80 " " "	Jan. 19 " 20	8 10	W, E E, W	72 19 44·12 44·16	+ 4 14·93 16·26	59·05 60·42	59·74	1·0	0·03	0·0009
29	1411 & 1413 Gr. 80 " " "	Jan. 19 " 20	0 38	E, W W, E	71 57 56·93 56·97	+ 26 2·73 2·67	59·66 59·64	59·65	1·0	0·06	0·0036
30	1428 & 1436 Gr. 80 " " "	Jan 19 " 20	3 7	W, E E, W	72 19 5·69 5·73	+ 4 53·80 54·89	59·49 60·62	60·06	0·7	0·35	0·0858
31	1428 & 1459 Gr. 80 " " "	Jan. 19 " 20	2 55	W, E E, W	72 31 40·87 40·91	− 7 40·68 40·82	60·19 60·09	60·14	0·7	0·43	0·1294
32	1465 & 1466 Gr. 80 " " "	Jan. 19 " 20	4 24	E, W W, E	72 32 39·92 39·97	− 8 40·42 40·91	59·50 59·06	59·28	1·0	0·43	0·1849
33	1474 & 1480 Gr. 80 " " "	Jan. 19 " 20	11 28	W, E E, W	72 18 40·92 40·96	+ 5 17·89 17·76	58·81 58·72	58·77	1·0	0·94	0·8836
34	1494 & 1524 Gr. 80	Jan. 20	5 13	W, E	72 44 51·06	− 20 50·57	60·49	60·49	0·5	0·78	0·3042
35	1494 & 1529 Gr. 80	Jan. 20	5 12	W, E	72 46 16·55	− 22 15·62	60·93	60·93	0·5	1·22	0·7442
36	1504 & 1524 Gr. 80	Jan. 20	5 6	W, E	72 37 44·21	− 13 44·12	60·09	60·09	0·5	0·38	0·0722
37	1529 & 1504 Gr. 80	Jan. 20	5 5	E, W	72 39 9·70	− 15 9·17	60·53	60·53	0·5	0·82	0·3362
38	1546 & 1565 Gr. 80 " " "	Jan. 19 " 20	19 47	W, E E, W	72 31 38·56 38·62	− 7 39·89 38·68	58·67 59·94	59·31	1·0	0·40	0·1600
39	1571 & 1572 Gr. 80 " " "	Jan. 19 " 20	5 50	E, W W, E	72 23 53·07 53·14	+ 0 6·02 5·44	59·09 58·58	58·84	1·0	0·87	0·7569
40	1585 & 1596 Gr. 80 " " "	Jan. 19 " 20	7 24	W, E E, W	72 14 24·10 24·16	+ 9 35·00 35·81	59·10 59·97	59·54	1·0	0·17	0·0289
41	1603 & 1617 Gr. 80 " " "	Jan. 19 " 20	3 35	E, W W, E	71 54 38·88 38·95	+ 29 20·62 19·58	59·50 58·53	59·02	1·0	0·69	0·4761
42	1621 & 1628 Gr. 80 " " "	Jan. 19 " 20	8 32	W, E E, W	72 1 47·90 47·97	+ 22 11·02 11·20	58·92 59·17	59·05	1·0	0·66	0·4356
43	1650 & 1665 Gr. 80 " " "	Jan 19 " 20	6 46	E, W W, E	72 43 39·03 39·11	− 19 39·29 39·04	59·74 60·07	59·91	1·0	0·20	0·0400

236. Vanakonda—*Co-latitude* 72° 23′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
44	1673 & 1681 Gr. 80	Jan. 19	2 26	W, E	72 3 26·76	+ 20 33·07	59·83				
	„ „ „	„ 20		E, W	26·85	32·46	59·31	59·57	0·7	0·14	0·0137
45	1673 & 1703 Gr. 80	Jan. 19	2 51	W, E	72 28 18·39	− 4 18·67	59·72				
	„ „ „	„ 20		E, W	18·48	18·58	59·90	59·81	0·7	0·10	0·0070
46	1708 & 1717 Gr. 80	Jan. 19	10 18	E, W	72 12 46·06	+ 11 12·69	58·75				
	„ „ „	„ 20		W, E	46·15	14·05	60·20	59·48	1·0	0·23	0·0529
								Σ P = 37·9		Σ Pvv = 12·2228	

Summary.

No. of pairs 46
No. of observations 85

Mean difference between observations taken E, W and those taken W, E = − 0″·02

Observed Co-latitude (weighted mean) 72° 23′ 59″·71 ± 0″·057

Correction for Height above Sea-level + 0″·07

Final Co-latitude 72° 23′ 59″·78

		°	′	″	″
Astronomical Latitude (A)	=	17	36	0·22	± 0·057
Geodetic Latitude (G)	=	17	36	6·87	
Deflection of plumb-line (A−G)	=		−	6·65	

237. Viraria—*Co-latitude* 65° 3′ +

Latitude	... 24° 57′	*Instrument*—Zenith Telescope		
Longitude	... 71 5	*Mean Height of Barometer*	in. 29·58	
Height	... 460 feet	*Mean Temperature*	67°·6	

Observer—Lieut. H. M. Cowie, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
1	10 & 14 Newcomb	Nov. 29	10 48	W, E	64 33 40·49	+ 29 47·40	27·89	27·89	0·7	0·55	0·2118
2	75 Gr. 80 & 36 Newc. " " " "	Nov. 29 " 30	5 17	E, W W, E	64 57 43·75 43·75	+ 5 44·44 43·83	28·19 27·58	27·89	0·7	0·55	0·2118
3	36 Newc. & 113 Gr. 80 " " " "	Nov. 29 " 30	5 39	W, E E, W	65 19 4·61 4·60	− 15 37·14 37·40	27·47 27·20	27·34	0·7	0·00	0·0000
4	136 & 160 Gr. 80 " " "	Nov. 29 " 30	6 19	E, W W, E	65 2 4·22 4·21	+ 1 23·45 23·34	27·67 27·55	27·61	0·7	0·27	0·0510
5	136 & 181 Gr. 80 " " "	Nov. 29 " 30	6 25	E, W W, E	64 55 43·87 43·87	+ 7 43·31 43·22	27·18 27·09	27·14	0·7	0·20	0·0280
6	185 Gr. 80 & 79 Newc. " " " "	Nov. 29 " 30	21 49	W, E E, W	65 5 35·86 35·85	− 2 8·76 8·39	27·10 27·46	27·28	1·0	0·06	0·0036
7	82 & 93 Newcomb " " "	Nov. 29 " 30	19 41	E, W W, E	64 40 30·34 30·32	+ 22 57·13 57·01	27·47 27·33	27·40	0·7	0·06	0·0025
8	88 & 93 Newcomb " " "	Nov. 29 " 30	19 38	E, W W, E	64 43 56·06 56·03	+ 19 29·19 30·48	25·25 26·51	25·88	0·7	1·46	1·4921
9	97 & 108 Newcomb " " "	Nov. 29 " 30	16 8	W, E E, W	65 12 43·84 43·83	− 9 16·32 16·39	27·52 27·44	27·48	1·0	0·14	0·0196
10	118 & 121 Newcomb " " "	Nov. 29 " 30	4 23	E, W W, E	65 17 12·62 12·59	− 13 45·17 45·18	27·45 27·41	27·43	1·0	0·09	0·0081
11	296 & 317 Gr. 80 " " "	Nov. 29 " 30	7 44	W, E E, W	64 55 36·30 36·27	+ 7 50·89 50·91	27·19 27·18	27·19	1·0	0·15	0·0225
12	334 & 339 Gr. 80 " " "	Nov. 29 " 30	4 33	E, W W, E	64 42 18·21 18·18	+ 21 9·35 9·52	27·56 27·70	27·63	1·0	0·29	0·0841

237. Viraria—*Co-latitude* 65° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
13	347 Gr. 80 & 155 Newc.	Nov. 29	7 50	W, E	64 54 54·66	+ 8 31·97	26·63	26·60	1·0	0·74	0·5476
	" " " "	" 30		E, W	54·63	31·94	26·57				
14	161 Newc. & 414 Gr. 80	Nov. 28	3 39	W, E	64 48 47·86	+ 14 39·43	27·29	27·34	0·7	0·00	0·0000
	" " " "	Dec. 1		E, W	47·71	39·68	27·39				
15	414 Gr. 80 & 185 Newc.	Nov. 28	3 57	E, W	65 6 28·51	− 3 1·12	27·39	27·28	0·7	0·06	0·0025
	" " " "	Dec. 1		W, E	28·37	1·21	27·16				
16	471 Gr. 80 & 203 Newc.	Nov. 28	4 1	W, E	65 18 36·83	− 15 9·27	27·56	27·63	0·7	0·29	0·0589
	" " " "	Dec. 1		E, W	36·70	9·01	27·69				
17	471 Gr. 80 & 209 Newc.	Nov. 28	3 57	W, E	65 15 14·27	− 11 46·76	27·51	27·55	0·7	0·21	0·0309
	" " " "	Dec. 1		E, W	14·13	46·54	27·59				
18	589 Gr. 80 & 248 Newc.	Nov. 28	14 27	W, E	64 43 4·86	+ 20 22·49	27·35	27·42	1·0	0·08	0·0064
	" " " "	Dec. 1		E, W	4·74	22·74	27·48				
19	256 & 258 Newcomb	Nov. 28	3 28	E, W	64 43 36·41	+ 19 50·83	27·24	27·12	1·0	0·22	0·0484
	" " "	Dec. 1		W, E	36·29	50·70	26·99				
20	273 & 283 Newcomb	Nov. 28	9 27	E, W	65 7 29·66	− 4 2·27	27·39	27·10	1·0	0·24	0·0576
	" " "	Dec. 1		W, E	29·57	2·76	26·81				
21	740 & 776 Gr. 80	Nov. 28	12 30	W, E	65 11 14·06	− 7 46·07	27·99	27·65	0·7	0·31	0·0673
	" " "	Dec. 1		E, W	13·97	46·67	27·30				
22	749 & 776 Gr. 80	Nov. 28	12 39	W, E	65 20 30·42	− 17 2·49	27·93	27·84	0·7	0·50	0·1750
	" " "	Dec. 1		E, W	30·34	2·59	27·75				
23	327 Newc. & 869 Gr. 80	Nov. 28	13 34	W, E	65 12 6·93	− 8 39·77	27·16	27·47	1·0	0·13	0·0169
	" " " "	Dec. 1		E, W	6·91	39·14	27·77				
24	343 Newc & 902 Gr. 80	Nov. 28	3 21	E, W	64 48 45·24	+ 14 41·80	27·04	27·22	1·0	0·12	0·0144
	" " " "	Dec. 1		W, E	45·20	42·20	27·40				
25	348 Newc. & 943 Gr. 80	Nov. 28	7 34	W, E	65 27 6·77	− 23 39·32	27·45	27·63	0·7	0·29	0·0589
	" " " "	Dec. 1		E, W	6·77	38·97	27·80				
26	348 & 371 Newcomb	Nov. 28	7 13	W, E	65 5 43·57	− 2 16·52	27·05	27·19	0·7	0·15	0·0158
	" " "	Dec. 1		E, W	43·57	16·25	27·32				
27	994 & 1021 Gr. 80	Dec. 3	2 36	E, W	65 0 27·44	+ 2 59·70	27·14	27·01	1·0	0·33	0·1089
	" " "	" 4		W, E	27·43	59·45	26·88				

237. Viraria—*Co-latitude* 65° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
28	1059 & 1099 Gr. 80	Dec. 3	5 41	W, E	65 7 45·72	− 4 18·44	27·28				
	" " "	" 4		E, W	45·73	18·66	27·07	27·18	1·0	0·16	0·0256
29	426 & 430 Newcomb	Dec. 3	14 45	W, E	65 16 8·37	− 12 40·94	27·43				
	" " "	" 4		E, W	8·38	41·13	27·25	27·34	1·0	0·00	0·0000
30	440 & 458 Newcomb	Dec. 3	9 0	W, E	64 55 2·20	+ 8 24·84	27·04				
	" " "	" 4		E, W	2·22	25·08	27·30	27·17	0·7	0·17	0·0202
31	440 & 461 Newcomb	Dec. 3	8 53	W, E	64 47 53·49	+ 15 33·58	27·07				
	" " "	" 4		E, W	53·53	33·27	26·80	26·94	0·7	0·40	0·1120
32	468 & 479 Newcomb	Dec. 4	16 17	W, E	65 13 41·66	− 10 14·65	27·01	27·01	0·5	0·33	0·0545
33	475 & 479 Newcomb	Dec. 4	16 11	W, E	65 19 34·25	− 16 7·50	26·75	26·75	0·5	0·59	0·1741
34	484 Newc. & 1311 Gr. 80	Dec. 3	7 7	W, E	64 59 57·89	+ 3 29·19	27·08				
	" " " "	" 4		E, W	57·95	28·52	26·47	26·78	1·0	0·56	0·3136
35	498 & 511 Newcomb	Dec. 3	8 48	W, E	65 8 45·24	− 5 17·43	27·81				
	" " "	" 4		E, W	45·30	17·50	27·80	27·81	1·0	0·47	0·2209
36	517 & 521 Newcomb	Dec. 3	3 7	E, W	65 1 56·04	+ 1 31·35	27·39				
	" " "	" 4		W, E	56·11	31·21	27·32	27·36	0·7	0·02	0·0003
37	521 & 531 Newcomb	Dec. 3	2 51	W, E	65 17 56·69	− 14 29·10	27·59				
	" " "	" 4		E, W	56·78	29·26	27·52	27·56	0·7	0·22	0·0339
38	544 & 558 Newcomb	Dec. 3	4 11	E, W	65 3 11·50	+ 0 15·98	27·48				
	" " "	" 4		W, E	11·60	15·55	27·15	27·32	0·7	0·02	0·0003
39	1459 Gr. 80 & 558 Newc	Dec. 3	4 23	E, W	65 15 48·26	− 12 20·58	27·68	27·68	0·5	0·34	0·0578
40	1495 & 1500 Gr. 80	Dec. 3	8 40	W, E	65 22 35·62	− 19 8·41	27·21				
	" " "	" 4		E, W	35·73	8·68	27·05	27·13	1·0	0·21	0·0441
41	578 & 583 Newcomb	Dec. 3	13 54	W, E	65 2 45·00	+ 0 42·84	27·84				
	" " "	" 4		E, W	45·12	42·08	27·20	27·52	1·0	0·18	0·0324
42	1541 Gr. 80 & 595 Newc.	Dec. 4	9 44	W, E	64 55 17·40	+ 8 9·83	27·23	27·23	0·7	0·11	0·0085
43	1555 & 1571 Gr. 80	Dec. 3	1 37	E, W	64 59 48·11	+ 3 39·25	27·36				
	" " "	" 4		W, E	48·25	38·78	27·03	27·20	1·0	0·14	0·0196
44	1585 Gr. 80 & 623 Newc.	Dec. 4	0 27	E, W	65 19 50·47	− 16 22·80	27·67	27·67	0·7	0·33	0·0762
45	634 & 638 Newcomb	Dec. 3	16 31	W, E	64 58 47·96	+ 4 39·20	27·16				
	" " "	" 4		E, W	48·11	38·88	26·99	27·08	1·0	0·26	0·0676
46	641 Newc. & 1662 Gr. 80	Dec. 3	7 22	E, W	65 24 2·49	− 20 35·03	27·46				
	" " " "	" 4		W, E	2·66	35·49	27·17	27·32	1·0	0·02	0·0004
47	1464 & 1474 Newcomb	Nov. 29	13 46	E, W	64 31 49·81	+ 31 38·84	28·65				
	" " "	" 30		W, E	49·89	38·52	28·41	28·53	1·0	1·19	1·4161

237. Viraria—*Co-latitude* 65° 3′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N.P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1900	° ′		° ′ ″	′ ″	″	″			
48	1482 & 1488 Newcomb	Nov. 29	25 9	W, E	65 22 21·31	− 18 53·81	27·50				
	" " "	" 30		E, W	21·35	53·56	27·79	27·65	1·0	0·31	0·0961
49	1495 Newc. & 3818 Gr. 80	Nov. 29	13 26	E, W	64 53 43·64	+ 9 43·28	26·92				
	" " " "	" 30		W, E	43·69	43·46	27·15	27·04	0·7	0·30	0·0630
50	1495 & 1517 Newcomb	Nov. 29	13 40	E, W	65 7 41·97	− 4 14·80	27·17				
	" " "	" 30		W, E	42·02	14·58	27·44	27·31	0·7	0·03	0·0006
51	1520 & 1528 Newcomb	Nov. 29	16 28	W, E	64 39 40·76	+ 23 46·99	27·75				
	" " "	" 30		E, W	40·82	46·10	26·92	27·34	0·7	0·00	0·0000
52	1520 & 1534 Newcomb	Nov. 29	16 48	W, E	65 0 26·75	+ 3 0·65	27·40				
	" " "	" 30		E, W	26·80	0·27	27·07	27·24	0·7	0·10	0·0070
53	3908 Gr. 80 & 1552 Newc.	Nov. 29	23 53	E, W	65 24 7·11	− 20 39·44	27·67				
	" " " "	" 30		W, E	7·15	39·58	27·57	27·62	1·0	0·28	0·0784
54	1561 & 1583 Newcomb	Nov. 29	6 6	W, E	65 19 15·77	− 15 48·41	27·36				
	" " "	" 30		E, W	15·80	48·87	26·93	27·15	1·0	0·19	0·0361
									Σ P = 44·7		Σ Pvv = 6·3039

Summary.

No. of pairs 54
No. of observations 102

Mean difference between observations taken E, W and those taken W, E = 0″·00

Observed Co-latitude (weighted mean)	65°	3′	27″·34	± 0″·035
Correction for Height above Sea-level		+	0″·02	
Final Co-latitude	**65°**	**3′**	**27″·36**	

		°	′	″	″
Astronomical Latitude (A)	=	24	56	32·64	± 0·035
Geodetic Latitude (G)	=	24	56	36·13	
Deflection of plumb-line (A−G)	=		−	3·49	

238. Vizagapatam Base-line N. End—*Co-latitude* 71° 59′ +

Latitude ... 18° 1′ *Instrument*—Zenith Telescope

Longitude ... 83 16 *Mean Height of Barometer* 29·82 in.

Height ... 181 feet *Mean Temperature* 69°·0

Observer—Lieut. E. A. Tandy, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
1	42 & 61 Gr. 80 " " "	Dec. 17 " 18	18 25	W, E E, W	72 11 18·18 18·25	− 12 14·69 17·50	3·49 0·75	2·12	1·0	1·21	1·4641
2	68 & 74 Gr. 80 " " "	Dec. 18 " 19	11 24	W, E E, W	72 12 0·84 0·90	− 12 57·07 57·38	3·77 3·52	3·65	1·0	0·32	0·1024
3	92 & 120 Gr. 80 " " " " " "	Dec. 17 " 18 " 19	10 52	E, W W, E W, E	72 5 49·93 49·90 50·05	− 6 47·17 46·93 47·00	2·76 3·06 3·05	2·91	1·2	0·42	0·2117
4	148 & 162 Gr. 80	Dec. 24	10 33	W, E	72 6 1·21	− 6 57·51	3·70	3·70	0·7	0·37	0·0958
5	167 & 188 Gr. 80 " " "	Dec. 18 " 19	17 8	W, E E, W	72 2 28·98 29·03	− 3 25·75 24·44	3·23 4·59	3·91	1·0	0·58	0·3364
6	196 & 199 Gr. 80 " " "	Dec. 17 " 19	11 15	W, E E, W	71 41 57·06 57·16	+ 17 7·27 6·41	4·33 3·57	3·95	1·0	0·62	0·3844
7	220 & 239 Gr. 80 " " "	Dec. 17 " 18	0 23	E, W W, E	71 39 56·51 56·56	+ 19 6·03 7·42	2·54 3·98	3·26	1·0	0·07	0·0049
8	264 & 273 Gr. 80 " " "	Dec. 22 " 23	1 26	W, E E, W	71 39 16·24 16·28	+ 19 46·84 46·30	3·08 2·58	2·83	1·0	0·50	0·2500
9	296 & 331 Gr. 80 " " "	Dec. 22 " 23	0 51	E, W W, E	71 49 21·94 21·99	+ 9 41·19 41·40	3·13 3·39	3·26	1·0	0·07	0·0049
10	342 & 353 Gr. 80 " " "	Dec. 22 " 23	9 55	W, E E, W	71 43 20·03 20·08	+ 15 42·24 44·18	2·27 4·26	3·27	0·7	0·06	0·0025
11	353 & 369 Gr. 80 " " "	Dec. 22 " 23	10 5	E, W W, E	71 54 18·27 18·31	+ 4 43·07 45·80	1·34 4·11	2·73	0·7	0·60	0·2520
12	390 & 411 Gr. 80 " " "	Dec. 21 " 22	6 6	W, E E, W	71 52 58·96 58·99	+ 6 4·87 4·40	3·83 3·39	3·61	1·0	0·28	0·0784

238. Vizagapatam Base-line N. End—*Co-latitude* 71° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = P	v	P v v
							by each observation	Mean			
		1898	° ′		° ′ ″	′ ″	″	″			
13	449 & 460 Gr. 80	Dec. 21	20 40	W, E	72 12 22·73	− 13 20·09	2·64				
	" " "	" 22		E, W	22·74	20·28	2·46	2·55	1·0	0·78	0·6084
14	467 & 475 Gr. 80	Dec. 16	0 56	E, W	71 34 47·78	+ 24 15·62	3·40				
	" " "	" 17		W, E	47·78	14·99	2·77	3·09	1·0	0·24	0·0576
15	539 & 576 Gr. 80	Dec. 21	5 37	E, W	71 48 16·44	+ 10 46·53	2·97				
	" " "	" 22		W, E	16·46	46·37	2·83	2·90	1·0	0·43	0·1849
16	607 & 610 Gr. 80	Dec. 16	21 29	W, E	71 45 56·02	+ 13 7·14	3·16				
	" " "	" 21		E, W	56·08	6·53	2·61	2·89	1·0	0·44	0·1936
17	664 & 677 Gr. 80	Dec. 16	3 12	W, E	71 39 34·11	+ 19 29·23	3·34				
	" " "	" 21		E, W	34·17	28·06	2·23	2·79	1·0	0·54	0·2916
18	698 & 703 Gr. 80	Dec. 16	0 34	E, W	71 44 41·73	+ 14 20·90	2·63				
	" " "	" 21		W, E	41·81	20·97	2·78	2·71	0·7	0·62	0·2691
19	703 & 712 Gr. 80	Dec. 16	0 38	W, E	71 40 17·91	+ 18 44·50	2·41				
	" " "	" 21		E, W	18·01	44·66	2·67	2·54	0·7	0·79	0·4369
20	792 & 823 Gr. 80	Dec. 21	3 41	E, W	72 14 5·12	− 15 1·32	3·80				
	" " "	" 22		W, E	5·16	3·89	1·27	2·54	1·0	0·79	0·6241
21	836 & 869 Gr. 80	Dec. 22	6 27	E, W	72 19 9·54	− 20 6·14	3·40	3·40	0·7	0·07	0·0034
22	892 & 916 Gr. 80	Dec. 21	0 37	E, W	72 5 41·72	− 6 38·26	3·46	3·46	0·7	0·13	0·0118
23	930 & 953 Gr. 80	Dec. 16	7 59	E, W	72 8 43·43	− 9 41·38	2·05				
	" " "	" 21		W, E	43·60	41·65	1·95	2·00	1·0	1·33	1·7689
24	962 & 999 Gr. 80	Dec. 18	1 38	E, W	71 53 38·33	+ 5 26·26	4·59				
	" " "	" 21		W, E	37·83	25·58	3·41	4·00	1·0	0·67	0·4489
25	1043 & 1062 Gr. 80	Dec. 18	5 25	E, W	72 17 5·82	− 18 2·18	3·64				
	" " "	" 21		W, E	5·64	1·91	3·73	3·69	1·0	0·36	0·1296
26	1099 & 1116 Gr. 80	Dec. 21	12 49	E, W	72 15 29·15	− 16 26·84	2·31				
	" " "	" 22		W, E	29·20	25·77	3·43	2·87	1·0	0·46	0·2116
27	1150 & 1159 Gr. 80	Dec. 21	7 37	W, E	72 23 24·47	− 24 20·49	3·98				
	" " "	" 22		E, W	24·52	20·23	4·29	4·14	1·0	0·81	0·6561
28	1184 & 1256 Gr. 80	Dec. 18	4 26	W, E	72 15 48·12	− 16 44·08	4·04				
	" " "	" 21		E, W	48·34	45·48	2·86	3·45	1·0	0·12	0·0144
29	1271 & 1283 Gr. 80	Dec. 18	9 46	E, W	71 45 17·94	+ 13 46·12	4·06				
	" " "	" 21		W, E	18·16	44·78	2·94	3·50	1·0	0·17	0·0289
30	1285 & 1303 Gr. 80	Dec. 18	9 0	W, E	71 52 33·45	+ 6 30·37	3·82	3·82	1·0	0·49	0·2401
31	1311 & 1327 Gr. 80	Dec. 18	0 26	E, W	71 40 14·17	+ 18 48·60	2·77				
	" " "	" 21		W, E	14·43	47·08	1·51	2·14	0·7	1·19	0·9913

238. Vizagapatam Base-line N. End—*Co-latitude* 71° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
32	1327 & 1365 Gr. 80	Dec. 18	0 35	W, E	71 49 49·40	+ 9 13·86	3·26				
	„ „ „	„ 21		E, W	49·67	12·04	1·71	2·49	0·7	0·84	0·4939
33	1411 & 1413 Gr. 80	Dec. 18	0 38	W, E	71 59 2·75	+ 0 2·18	4·93				
	„ „ „	„ 21		E, W	3·03	1·69	4·72	4·83	1·0	1·50	2·2500
34	1452 & 1467 Gr. 80	Dec. 18	14 40	E, W	71 34 45·61	+ 24 17·20	2·81				
	„ „ „	„ 20		W, E	45·66	16·12	1·78	2·30	1·0	1·03	1·0609
35	1474 & 1480 Gr. 80	Dec. 18	11 28	W, E	72 19 54·51	− 20 51·12	3·39				
	„ „ „	„ 20		E, W	54·74	50·71	4·03	3·71	1·0	0·38	0·1444
36	1499 & 1517 Gr. 80	Dec. 18	12 34	E, W	71 56 35·65	+ 2 28·29	3·94				
	„ „ „	„ 20		W, E	35·88	27·76	3·64	3·79	0·7	0·46	0·1481
37	1517 & 1520 Gr. 80	Dec. 18	12 17	W, E	72 13 26·25	− 14 22·44	3·81				
	„ „ „	„ 20		E, W	26·50	24·23	2·27	3·04	0·7	0·29	0·0589
38	1554 & 1573 Gr. 80	Dec. 19	7 44	W, E	72 6 52·53	− 7 50·05	2·48				
	„ „ „	„ 20		E, W	52·66	49·66	3·00	2·74	1·0	0·59	0·3481
39	1580 & 1592 Gr. 80	Dec. 19	18 29	E, W	72 12 39·81	− 13 35·23	4·58				
	„ „	„ 20		W, E	39·95	36·16	3·79	4·19	1·0	0·86	0·7396
40	1603 & 1617 Gr. 80	Dec. 19	3 35	W, E	71 56 9·07	+ 2 55·57	4·64				
	„ „ „	„ 20		E, W	9·21	54·43	3·64	4·14	1·0	0·81	0·6561
41	1622 & 1637 Gr. 80	Dec. 19	14 45	E, W	72 19 47·26	− 20 42·91	4·35				
	„ „ „	„ 20		W, E	47·42	45·43	1·99	3·17	1·0	0·16	0·0256
42	1652 & 1666 Gr. 80	Dec. 19	5 44	E, W	71 48 43·20	+ 10 20·77	3·97				
	„ „ „	„ 23		W, E	43·84	18·70	2·54	3·26	1·0	0·07	0·0049
43	1673 & 1681 Gr. 80	Dec. 19	2 26	W, E	72 5 3·04	− 5 59·59	4·35				
	„ „ „	„ 20		E, W	4·09	59·98	4·11	4·23	1·0	0·90	0·8100
44	1708 & 1717 Gr. 80	Dec. 20	10 18	W, E	72 14 25·38	− 15 22·63	3·75				
	„ „ „	„ 23		E, W	25·89	22·60	3·29	3·52	1·0	0·19	0·0361
45	1729 & 1733 Gr. 80	Dec. 19	10 48	W, E	72 17 48·21	− 18 44·80	3·41				
	„ „ „	„ 20		E, W	48·39	44·71	3·68	3·55	1·0	0·22	0·0484
46	1743 & 1748 Gr. 80	Dec. 19	16 45	E, W	71 59 8·24	− 0 4·28	3·96				
	„ „ „	„ 20		W, E	8·42	4·73	3·69	3·83	1·0	0·50	0·2500
47	1763 & 1793 Gr. 80	Dec. 19	2 22	W, E	71 39 6·40	+ 19 59·04	5·44				
	„ „ „	„ 20		E, W	6·59	57·28	3·87	4·66	1·0	1·33	1·7689
48	1798 & 1802 Gr. 80	Dec. 19	15 32	E, W	71 53 51·04	+ 5 12·67	3·71				
	„ „ „	„ 20		W, E	51·23	11·61	2·84	3·28	1·0	0·05	0·0025
49	1816 & 1827 Gr. 80	Dec. 19	0 59	W, E	72 0 52·27	− 1 48·52	3·75	3·75	0·7	0·42	0·1235
50	1862 & 1865 Gr. 80	Dec. 20	2 50	E, W	72 2 41·76	− 3 40·03	1·73				
	„ „ „	„ 23		W, E	42·39	39·28	3·11	2·42	1·0	0·91	0·8281

238. Vizagapatam Base-line N. End—*Co-latitude* 71° 59′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1898	° ′		° ′ ″	′ ″	″	″			
51	1888 & 1898 Gr. 80	Dec. 19	8 35	E, W	72 8 24·39	− 9 19·82	4·57				
	" " "	" 20		W, E	24·63	19·10	5·53	5·05	1·0	1·72	2·9584
52	4003 & 4049 Gr. 80	Dec. 18	10 11	E, W	71 53 39·73	+ 5 23·55	3·28				
	" " "	" 19		W, E	39·81	24·26	4·07	3·68	1·0	0·35	0·1225
								Σ P = 48·6		Σ Pvv = 23·2376	

Summary.

No. of pairs 52
No. of observations 100

Mean difference between observations taken E, W and those taken W, E = − 0″·10

Observed Co-latitude (weighted mean) 71° 59′ 3″·33 ± 0″·065

Correction for Height above Sea-level + 0″·01

Final Co-latitude 71° 59′ 3″·34

		°	′	″	″
Astronomical Latitude (A)	=	18	0	56·66	± 0·065
Geodetic Latitude (G)	=	18	1	2·93	
Deflection of plumb-line (A − G)	=		−	6·27	

239. Waltair—*Co-latitude* 72° 16′ +

Latitude	... 17° 43′	*Instrument*—Zenith Telescope	
Longitude	... 83 22	*Mean Height of Barometer*	in. 29·85
Height	... 200 feet	*Mean Temperature*	74°·6

Observer—Captain G. P. Lenox Conyngham, R.E.

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
1	1365 & 1395 Gr. 80 " " "	Mar. 16 " 17	0 11	E, W W, E	72 12 57·74 57·71	+ 3 42·06 42·33	39·80 40·04	39·92	0·7	0·37	0·0958
2	1365 & 1411 Gr. 80 " " "	Mar. 16 " 17	0 32	E, W W, E	71 51 48·85 48·81	+ 24 50·52 51·07	39·37 39·88	39·63	0·7	0·08	0·0045
3	1368 & 1395 Gr. 80 " " "	Mar. 16 " 17	0 37	E, W W, E	72 38 30·78 30·75	− 21 49·85 51·06	40·93 39·69	40·31	0·7	0·76	0·4043
4	1411 & 1368 Gr. 80 " " "	Mar. 16 " 17	0 58	W, E E, W	72 17 21·89 21·85	− 0 41·40 42·34	40·49 39·51	40·00	0·7	0·45	0·1418
5	1418 & 1449 Gr. 80 " " "	Mar. 16 " 17	7 26	W, E E, W	72 32 47·57 47·54	− 16 7·19 6·56	40·38 40·98	40·68	1·0	1·13	1·2769
6	1451 & 1474 Gr. 80 " " "	Mar. 16 " 17	11 33	E, W W, E	72 23 21·11 21·07	− 6 41·27 42·05	39·84 39·02	39·43	0·7	0·12	0·0101
7	1474 & 1480 Gr. 80 " " "	Mar. 16 " 17	11 28	W, E E, W	72 18 40·75 40·71	− 2 1·34 1·05	39·41 39·66	39·54	0·7	0·01	0·0001
8	1517 & 1520 Gr. 80 " " "	Mar. 16 " 17	12 17	W, E E, W	72 12 6·64 6·59	+ 4 33·03 31·92	39·67 38·51	39·09	1·0	0·46	0·2116
9	1554 & 1573 Gr. 80 " " "	Mar. 16 " 17	7 44	W, E E, W	72 5 27·08 27·04	+ 11 12·28 12·84	39·36 39·88	39·62	0·7	0·07	0·0034
10	1573 & 1585 Gr. 80 " " "	Mar. 16 " 17	7 29	E, W W, E	72 20 8·35 8·30	− 3 28·57 28·20	39·78 40·10	39·94	0·7	0·39	0·1065
11	1585 & 1596 Gr. 80 " " "	Mar. 16 " 17	7 24	W, E E, W	72 14 24·20 24·15	+ 2 15·80 15·37	40·00 39·52	39·76	0·7	0·21	0·0309
12	1596 & 1554 Gr. 80 " " "	Mar. 16 " 17	7 38	E, W W, E	71 59 42·93 42·88	+ 16 56·64 56·39	39·57 39·27	39·42	0·7	0·13	0·0118
13	1603 & 1617 Gr. 80 " " "	Mar. 16 " 17	3 35	E, W W, E	71 54 38·91 38·85	+ 22 1·16 0·82	40·07 39·67	39·87	1·0	0·32	0·1024
14	1621 & 1628 Gr. 80 " " "	Mar. 16 " 17	8 32	W, E E, W	72 1 48·06 48·00	+ 14 50·56 51·98	38·62 39·98	39·30	1·0	0·25	0·0625
15	1652 & 1666 Gr. 80 " " "	Mar. 16 " 17	5 44	E, W W, E	71 47 8·09 8·04	+ 29 30·11 29·93	38·20 37·97	38·09	1·0	1·46	2·1316

239. Waltair—*Co-latitude* 72° 16′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude		Weight = p	v	p v v
							by each observation	Mean			
		1894	° ′		° ′ ″	′ ″	″	″			
16	1673 & 1681 Gr. 80 " " "	Mar. 16 " 18	2 26	W, E E, W	72 3 27·10 27·08	+ 13 11·75 13·22	38·94 40·30	39·62	1·0	0·07	0·0049
17	1690 & 1695 Gr. 80 " " "	Mar. 16 " 18	19 44	E, W W, E	72 28 27·42 27·33	− 11 48·33 48·27	39·19 39·06	39·13	1·0	0·42	0·1764
18	1708 & 1717 Gr. 80 " " "	Mar. 16 " 18	10 18	W, E E, W	72 12 46·75 46·65	+ 3 52·61 52·30	39·36 38·95	39·16	1·0	0·39	0·1521
19	1724 & 1732 Gr. 80 " " "	Mar. 16 " 18	6 20	E, W W, E	72 34 37·42 37·32	− 17 56·78 57·16	40·64 40·16	40·40	1·0	0·85	0·7225
20	1743 & 1748 Gr. 80 " " "	Mar. 16 " 18	16 45	W, E E, W	71 57 27·13 26·95	+ 19 11·94 12·80	39·07 39·75	39·41	0·7	0·14	0·0137
21	1748 & 1766 Gr. 80 " " "	Mar. 16 " 18	17 7	W, E E, W	72 19 24·88 24·78	− 2 45·46 45·58	39·42 39·20	39·31	0·7	0·24	0·0403
22	1777 & 1802 Gr. 80 " " "	Mar. 14 " 15	15 34	E, W W, E	71 54 1·31 1·26	+ 22 38·29 38·28	39·60 39·54	39·57	0·7	0·02	0·0003
23	1798 & 1802 Gr. 80 " " "	Mar. 14 " 15	15 30	E, W W, E	71 52 8·92 8·87	+ 24 30·42 30·38	39·34 39·25	39·30	0·7	0·25	0·0438
24	1816 & 1827 Gr. 80 " " "	Mar. 14 " 15	1 0	W, E E, W	71 59 10·22 10·16	+ 17 29·38 29·13	39·60 39·29	39·45	1·0	0·10	0·0100
25	1831 & 1862 Gr. 80 " " "	Mar. 14 " 15	2 56	E, W W, E	72 7 16·45 16·40	+ 9 22·49 23·84	38·94 40·24	39·59	0·7	0·04	0·0011
26	1862 & 1865 Gr. 80 " " "	Mar. 14 " 15	2 49	W, E E, W	72 0 59·42 59·36	+ 15 39·64 39·84	39·06 39·20	39·13	0·7	0·42	0·1235
27	1888 & 1898 Gr. 80 " " "	Mar. 14 " 15	8 35	E, W W, E	72 6 43·02 42·97	+ 9 55·84 56·71	38·86 39·68	39·27	1·0	0·28	0·0784
28	1929 & 1970 Gr. 80 " " "	Mar. 14 " 15	0 22	W, E E, W	71 58 38·59 38·54	+ 18 0·50 0·63	39·09 39·17	39·13	1·0	0·42	0·1764
29	1977 & 2009 Gr. 80 " " "	Mar. 14 " 15	4 20	E, W W, E	72 41 1·53 1·49	− 24 21·28 21·46	40·25 40·04	40·15	0·7	0·60	0·2520
30	2008 & 2009 Gr. 80 " " "	Mar. 14 " 15	4 25	E, W W, E	72 35 45·33 45·29	− 19 5·51 5·70	39·82 39·59	39·71	0·7	0·16	0·0179

239. Waltair—*Co-latitude* 72° 16′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	Pvv
		1894	° ′		° ′ ″	′ ″	″	″			
31	2020 & 2025 Gr. 80 " " "	Mar. 14 " 15	21 4	W, E E, W	72 10 42·79 42·75	+ 5 56·28 57·66	39·07 40·41	39·74	0·7	0·19	0·0253
32	2020 & 2027 Gr. 80 " " "	Mar. 14 " 15	20 51	W, E E, W	71 57 27·75 27·71	+ 19 11·19 11·75	38·94 39·46	39·20	0·7	0·35	0·0858
33	2035 & 2047 Gr. 80 " " "	Mar. 14 " 15	21 6	E, W W, E	72 0 3·66 3·62	+ 16 34·51 35·43	38·17 39·05	38·61	0·7	0·94	0·6185
34	2035 & 2048 Gr. 80 " " "	Mar. 14 " 15	21 5	E, W W, E	72 1 9·33 9·29	+ 15 29·20 29·88	38·53 39·17	38·85	0·7	0·70	0·3480
35	2050 & 2063 Gr. 80 " " "	Mar. 14 " 15	11 12	W, E E, W	72 46 55·91 55·86	− 30 16·49 16·79	39·42 39·07	39·25	1·0	0·30	0·0900
36	2084 & 2124 Gr. 80 " " "	Mar. 14 " 15	3 4	W, E E, W	72 35 10·90 10·75	− 18 30·54 31·26	40·36 39·49	39·93	1·0	0·38	0·1444
37	2144 & 2150 Gr. 80 " " "	Mar. 14 " 15	0 50	E, W W, E	72 51 1·44 1·40	− 34 21·50 20·42	39·94 40·98	40·46	0·7	0·91	0·5797
38	2150 & 2167 Gr. 80 " " "	Mar. 14 " 15	1 18	W, E E, W	72 22 42·29 42·25	− 6 3·66 1·99	38·63 40·26	39·45	0·7	0·10	0·0070
39	2269 & 2273 Gr. 80 " " "	Mar. 19 " 21	9 11	E, W W, E	72 12 31·59 31·50	+ 4 8·53 9·48	40·12 40·98	40·55	0·7	1·00	0·7000
40	2269 & 2283 Gr. 80 " " "	Mar. 19 " 21	9 27	E, W W, E	71 56 14·84 14·76	+ 20 25·01 25·83	39·85 40·59	40·22	0·7	0·67	0·3142
41	2303 & 2311 Gr. 80 " " "	Mar. 19 " 21	2 20	W, E E, W	72 47 51·72 51·63	− 31 11·51 11·03	40·21 40·60	40·41	1·0	0·86	0·7396
42	2324 & 2356 Gr. 80 " " "	Mar. 19 " 21	15 37	W, E E, W	71 53 48·08 47·96	+ 22 51·12 51·84	39·20 39·80	39·50	0·7	0·05	0·0018
43	2355 & 2357 Gr. 80 " " "	Mar. 19 " 21	15 47	E, W W, E	72 4 2·27 2·15	+ 12 37·51 36·56	39·78 38·71	39·25	0·7	0·30	0·0630
44	2357 & 2371 Gr. 80 " " "	Mar. 19 " 21	15 36	W, E E, W	72 15 57·61 57·54	+ 0 42·12 41·95	39·73 39·49	39·61	0·7	0·06	0·0025
45	2371 & 2387 Gr. 80 " " "	Mar. 19 " 21	15 33	E, W W, E	72 14 38·61 38·53	+ 2 1·39 1·50	40·00 40·03	40·02	0·7	0·47	0·1546

239. Waltair—Co-latitude 72° 16′ +

Serial No. of pair	Stars Observed	Date	Mean of Zenith Distances	Positions of Telescope during Observation	Mean of N. P. D's	Half of the Observed Difference of Zenith Distances	Seconds of Co-latitude by each observation	Seconds of Co-latitude Mean	Weight = P	v	P v v
		1894	° ′		° ′ ″	′ ″	″	″			
46	2432 & 2443 Gr. 80	Mar. 19	2 8	E, W	72 7 24·07	+ 9 15·44	39·51	39·51	0·7	0·04	0·0011
47	2445 & 2475 Gr. 80 " " "	Mar. 19 " 21	1 14	W, E E, W	72 46 4·14 4·09	− 29 23·32 23·94	40·82 40·15	40·49	1·0	0·94	0·8836
48	2490 & 2510 Gr. 80 " " "	Mar. 19 " 21	0 24	E, W W, E	72 17 8·99 8·92	− 0 29·27 30·34	39·72 38·58	39·15	1·0	0·40	0·1600
49	2521 & 2547 Gr. 80	Mar. 21	1 14	E, W	71 50 6·89	+ 26 31·12	38·01	38·01	0·7	1·54	1·6601
50	2555 & 2570 Gr. 80 " " "	Mar. 19 " 21	3 44	E, W W, E	72 0 26·22 26·19	+ 16 13·11 13·04	39·33 39·23	39·28	1·0	0·27	0·0729
51	2582 & 2599 Gr. 80 " " "	Mar. 19 " 21	13 9	W, E E, W	72 25 55·89 55·84	− 9 16·58 15·72	39·31 40·12	39·72	1·0	0·17	0·0289
52	2607 & 2615 Gr. 80 " " "	Mar. 19 " 21	9 10	E, W W, E	72 3 27·64 27·60	+ 13 11·32 11·06	38·96 38·66	38·81	1·0	0·74	0·5476
									Σ P = 42·4		Σ Pvv = 13·6311

Summary.

No. of pairs 52
No. of observations 102

Mean difference between observations taken E, W and those taken W, E = + 0″·06

Observed Co-latitude (weighted mean) 72° 16′ 39″·55 ± 0″·053

Correction for Height above Sea-level + 0″·01

Final Co-latitude 72° 16′ 39″·56

		°	′	″	
Astronomical Latitude (A)	=	17	48	20·44	± 0·053
Geodetic Latitude (G)	=	17	43	29·31	
Deflection of plumb-line (A − G)	=		−	8·87	

ASTRONOMICAL LATITUDES

PART III.

DEFLECTIONS OF THE PLUMB-LINE.

ASTRONOMICAL LATITUDES.

ABBREVIATIONS EMPLOYED TO DENOTE INSTRUMENTS.

Z. S. R.—Ramsden's Zenith Sector.

A. C. No. 1.—Astronomical Circle No. 1.

A. C. No. 2.—Astronomical Circle No. 2.

Z. S. No. 1.—Strange's Zenith Sector No. 1.

Z. S. No. 2.—Strange's Zenith Sector No. 2.

T. S. 36.—Troughton and Simms' 36-inch Theodolite.

T. S. 24 No. 2.—Troughton and Simms' 24-inch Theodolite No. 2.

T. S. 14 No. 5.—Troughton and Simms' 14-inch Theodolite No. 5.

T. S. 12 No. 2.—Troughton and Simms' 12-inch Theodolite No. 2.

T. S. 6 No. 1100.—Troughton and Simms' 6-inch Theodolite No. 1100.

Z. T.—Troughton and Simms' Zenith Telescope.

TABLE I.—Alphabetical List of all Latitude Stations.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Method of Observation	Year	No. of Stars observed	No. of Latitude determinations
			° ′	° ′	Feet					
	112	Achola	18 15	77 2	2274	Z. T.	Talcott	1893	75	69
	113	Agra-group east point	27 9	78 9	550	Z. T.	Talcott	1898	39	39
	114	Agra-group north point	27 14	78 4	550	Z. T.	Talcott	1898	43	37
	115	Agra-group south point	27 6	78 3	550	Z. T.	Talcott	1898	43	47
	116	Agra-group west point	27 10	77 59	550	Z. T.	Talcott	1898	44	40
	117	Agra Longitude station, 1st visit	27 10	78 3	550	Z. S. No. 1	Talcott	1893	65	77
		Agra Longitude station, 2nd „	„	„	„	Z. T.	Talcott	1898	61	140
	118	Agra parade point	27 9	78 4	550	Z. T.	Talcott	1898	53	66
	119	Ahmadpur	23 36	77 43	1713	Z. S. No. 1	Talcott	1899	58	70
1		Akampalle	17 11	77 37	1557	Z. S. No. 2	Sector	1872	35	63
	120	Akbar	30 54	73 20	641	Z. T.	Talcott	1901	45	50
	121	Akyab	20 8	92 56	20	Z. T.	Talcott	1905	34	39
	122	Alamkhán	24 50	68 46	67	Z. T.	Talcott	1901	101	108
	123	Algi	25 30	78 24	854	Z. T.	Talcott	1902	60	109
	124	Amritsar	31 38	74 55	770	Z. S. No. 1	Talcott	1894	32	88
2		Ámsot	30 23	77 44	3140	A. C. No. 1	Z. D.	1861	94	366
	125	Amúa	24 0	80 32	2113	Z. T.	Talcott	1899	102	110
	126	Andhiári	24 41	78 16	1330	Z. T.	Talcott	1902	66	103
	127	Ankora	19 25	79 39	1463	Z. S. No. 2	Sector	1889	71	212
3		Aramlia	24 25	75 2	1532	A. C. No. 2	Z. D.	1869	70	419
4		Arasákulam	8 14	77 47	55	Z. S. No. 2	Sector	1871	41	75
5		Badgaon	20 44	77 39	1128	Z. S. No. 2	Sector	1872	37	80
	128	Bahak	30 45	78 16	9715	Z. T.	Talcott	1903	34	36
	129	Bajamara	30 46	77 56	9681	Z. T.	Talcott	1903	34	32
6		Bandúr	14 58	77 3	1447	Z. S. No. 2	Sector	1871	38	70
7		Bangalore Base-line N. E. End	13 5	77 42	3016	Z. S. No. 2	Sector	1870	44	142
8		Bangalore Base-line S. W. End	13 1	77 37	3126	Z. S. No. 2	Sector	1869-70	86	304

TABLE I.—Alphabetical List of all Latitude Stations.

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			° ′	° ′	Feet					
9		Banog	30 29	78 3	7433	T. S. 24 No. 2	Z. D.	1851	18	197
	130	Bánsgopál	28 33	78 34	677	Z. S. No. 1	Talcott	1899	83	108
10		Bánskho	26 50	76 11	1870	A. C. No. 1	Z. D.	1866	64	252
	131	Bhaorása	24 8	78 3	1387	Z. S. No. 1	Talcott	1898	74	75
	132	Bhímsain	20 58	79 49	1490	Z. S. No. 2	Sector	1887	68	134
	133	Birond	29 15	79 45	6967	Z. T.	Talcott	1903	31	51
	134	Bithnok	27 53	72 42	774	Z. S. No. 1	Talcott	1893	72	85
11		Black Station	9 31	78 5	346	Z. S. No. 2	Sector	1870	38	60
	135	Bolarum	17 30	78 34	1971	Z. T.	Talcott	1893	78	84
	136	Bolíkonda	17 43	79 50	1363	Z. S. No. 2	Sector	1889	74	204
12		Bŏmmasandra	14 0	77 30	2005	Z. S. R.	Z. D.	1806	12	104
	137	Bostán	28 31	77 33	758	Z. S. No. 1	Talcott	1900	85	106
	138	Budhon	24 5	78 34	1867	Z. T.	Talcott	1902-03	62	127
	139	Burgpaili	18 54	79 44	983	Z. S. No. 2	Sector	1889	71	211
13		Calcutta	22 33	88 24	18	A. C. No. 2	Z. D.	1864-65	86	688
	140	Chamu	26 40	72 38	1065	Z. S. No. 1	Talcott	1892	39	62
	141	Chandaos	28 5	77 54	699	Z. S. No. 1	Talcott	1900	80	92
	142	Chandípur	21 27	87 5	53	Z. T.	Talcott	1899	85	95
	143	Chanduria	25 44	88 25	160	Z. T.	Talcott	1901-02	75	74
	144	Chánga	24 59	69 54	349	Z. T.	Talcott	1900-01	105	115
	145	Chaniána	24 7	72 35	953	Z. S. No. 1	Talcott	1893	36	46
							Sector		32	57
	146	Charaldánga	24 53	88 26	149	Z. T.	Talcott	1901	90	100
14		Chendwár	23 57	85 29	2817	A. C. No. 2	Z. D.	1865-66	34	408
15		Chikalgurki	14 59	77 14	1516	Z. S. No. 2	Sector	1871	38	54
	147	Colába	18 54	72 51	75	Z. T.	Talcott	1892	70	74
	148	Cuttack	20 29	85 54	133	Z. T.	Talcott	1899	108	124
	149	Daiádhari	24 38	77 42	1867	Z. S. No. 1	Talcott	1898	74	80
	150	Dalea	22 20	82 4	1622	Z. T.	Talcott	1900	53	54

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			° ′	° ′	Feet					
16		Dámargída 1st visit	18 3	77 43	1941*	Z. S. R.	Z. D.	1815	13	205
		Dámargída 2nd "	"	"	1946†	A. C. No. 1	Z. D.	1840-41	32	1566
	151	Dánapa	15 56	80 0	150	Z. T.	Talcott	1891	81	172
	152	Dargawa	24 37	79 4	1152	Z. T.	Talcott	1903	50	188
	153	Dariápur	21 47	87 55	63	Z. T.	Talcott	1899	93	106
	154	Darutippa	15 1	79 57	195	Z. T.	Talcott	1891	117	121
17		Datairi	28 44	77 41	767	A. C. No. 1	Z. D.	1864	92	446
	155	Deesa	24 15	72 14	443	Z. S. No. 1	Talcott / Sector	1893	33 / 5	74 / 14
	156	Dehra Dún Base-line E. End	30 17	78 1	1958	Z. T.	Talcott	1892	33	36
	157	Dehra Dún Haig Observatory	30 19	78 6	2240	Z. T.	Talcott	1904-05	29	49
18		Dehra Dún Observatory (old)	30 20	78 6	2289	T.S. 24 No. 2	Z. D.	1852	16	180
19		Deo Dongri	23 27	75 35	1727	A. C. No. 2	Z. D.	1869	72	433
	158	Dera Dín Panáh	30 34	70 59	490	Z. S. No. 1	Talcott	1894	40	52
20		Devanúr	17 11	77 44	1593	Z. S. No. 2	Sector	1872	36	72
21		Devaragat	16 7	77 44	1332	Z. S. No. 2	Sector	1871	39	69
22		Dewarsán	26 16	80 21	439	Z. S. No. 2	Sector	1885	33	112
23		Dhaigaon	19 31	75 15	1553	A. C. No. 2	Z. D.	1870	72	441
24		Dhánura	20 44	77 44	1135	Z. S. No. 2	Sector	1872	35	59
	159	Dhauleshvar	18 26	74 12	2939	Z. T.	Talcott	1892-93	101	102
	160	Dhúlipalla	16 26	80 8	245	Z. S. No. 2	Sector	1889	57	210
	161	Didáwa	24 51	71 21	212	Z. T.	Talcott	1900	116	111
	162	Díwai	19 50	79 35	967	Z. S. No. 2	Sector	1888-89	74	204
25		Dŏddagunta 1st visit	13 0	77 40	3003	Z. S. R.	Z. D.	1805-06	16	163
		Dŏddagunta 2nd "	"	"	"	Z. S. No. 2	Sector	1870	46	148
26		Dotra	20 41	77 35	1140	Z. S. No. 2	Sector	1872	35	60
27		Etora	26 54	80 42	429	Z. S. No. 2	Sector	1885	29	99

* Refers to the mark at the ground level of the Observatory.
† Do. do. floor do. do.

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			° ′	° ′	Feet					
28		Garinda	27 56	75 4	1204	A. C. No. 2	Z. D.	1868	70	416
29		Gattináráyantippa	16 8	77 48	1225	Z. S. No. 2	Sector	1872	38	72
30		Gogípatri	(Latitude observations are not reliable and require revision)							
	163	Gudali	14 1	80 4	292	Z. T.	Talcott	1891	86	170
31		Gurária	24 26	76 7	1360	A. C. No. 1	Z. D.	1865	60	239
	164	Gúrmi	26 36	78 33	575	Z. T.	Talcott	1902	46	94
		Gúru Sikkar *See* Oria	...	...	...	...	...	...	...	...
32		Gurwáni	24 1	82 20	2083	A. C. No. 2	Z. D.	1866	30	360
33		Halda	19 9	77 43	1335	Z. S. No. 2	Sector	1872	34	60
34		Harnása 1st visit	22 47	75 36	1816	A. C. No. 2	Z. D.	1869	12	24
		Harnása 2nd "	"	"	"	A. C. No. 2	Z. D.	1869	72	432
	165	Háthbena	19 52	82 4	2600	Z. T.	Talcott	1900	66	70
35		Hŏnnavalli	14 17	75 13	2775	Z. S. No. 1	Sector	1872	31	143
36		Hŏnnúr	14 55	77 8	1579	Z. S. No. 2	Sector	1871	58	155
37		Huríláong	24 2	84 24	1378	A. C. No. 2	Z. D.	1866	50	400
38		Isanpur	30 38	76 9	874	A. C. No. 2	Z. D.	1867	67	410
	166	Jalpaiguri	26 31	88 47	280	Z. T.	Talcott	1902	41	83
	167	Jambo	27 16	72 34	772	Z. S. No. 1	Talcott	1892	40	58
39		Jarúra	28 0	80 31	536	Z. S. No. 2	Sector	1884	26	121
40		Jetgarh	26 18	74 21	1967	A. C. No. 2	Z. D.	1868	70	421
41		Kaliána	29 31	77 42	828	A. C. No. 2	Z. D.	1839-40	36	1870
42		Kaliánpur 1st visit	24 7	77 42	1765	Z. S. R.	Z. D.	1824-25	17	388
		Kaliánpur 2nd "	"	"	"	A. C. No. 1	Z. D.	1839-40	36	1811
		Kaliánpur 3rd "	"	"	"	A. C. No. 2	Z. D.	1840-41	32	1529
		Kaliánpur 4th "	"	"	"	A. C. No. 1	Z. D.	1865	80	320
		Kaliánpur 5th "	"	"	"	A. C. No. 1	Z. D.	1865	60	242
	168	Kaliánpur 6th "	"	"	"	Z. S. No. 1	Talcott	1899	79	87
	169	Kámkhera	24 0	77 46	1780	Z. S. No. 1	Talcott	1899	67	84
43		Kánákhera	25 51	80 28	416	Z. S. No. 2	Sector	1885	32	133

TABLE I.—Alphabetical List of all Latitude Stations.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Method of Observation	Year	No. of Stars observed	No. of Latitude determinations
			° ′	° ′	Feet					
	170	Kanheri	18 30	75 46	2610	Z. T.	Talcott	1893	108	103
44		Kánkra	25 38	76 10	1652	A. C. No. 1	Z. D.	1866	62	239
45		Karachi	24 50	67 4	35	A. C. No. 1	Z. D.	1855	34	1614
46		Karára	24 5	81 18	1966	A. C. No. 2	Z. D.	1866-67	50	400
47		Karaundi	23 11	80 2	1625	T. S. 36	Z. D.	1867	22	264
	171	Karía	19 12	82 10	2014	Z. T.	Talcott	1900	100	104
	172	Károthol	24 54	67 56	260	Z. T.	Talcott	1901	90	100
48		Kátpálaiyam	10 57	77 43	878	Z. S. No. 2	Sector	1870	50	133
	173	Kaulia	27 49	85 17	7051	T. S. 6 No 1100	Z. D.	1903	4	21
49		Kem	18 11	75 21	1951	A. C. No. 2	Z D.	1870	68	406
50		Kesri	25 47	77 43	1487	A. C. No. 1	Z. D.	1861-65	96	375
51		Khámor	25 45	74 50	1393	A. C. No. 2	Z. D.	1868	74	444
	174	Khankharia	24 37	71 56	362	Z. T.	Talcott	1900	92	93
52		Khánpisura 1st visit	18 46	74 49	2751	A. C. No. 2	Z. D.	1870	59	59
	175	Khánpisura 2nd „	„	„	„	Z. T.	Talcott	1893	103	110
53		Khimúána	30 22	75 3	731	A. C. No. 1	Z. D.	1867	50	429
	176	Khirsar	28 30	72 42	603	Z. S. No. 1	Talcott	1893	74	93
	177	Khori	25 1	69 6	63	Z. T.	Talcott	1901	98	118
	178	Khundábolo	19 51	85 1	3115	Z. T.	Talcott	1899	94	110
	179	Kidarkanta	31 1	78 13	12509	Z. T.	Talcott	1903	34	36
	180	Kistama	14 27	79 48	458	Z. T.	Talcott	1891	86	164
54		Kodangal	17 8	77 41	1906	Z. S. No. 2	Sector	1872	38	72
55		Koramúr	14 8	75 1	2527	Z. S. No. 1	Sector	1872	31	114
56		Kudankulam	8 10	77 44	175	Z. S. No. 2	Sector	1871	54	192
57		Kundgol 1st visit	15 15	75 17	2147	Z. S. No. 1	Sector	1871	47	175
		Kundgol 2nd „	„	„	„	Z. S. No. 1	Sector	1872	32	120
	181	Kurseong	26 52	88 18	4428	Z. T.	Talcott	1902	35	57

TABLE I.—Alphabetical List of all Latitude Stations.

Reference Number From Vol. XI	Reference Number From present volume	Name of Station	Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Method of Observation	Year	No. of Stars observed	No. of Latitude determinations
			° ′	° ′	Feet					
58		Kutipárai	9 29	78 3	347	Z. S. No. 2	Sector	1870	57	182
59		Ládi	23 9	77 45	1875	A. C. No. 1	Z. D.	1865	126	451
	182	Ládimsir	29 22	72 2	468	Z. S. No. 1	Talcott	1894	86	108
	183	Lambatach	31 1	77 57	10474	Z. T.	Talcott	1903	39	43
60		Linganapalle	17 7	77 45	1815	Z. S. No. 2	Sector	1872	37	71
	184	Lingmára	21 43	80 11	1400	Z. S. No. 2	Sector	1887	66	182
	185	Lohágara	26 2	88 24	205	Z. T.	Talcott	1902	58	64
61		Lora	23 30	80 12	1923	A. C. No. 2	Z. D.	1866	50	400
	186	Losalli	24 6	77 36	1749	Z. S. No. 1	Talcott	1899	65	77
	187	Lúnki	24 58	70 42	588	Z. T.	Talcott	1900	69	39
	188	Madhupur	23 57	88 32	92	Z. T.	Talcott	1901	80	91
	189	Madras Observatory	13 4	80 17	54	Z. S. No. 2	Sector	1896-97	43	101
	190	Mahadeo Pokra	27 42	85 34	7095	T. S. 6 No. 1100	Z. D.	1903	3	15
62		Majala	16 47	74 29	2613	Z. S. No. 1	Sector	1872	44	191
	191	Majhár	26 6	78 31	1028	Z. T.	Talcott	1902	67	104
	192	Mal	18 47	84 33	483	Z. T.	Talcott	1899	87	102
63		Malúncha	23 54	87 8	970	A. C. No. 2	Z. D.	1865	32	384
64		Mandála	19 3	77 46	1294	Z. S. No. 2	Sector	1872	35	64
	193	Mándvi	18 38	73 35	4121	Z. T.	Talcott	1892	93	99
65		Mangalore	12 52	74 53	186	Z. S. No. 1	Sector	1872	44	171
66		Mávinhúnda	16 25	74 50	2582	Z. S. No. 1	Sector	1872	38	131
	194	Mooltan	30 11	71 29	420	Z. S. No. 1	Talcott	1894	62	75
	195	Moulmein	16 30	97 40	90	Z. T.	Talcott	1905	49	52
67		Murree	33 55	73 27	...	T. S. 36	Z. D.	1858	22	110
68		Mussooree 1st visit	30 28	78 7	6937	A. C. No. 1	Z. D.	1866	12	95
		Mussooree 2nd "	"	"	"	A. C. No. 1	Z. D.	1867	33	136
		Mussooree 3rd "	"	"	"	A. C. No. 2	Z. D.	1867	12	48

TABLE I.—Alphabetical List of all Latitude Stations.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Method of Observation	Year	No. of Stars observed	No. of Latitude determinations
			° ′	° ′	Feet					
	196	Nagarkhána	22 23	91 51	290	Z. T.	Talcott	1905	42	41
	197	Náharmau	23 30	78 52	1940	Z. T.	Talcott	1903	40	121
69		Namthabad	15 6	77 39	1169	Z. S. R.	Z. D.	1811	19	170
70		Navalúr	15 26	75 6	2445	Z. S. No. 1	Sector	1872	32	127
	198	Niálamari	17 2	79 46	1144	Z. S. No. 2	Sector	1889	72	211
71		Nimbágal	14 52	77 14	1565	Z. S. No. 2	Sector	1871	38	58
72		Nimkár	27 21	80 32	486	Z. S. No. 2	Sector	1885	28	119
	199	Nitali	18 17	76 19	2289	Z. T.	Talcott	1893	115	118
73		Noh	27 51	77 41	710	A. C. No. 1	Z. D.	1864	94	401
74		Nojli	29 53	77 43	929	A. C. No. 1	Z. D.	1863-64	90	495
	200	Ongole	15 30	80 5	250	Z. T.	Talcott	1891	84	167
	201	Oria	24 38	72 48	4200	Z. S. No. 1	Talcott Sector	1893	34 33	84 66
75		Pachapálaiyam 1st visit	11 0	77 40	970	Z. S. R.	Z. D.	1806	20	188
		Pachapálaiyam 2nd "	"	"	"	Z. S. No. 2	Sector	1870	48	143
76		Pahárgarh	24 56	77 44	1641	A. C. No. 1	Z. D.	1865	90	365
77		Pandalagudi	9 23	78 8	217	Z. S. No. 2	Sector	1870-71	38	65
	202	Parampúdi	17 13	81 15	684	Z. T.	Talcott	1894	72	73
	203	Pathåídi	21 49	82 19	879	Z. T.	Talcott	1900	62	61
	204	Patna	21 47	87 14	80	Z. T.	Talcott	1899	85	126
78		Pávagada	14 6	77 19	3022	Z. S. R.	Z. D.	1805	6	67
79		Pavia	25 27	80 47	481	Z. S. No. 2	Sector	1885	35	134
80		Pĕddapád	16 17	77 47	1090	Z. S. No. 2	Sector	1872	28	107
	205	Phallut	27 13	88 3	11815	Z. T.	Talcott	1902	23	14
81		Pialmudi	17 4	77 39	1869	Z. S. No. 2	Sector	1872	36	62
	206	Pirmulo	17 53	78 38	2093	Z. T.	Talcott	1893-94	84	89
82		Port Blair	(This	station	is not	connected	with the	triangu	lation)	
83		Poshkar	(Lati	tude	obser	vations are	unreliable	and requ	ire revi	sion)
84		Potenda	24 37	81 0	993	Z. S. No. 2	Sector	1885	31	115

TABLE I.—Alphabetical List of all Latitude Stations.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Method of Observation	Year	No. of Stars observed	No. of Latitude determinations
			° ′	° ′	Feet					
	207	Prome	18 49	95 15	100	Z. T.	Talcott	1905	31	39
85		Punnæ { 1st visit	8 9	77 40	48	Z. S. R.	Z. D.	1809	18	235
		Punnæ { 2nd "	"	"	"	Z. S. No. 2	Sector	1871	42	78
	208	Quetta	30 12	67 3	5500	T.S.12 No.2	Z. D.	1904	22	42
86		Rádhápuram	8 17	77 45	167	Z. S. No. 2	Sector	1871	38	81
	209	Rájpur	30 24	78 8	3500	Z. T.	Talcott	1892	18	19
	210	Rájuli	20 13	79 47	1070	Z. S. No. 2	Sector	1887	84	174
87		Rákhi	29 17	76 9	785	A. C. No. 1	Z. D.	1866	64	252
	211	Ramai	20 57	82 11	1313	Z. T.	Talcott	1900	52	60
88		Rámbágh	24 51	67 3	...	T. S. 36	Z. D.	1853	12	48
	212	Rámgír	18 35	79 74	1772	Z. S. No. 2	Sector	1889	69	208
89		Rám Thal	28 30	75 3	951	A. C. No. 2	Z. D.	1868	70	420
90		Rámuápur	28 22	80 31	541	Z. S. No. 2	Sector	1884-85	28	157
91		Rangír	24 0	79 28	1184	A. C. No. 2	Z. D.	1867	50	400
92		Rángrai	20 48	77 38	1046	Z. S. No. 2	Sector	1872	33	48
	213	Ranjítgarh	32 35	74 40	900	Z. T.	Talcott	1901	27	27
	214	Ráwal	18 32	83 36	874	Z. T.	Talcott	1898-99	85	87
93		Rewat	26 54	74 19	1542	A. C. No. 2	Z. D.	1868	70	420
	215	Rojhra	24 57	70 17	518	Z. T.	Talcott	1900	113	127
	216	Salímpur	27 47	78 33	645	Z. S. No. 1	Talcott	1900	68	90
	217	Samdari	25 49	72 37	600	Z. S. No. 1	Talcott	1893	42	72
94		Sangatpur { 1st visit	31 18	75 5	779	A. C. No. 1	Z. D.	1867	42	579
		Sangatpur { 2nd "	"	"	"	A. C. No. 2	Z. D.	1868	42	256
	218	Sánjib	17 31	82 44	2142	Z. T.	Talcott	1894	69	78
	219	Sankráo	28 2	78 35	670	Z. S. No. 1	Talcott	1900	67	121
		Sarandipat *See* Sarey Khan	...	...	...	...	...	...	...	...
	220	Sarey Khan	22 13	80 5	1409	Z. S. No. 2	Sector	1886	52	183

TABLE I.—Alphabetical List of all Latitude Stations.

Reference Number From Vol. XI	Reference Number From present volume	Name of Station	Latitude North	Longitude East of Greenwich	Height above Mean Sea Level	Instrument	Method of Observation	Year	No. of Stars observed	No. of Latitude determinations
			° ′	° ′	Feet					
	221	Sarkára	29 16	78 35	761	Z. S. No. 1	Talcott	1899	70	84
	222	Saugor	23 50	78 49	2033	Z. T.	Talcott	1903	33	102
95		Sawaipur	29 39	75 6	697	A. C. No. 1	Z. D.	1867	50	418
	223	Senchal	26 59	88 20	8600	Z. T.	Talcott	1902	19	20
96		Sháhpur	32 2	75 8	830	A. C. No. 1	Z. D.	1866-67	40	898
97		Shúlakarai	9 32	77 59	333	Z. S. No. 2	Sector	1870	40	77
	224	Siliguri	26 42	88 27	401	Z. T.	Talcott	1902	33	42
	225	Singáwáram	17 45	80 59	714	Z. T.	Talcott	1894	69	83
	226	Sironj Base-line N. E. End	24 9	77 53	1481	Z. S. No. 1	Talcott	1898-99	82	90
	227	Sirsa	28 55	78 35	739	Z. S. No. 1	Talcott	1899	74	86
	228	Sítápár	21 25	80 22	1237	Z. S. No. 2	Sector	1887	65	166
	229	Sonáda	23 7	72 48	250	Z. S. No. 1	Talcott	1893	47	77
	230	St. Thomas's Mount	13 0	80 14	250	Z. T.	Talcott	1890	78	123
	231	Súrantál	24 14	77 43	1802	Z. S. No. 1	Talcott	1899	72	81
98		Takalkhera	21 6	77 41	1094	Z. S. R.	Z. D.	1823-24	24	414
99		Talegaon	19 1	77 40	1233	Z. S. No. 2	Sector	1872	34	64
100		Tanakarakulam	8 14	77 41	176	Z. S. No. 2	Sector	1871	36	57
101		Tásing	27 53	76 15	2050	A. C. No. 1	Z. D.	1866	60	233
	232	Telu	28 56	72 17	470	Z. S. No. 1	Talcott	1893-94	68	77
102		Thíkri	22 1	75 27	851	A. C. No. 2	Z. D.	1869-70	74	451
	233	Thob	26 3	72 25	856	Z. S. No. 1	Talcott	1892	39	65
	234	Tinsia	24 6	77 21	1776	Z. S. No. 1	Talcott	1899	60	70
103		Tiruvendipuram	11 45	79 45	...	Z. S. R.	Z. D.	1808	8	68
	235	Tonglu	27 2	88 8	10073	Z. T.	Talcott	1902	21	17
104		Tŏnsalgutta	16 18	77 37	1133	Z. S. No. 2	Sector	1872	34	65
105		Tuagat	16 10	77 37	1450	Z. S. No. 2	Sector	1871	33	64
106		Usira	26 57	77 40	810	A. C. No. 1	Z. D.	1864	92	365
107		Valvádi	20 44	75 14	1125	A. C. No. 2	Z. D.	1870	72	435

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			° ′	° ′	Feet					
	236	Vánákonda	17 36	79 25	1664	Z. T.	Talcott	1894	78	85
108		Vijayápati	8 12	77 49	90	Z. S. No. 2	Sector	1871	42	77
	237	Virária	24 57	71 5	460	Z. T.	Talcott	1900	95	102
	238	Vizagapatam Base-line N. End	18 1	83 16	181	Z. T.	Talcott	1898	100	100
109		Voi	19 7	77 37	1439	Z. S. No. 2	Sector	1872	35	65
	239	Waltair	17 43	83 22	200	Z. T.	Talcott	1894	85	102
110		Yĕrragunta	14 48	77 1	1698	Z. S. No. 2	Sector	1871	39	75
111		Yĕttimalai	11 4	77 53	617	Z. S. No. 2	Sector	1870	56	171

TABLE II.—*Deflections of the Plumb-line at Latitude Stations arranged alphabetically.*

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line * = A − G (Northerly negative) (Southerly positive)	Region in which the station lies *Vide Table III**
			°	′	″	°	′	″	″	
	112	Achola	18	14	44·87	18	14	48·12	− 3·25	No. 7
	113	Agra-group east point	27	9	16·21	27	9	21·00	− 4·79	No. 5
	114	Agra-group north point	27	14	10·31	27	14	14·10	− 3·79	No. 5
	115	Agra-group south point	27	5	32·95	27	5	38·51	− 5·56	No. 5
	116	Agra-group west point	27	9	41·43	27	9	45·86	− 4·43	No. 5
	117	Agra Longitude station	27	9	34·62	27	9	39·93	− 5·31	No. 5
	118	Agra parade point	27	8	52·18	27	8	57·47	− 5·29	No. 5
	119	Ahmadpur	23	36	18·42	23	36	20·88	− 2·46	No. 7
1		Akampalle	17	10	50·39	17	10	53·96	− 3·57	No. 7
	120	Akbar	30	53	38·53	30	53	43·27	− 4·74	No. 5
	121	Akyab	20	8	14·87	20	8	12·86	+ 2·01	No. 10
	122	Alamkhán	24	49	30·50	24	49	31·23	− 0·73	No. 5
	123	Algi	25	29	48·16	25	29	46·19	+ 1·97	No. 3
	124	Amritsar	31	38	2·51	31	37	58·72	+ 3·79	No. 5
2		Ámsot	30	22	16·02	30	22	44·86	− 28·84	No. 1
	125	Amúa	23	59	57·02	23	59	56·24	+ 0·78	No. 3
	126	Andhiári	24	41	11·31	24	41	6·78	+ 4·53	No. 3
	127	Ankora	19	24	26·63	19	24	34·75	− 8·12	No. 8
3		Aramlia	24	25	2·66	24	25	7·27	− 4·61	No. 7
4		Arasákulam	8	13	41·96	8	13	39·52	+ 2·44	No. 9
5		Badgaon	20	44	15·54	20	44	23·06	− 7·52	No. 7
	128	Bahak	30	44	37·60	30	45	5·22	− 27·62	No. 1
	129	Bajamara	30	45	27·79	30	45	56·20	− 28·41	No. 1
6		Bandúr	14	57	44·41	14	57	42·32	+ 2·09	No. 9
7		Bangalore Base-line N. E. End	13	4	53·17	13	4	56·05	− 2·88	No. 9
8		Bangalore Base-line S. W. End	13	0	36·12	13	0	40·91	− 4·79	No. 9
9		Banog	30	28	4·18	30	28	36·91	− 32·73	No. 1

* In *Table III* India has been divided into ten regions: the division is illustrated in Plate VI.

TABLE II.—Deflections of the Plumb-line at Latitude Stations arranged alphabetically.

Reference Number		Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)	Region in which the station lies *Vide Table III*
From Vol. XI	From present volume		°	′	″	°	′	″	″	
	130	Bánsgopál	28	33	23·28	28	33	28·08	− 4·80	No. 3
10		Bánskho	26	50	2·37	26	50	7·89	− 5·52	No. 5
	131	Bhaorása	24	8	5·13	24	8	3·74	+ 1·39	No. 4
	132	Bhímsain	20	57	28·54	20	57	35·96	− 7·42	No. 8
	133	Birond	29	14	29·72	29	15	14·15	− 44·43	No. 1
	134	Bithnok	27	53	24·97	27	53	22·03	+ 2·94	No. 5
11		Black Station	9	31	4·22	9	31	1·30	+ 2·92	No. 9
	135	Bolarum	17	30	7·36	17	30	13·41	− 6·05	No. 8
	136	Bolíkonda	17	42	29·08	17	42	35·82	− 6·74	No. 8
12		Bŏmmasandra	13	59	42·63	13	59	36·34	+ 6·29	No. 9
	137	Bostán	28	30	54·25	28	30	59·64	− 5·39	No. 5
	138	Budhon	24	5	8·99	24	5	8·41	+ 0·58	No. 4
	139	Burgpaili	18	54	3·48	18	54	7·20	− 3·72	No. 8
13		Calcutta	22	32	55·58	22	32	54·67	+ 0·91	No. 3
	140	Chamu	26	39	53·44	26	39	52·74	+ 0·70	No. 5
	141	Chandaos	28	5	0·71	28	5	1·59	− 0·88	No. 5
	142	Chandípur	21	26	34·03	21	26	36·99	− 2·96	No. 8
	143	Chanduria	25	44	31·93	25	44	27·47	+ 4·46	No. 3
	144	Chánga	24	58	47·25	24	58	47·00	+ 0·25	No. 5
	145	Chaniána	24	6	25·39	24	6	36·64	− 11·25	No. 7
	146	Charaldánga	24	52	45·36	24	52	43·95	+ 1·41	No. 3
14		Chendwár	23	57	16·82	23	57	13·75	+ 3·07	No. 3
15		Chikalgurki	14	59	5·16	14	59	4·53	+ 0·63	No. 9
	147	Colába	18	53	39·15	18	53	49·48	− 10·33	No. 7
	148	Cuttack	20	28	52·05	20	29	0·68	− 8·63	No. 8
	149	Daiádhari	24	38	18·79	24	38	17·59	+ 1·20	No. 4
	150	Dalea	22	19	30·25	22	19	33·62	− 3·37	No. 8
16		Dámargída	18	3	14·92	18	3	17·35	− 2·43	No. 7
	151	Dánapa	15	55	59·69	15	56	0·14	− 0·45	No. 8

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	152	Dargawa	24	37	17·32	24	37	13·21	+ 4·11	No. 3
	153	Dariápur	21	47	28·82	21	47	27·95	+ 0·87	No. 3
	154	Darutippa	15	0	33·52	15	0	36·47	− 2·95	No. 8
17		Datairi	28	43	58·67	28	44	4·49	− 5·82	No. 5
	155	Deesa	24	15	21·15	24	15	29·35	− 8·20	No. 7
	156	Dehra Dún Base-line E. End	30	16	37·26	30	17	7·35	− 30·09	No. 1
	157	Dehra Dún Haig Observatory	30	18	51·80	30	19	28·73	− 36·93	No. 1
18		Dehra Dún Observatory (Old)	30	19	19·56	30	19	57·07	− 37·51	No. 1
19		Deo Dongri	23	26	43·17	23	26	47·79	− 4·62	No. 7
	158	Dera Dín Panáh	30	33	59·63	30	34	1·87	− 2·24	No. 5
20		Devanúr	17	10	56·88	17	11	0·43	− 3·55	No. 7
21		Devaragat	16	6	31·98	16	6	37·27	− 5·29	No. 7
22		Dewarsán	26	15	58·32	26	15	52·89	+ 5·43	No. 3
23		Dhaigaon	19	30	30·82	19	30	35·04	− 4·22	No. 7
24		Dhánura	20	44	3·35	20	44	10·84	− 7·49	No. 7
	159	Dhauleshvar	18	25	42·84	18	25	41·64	+ 1·20	No. 7
	160	Dhúlipalla	16	25	53·47	16	25	56·75	− 3·28	No. 8
	161	Didáwa	24	51	17·32	24	51	19·36	− 2·04	No. 5
	162	Díwai	19	49	26·87	19	49	32·57	− 5·70	No. 8
25		Dŏddagunta	12	59	51·52	12	59	55·76	− 4·24	No. 9
26		Dotra	20	41	22·25	20	41	28·91	− 6·66	No. 7
27		Etora	26	54	22·63	26	54	17·85	+ 4·78	No. 3
28		Garinda	27	55	30·05	27	55	30·55	− 0·50	No. 5
29		Gattináráyantippa	16	7	48·95	16	7	54·81	− 5·86	No. 7
30		Gogípatri	(Latitude observations are not reliable and require revision)							
	163	Gudali	14	1	10·65	14	1	9·45	+ 1·20	No. 9
31		Gurária	24	25	31·98	24	25	32·46	− 0·48	No. 4

TABLE II.—Deflections of the Plumb-line at Latitude Stations arranged alphabetically.

Reference Number From Vol. XI	Reference Number From present volume	Name of Station	Astronomical Latitude = A °	′	″	Geodetic Latitude = G °	′	″	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive) ″	Region in which the station lies Vide Table III
	164	Gúrmi	26	36	5·97	26	36	3·63	+ 2·34	No. 3
32		Gurwáni	24	1	28·93	24	1	25·71	+ 3·22	No. 3
33		Halda	19	9	24·41	19	9	29·38	− 4·97	No. 7
34		Harnása	22	47	26·71	22	47	29·91	− 3·20	No. 7
	165	Háthbena	19	51	42·60	19	51	42·34	+ 0·26	No. 8
35		Hŏnnavalli	14	16	30·76	14	16	32·46	− 1·70	No. 9
36		Hŏnnúr	14	55	22·20	14	55	18·96	+ 3·24	No. 9
37		Huríláong	24	2	16·74	24	2	5·99	+ 10·75	No. 3
38		Isanpur	30	38	16·03	30	38	20·01	− 3·98	No. 5
	166	Jalpaiguri	26	31	11·44	26	31	17·39	− 5·95	No. 2
	167	Jambo	27	16	31·94	27	16	28·88	+ 3·06	No. 5
39		Jarúra	27	59	50·22	27	59	55·94	− 5·72	No. 2
40		Jetgarh	26	18	8·02	26	18	6·39	+ 1·63	No. 4
41		Kaliána	29	30	47·98	29	30	54·70	− 6·72	No. 2
42	168	Kaliánpur		* Station		of origin			...	No. 4
	169	Kámkhera	23	59	42·89	23	59	44·93	− 2·04	No. 7
43		Kánákhera	25	51	25·97	25	51	20·95	+ 5·02	No. 3
	170	Kanheri	18	29	21·84	18	29	30·75	− 8·91	No. 7
44		Kánkra	25	37	58·75	25	37	59·53	− 0·78	No. 4
45		Karachi	24	49	50·14	24	49	50·25	− 0·11	No. 5
46		Karára	24	4	42·20	24	4	42·01	+ 0·19	No. 3
47		Karaundi	23	10	45·07	23	10	40·02	+ 5·05	No. 3
	171	Karía	19	12	2·67	19	12	5·98	− 3·31	No. 8
	172	Károthol	24	53	44·78	24	53	46·69	− 1·91	No. 5
48		Kátpálaiyam	10	56	36·66	10	56	35·97	+ 0·69	No. 9
	173	Kaulia	27	48	25·5	27	48	58·6	− 33·1	No. 1
49		Kem	18	10	45·68	18	10	48·90	− 3·22	No. 7
50		Kesri	25	46	41·57	25	46	35·81	+ 5·76	No. 4
51		Khámor	25	45	11·00	25	45	15·01	− 4·01	No. 5

* For values of Astronomical Latitude *see* pages (33) and (34).

TABLE II.—Deflections of the Plumb-line at Latitude Stations arranged alphabetically.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A °	′	″	Geodetic Latitude = G °	′	″	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive) ″	Region in which the station lies Vide Table III
	174	Khankharia	24	36	58·17	24	36	56·19	+ 1·98	No. 5
52	175	Khánpisura	18	45	22·60	18	45	30·65	− 8·05	No. 7
53		Khimúána	30	22	11·74	30	22	14·82	− 3·08	No. 5
	176	Khirsar	28	29	43·75	28	29	40·91	+ 2·84	No. 5
	177	Khori	25	0	30·60	25	0	31·53	− 0·93	No. 5
	178	Khundábolo	19	51	7·03	19	51	12·90	− 5·87	No. 8
	179	Kidarkanta	31	0	51·58	31	1	21·71	− 30·13	No. 1
	180	Kistama	14	27	12·28	14	27	14·56	− 2·28	No. 9
54		Kodangal	17	7	53·74	17	7	57·35	− 3·61	No. 7
55		Koramúr	14	8	1·71	14	8	6·59	− 4·88	No. 9
56		Kudankulam	8	10	23·41	8	10	21·55	+ 1·86	No. 9
57		Kundgol	15	15	14·46	15	15	15·28	− 0·82	No. 7
	181	Kurseong	26	51	15·05	26	52	5·56	− 50·51	No. 1
58		Kutipárai	9	28	47·09	9	28	44·87	+ 2·22	No. 9
59		Ládi	23	8	39·10	23	8	44·13	− 5·03	No. 7
	182	Ládimsir	29	21	39·83	29	21	41·58	− 1·75	No. 5
	183	Lambatach	31	0	34·38	31	1	8·46	− 34·08	No. 1
60		Linganapalle	17	7	13·40	17	7	16·66	− 3·26	No. 7
	184	Lingmára	21	42	55·36	21	43	3·07	− 7·71	No. 8
	185	Lohágara	26	2	14·17	26	2	12·02	+ 2·15	No. 3
61		Lora	23	29	46·30	23	29	41·53	+ 4·77	No. 3
	186	Losalli	24	6	18·19	24	6	19·17	− 0·98	No. 4
	187	Lúnki	24	58	18·73	24	58	23·15	− 4·42	No. 5
	188	Madhupur	23	56	42·82	23	56	38·97	+ 3·85	No. 3
	189	Madras Observatory	13	4	8·97	13	4	4·17	+ 4·80	No. 9
	190	Mahadeo Pokra	27	40	53·6	27	41	31·5	− 37·9	No. 1
62		Majala	16	46	55·45	16	46	56·82	− 1·37	No. 7
	191	Majhár	26	6	20·30	26	6	17·00	+ 3·30	No. 3
	192	Mal	18	47	6·75	18	47	16·97	− 10·22	No. 8

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63		Malúncha	23	54	29·64	23	54	29·02	+ 0·62	No. 3
64		Mandála	19	2	42·84	19	2	48·24	− 5·40	No. 7
	193	Mándvi	18	37	47·94	18	37	51·11	− 3·17	No. 7
65		Mangalore	12	52	17·76	12	52	14·76	+ 3·00	No. 9
66		Mávinhúnda	16	25	4·47	16	25	4·19	+ 0·28	No. 7
	194	Mooltan	30	10	56·15	30	10	58·70	− 2·55	No. 5
	195	Moulmein	16	30	2·97	16	29	54·62	+ 8·35	No. 10
67		Murree	33	54	37·35	33	54	57·35	− 20·00	No. 1
68		Mussooree	30	27	4·02	30	27	40·55	− 36·53	No. 1
	196	Nagarkhána	22	22	57·08	22	22	56·38	+ 0·70	No. 10
	197	Náharmau	23	30	13·14	23	30	18·15	− 5·01	No. 8
69		Namthabad	15	5	51·75	15	5	52·40	− 0·65	No. 9
70		Navalúr	15	25	28·48	15	25	31·17	− 2·69	No. 7
	198	Niálamari	17	1	25·93	17	1	33·63	− 7·70	No. 8
71		Nimbágal	14	51	56·14	14	51	52·43	+ 3·71	No. 9
72		Nimkár	27	21	8·16	27	21	8·09	+ 0·07	No. 3
	199	Nitali	18	17	2·74	18	17	7·16	− 4·42	No. 7
73		Noh	27	50	53·13	27	50	53·08	+ 0·05	No. 5
74		Nojli	29	53	14·12	29	53	27·76	− 13·64	No. 2
	200	Ongole	15	29	52·87	15	29	56·85	− 3·98	No. 8
	201	Oria	24	37	47·63	24	37	50·96	− 3·33	No. 5
75		Pachapálaiyam	10	59	40·81	10	59	39·88	+ 0·93	No. 9
76		Pahárgarh	24	56	6·47	24	56	6·92	− 0·45	No. 4
77		Pandalagudi	9	23	30·55	9	23	27·69	+ 2·86	No. 9
	202	Parampúdi	17	12	32·63	17	12	38·28	− 5·65	No. 8
	203	Patháidi	21	48	43·06	21	48	45·96	− 2·90	No. 8
	204	Patna	21	47	17·28	21	47	20·83	− 3·55	No. 8
78		Pávagada	14	6	18·80	14	6	15·39	+ 3·41	No. 9
79		Pavia	25	27	21·18	25	27	17·39	+ 3·79	No. 3

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Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A °	′	″	Geodetic Latitude = G °	′	″	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive) ″	Region in which the station lies *Vide Table III*
80		Pĕddapád	16	17	14·13	16	17	20·38	− 6·25	No. 7
	205	Phallut	27	12	4·30	27	12	40·86	− 36·56	No. 1
81		Pialmudi	17	4	1·06	17	4	6·05	− 4·99	No. 7
	206	Pirmulo	17	52	58·32	17	53	2·81	− 4·49	No. 8
82		Port Blair	This station is not			connected with the			triangulation	
83		Poshkar	Latitude		observat	ions are not reliable			and require	revision
84		Potenda	24	37	24·71	24	37	23·04	+ 1·67	No. 3
	207	Prome	18	49	18·62	18	49	14·18	+ 4·44	No. 10
85		Punnæ	8	9	29·92	8	9	27·79	+ 2·13	No. 9
	208	Quetta	30	11	55·82	30	11	57·37	− 1·55	No. 6
86		Rádhápuram	8	17	1·75	8	16	59·44	+ 2·31	No. 9
	209	Rájpur	30	23	9·15	30	23	56·83	− 47·68	No. 1
	210	Rájuli	20	12	51·25	20	12	55·45	− 4·20	No. 8
87		Rákhi	29	17	20·76	29	17	21·28	− 0·52	No. 5
	211	Ramai	20	56	50·31	20	56	51·47	− 1·16	No. 8
88		Rámbágh	24	51	20·58	24	51	21·44	− 0·86	No. 5
	212	Rámgír	18	35	26·90	18	35	26·12	+ 0·78	No. 8
89		Rám Thal	28	29	38·81	28	29	39·27	− 0·46	No. 5
90		Rámuápur	28	22	0·10	28	22	11·04	− 10·94	No. 2
91		Rangír	24	0	19·28	24	0	20·37	− 1·09	No. 3
92		Rángrai	20	48	7·16	20	48	14·68	− 7·52	No. 7
	213	Ranjítgarh	32	35	6·52	32	35	12·11	− 5·59	No. 5
	214	Ráwal	18	32	4·73	18	32	9·22	− 4·49	No. 8
93		Rewat	26	53	54·74	26	53	53·98	+ 0·76	No. 4
	215	Rojhra	24	57	26·09	24	57	26·28	− 0·19	No. 5
	216	Salímpur	27	46	36·23	27	46	36·46	− 0·23	No. 3
	217	Samdari	25	48	59·58	25	48	59·55	+ 0·03	No. 5
94		Şangatpur	31	17	35·42	31	17	34·43	+ 0·99	No. 5
	218	Sánjib	17	31	12·32	17	31	18·68	− 6·36	No. 8

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	219	Sankráo	28	2	28·92	28	2	29·00	− 0·08	No. 3
	220	Sarey Khan	22	12	50·66	22	12	55·61	− 4·95	No. 8
	221	Sarkára	29	15	35·09	29	15	46·91	− 11·82	No. 2
	222	Saugor	23	49	48·71	23	49	48·07	+ 0·64	No. 4
95		Sawaipur	29	39	13·13	29	39	13·96	− 0·83	No. 5
	223	Senchal	26	58	33·01	26	59	8·25	− 35·24	No. 1
96		Sháhpur	32	1	34·23	32	1	33·77	+ 0·46	No. 5
97		Shúlakarai	9	32	15·53	9	32	13·28	+ 2·25	No. 9
	224	Siliguri	26	41	18·10	26	41	40·37	− 22·27	No. 2
	225	Singáwáram	17	45	8·71	17	45	10·38	− 1·67	No. 8
	226	Sironj Base-line N. E. End	24	8	55·45	24	8	53·57	+ 1·88	No. 4
	227	Sirsa	28	54	30·27	28	54	39·64	− 9·37	No. 2
	228	Sítápár	21	24	43·83	21	24	50·54	− 6·71	No. 8
	229	Sonáda	23	7	15·61	23	7	19·89	− 4·28	No. 7
	230	St. Thomas's Mount	13	0	20·64	13	0	14·79	+ 5·85	No. 9
	231	Súrantál	24	14	21·36	24	14	20·42	+ 0·94	No. 4
98		Takalkhera	21	5	50·17	21	5	56·76	− 6·59	No. 7
99		Talegaon	19	1	21·65	19	1	26·64	− 4·99	No. 7
100		Tanakarakulam	8	13	57·50	8	13	55·39	+ 2·11	No. 9
101		Tásing	27	52	59·49	27	52	59·47	+ 0·02	No. 5
	232	Telu	28	56	12·41	28	56	11·34	+ 1·07	No. 5
102		Thíkri	22	1	3·92	22	1	2·77	+ 1·15	No. 7
	233	Thob	26	3	2·90	26	3	5·85	− 2·95	No. 5
	234	Tinsia	24	6	29·05	24	6	27·97	+ 1·08	No. 4
103		Tiruvendipuram	11	44	43·40	11	44	37·64	+ 5·76	No. 9
	235	Tonglu	27	1	11·30	27	1	53·54	− 42·24	No. 1
104		Tŏnsalgutta	16	18	2·36	16	18	6·91	− 4·55	No. 7
105		Tuagat	16	9	46·73	16	9	51·66	− 4·93	No. 7

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Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)	Region in which the station lies *Vide Table III*
			°	′	″	°	′	″	″	
106		Usira	26	57	0·50	26	57	6·22	− 5·72	No. 5
107		Valvádi	20	44	21·27	20	44	27·73	− 6·46	No. 7
	236	Vánákonda	17	36	0·22	17	36	6·87	− 6·65	No. 8
108		Vijayápati	8	12	10·67	8	12	8·34	+ 2·33	No. 9
	237	Virária	24	56	32·64	24	56	36·13	− 3·49	No. 5
	238	Vizagapatam Base-line N. End	18	0	56·66	18	1	2·93	− 6·27	No. 8
109		Voi	19	7	14·69	19	7	19·89	− 5·20	No. 7
	239	Waltair	17	43	20·44	17	43	29·31	− 8·87	No. 8
110		Yĕrragunta	14	48	27·31	14	48	23·26	+ 4·05	No. 9
111		Yĕttimalai	11	3	52·10	11	3	50·00	+ 2·10	No. 9

ASTRONOMICAL LATITUDES.

For the purposes of the next table India has been divided into the ten following regions, which are shown on Plate VI.

1. Himalaya Mountains
2. Plains at the foot of the Himalaya.
3. North-East India.
4. Central India.
5. North-West India.
6. Baluchistan.
7. Western India.
8. Eastern India.
9. Southern India.
10. Burma.

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 1.—Himalaya Mountains.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A °	′	″	Geodetic Latitude = G °	′	″	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive) ″
2		Ámsot	30	22	16·02	30	22	44·86	− 28·84
	128	Bahak	30	44	37·60	30	45	5·22	− 27·62
	129	Bajamara	30	45	27·79	30	45	56·20	− 28·41
9		Banog	30	28	4·18	30	28	36·91	− 32·73
	133	Birond	29	14	29·72	29	15	14·15	− 44·43
	156	Dehra Dún Base-line E. End	30	16	37·26	30	17	7·35	− 30·09
	157	Dehra Dún Haig Observatory	30	18	51·80	30	19	28·73	− 36·93
18		Dehra Dún Observatory (Old)	30	19	19·56	30	19	57·07	− 37·51
	173	Kaulia	27	48	25·5	27	48	58·6	− 33·1
	179	Kidarkanta	31	0	51·58	31	1	21·71	− 30·13
	181	Kurseong	26	51	15·05	26	52	5·56	− 50·51
	183	Lambatach	31	0	34·38	31	1	8·46	− 34·08
	190	Mahadeo Pokra	27	40	53·6	27	41	31·5	− 37·9
67		Murree	33	54	37·35	33	54	57·35	− 20·00
68		Mussooree	30	27	4·02	30	27	40·55	− 36·53
	205	Phallut	27	12	4·30	27	12	40·86	− 36·56
	209	Rájpur	30	23	9·15	30	23	56·83	− 47·68
	223	Senchal	26	58	33·01	26	59	8·25	− 35·24
	235	Tonglu	27	1	11·30	27	1	53·54	− 42·24
		Mean deflection of the plumb-line for stations of Region No. 1 ... =							− 35·29

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 2.—Plains at the foot of the Himalaya.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)
			°	′	″	°	′	″	″
	166	Jalpaiguri	26	31	11·44	26	31	17·39	− 5·95
39		Jarúra	27	59	50·22	27	59	55·94	− 5·72
41		Kaliána	29	30	47·98	29	30	54·70	− 6·72
74		Nojli	29	53	14·12	29	53	27·76	− 13·64
90		Rámuápur	28	22	0·10	28	22	11·04	− 10·94
	221	Sarkára	29	15	35·09	29	15	46·91	− 11·82
	224	Siliguri	26	41	18·10	26	41	40·37	− 22·27
	227	Sirsa	28	54	30·27	28	54	39·64	− 9·37
Mean deflection of the plumb-line for stations of Region No. 2								=	− 10·90

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 3.—North-East India.

Reference Number From Vol. XI	Reference Number From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)
			°	′	″	°	′	″	″
	123	Algi	25	29	48·16	25	29	46·19	+ 1·97
	125	Amúa	23	59	57·02	23	59	56·24	+ 0·78
	126	Andhiári	24	41	11·31	24	41	6·78	+ 4·53
	130	Bánsgopál	28	33	23·28	28	33	28·08	− 4·80
13		Calcutta	22	32	55·58	22	32	54·67	+ 0·91
	143	Chanduria	25	44	31·93	25	44	27·47	+ 4·46
	146	Charaldánga	24	52	45·36	24	52	43·95	+ 1·41
14		Chendwár	23	57	16·82	23	57	13·75	+ 3·07
	152	Dargawa	24	37	17·32	24	37	13·21	+ 4·11
	153	Dariápur	21	47	28·82	21	47	27·95	+ 0·87
22		Dewarsán	26	15	58·32	26	15	52·89	+ 5·43
27		Etora	26	54	22·63	26	54	17·85	+ 4·78
	164	Gúrmi	26	36	5·97	26	36	3·63	+ 2·34
32		Gurwáni	24	1	28·93	24	1	25·71	+ 3·22
37		Huríláong	24	2	16·74	24	2	5·99	+ 10·75
43		Kánákhera	25	51	25·97	25	51	20·95	+ 5·02
46		Karára	24	4	42·20	24	4	42·01	+ 0·19
47		Karaundi	23	10	45·07	23	10	40·02	+ 5·05
	185	Lohágara	26	2	14·17	26	2	12·02	+ 2·15
61		Lora	23	29	46·30	23	29	41·53	+ 4·77
	188	Madhupur	23	56	42·82	23	56	38·97	+ 3·85
	191	Majhár	26	6	20·30	26	6	17·00	+ 3·30
68		Malúncha	23	54	29·64	23	54	29·02	+ 0·62
72		Nimkár	27	21	8·16	27	21	8·09	+ 0·07
79		Pavia	25	27	21·18	25	27	17·39	+ 3·79
84		Potenda	24	37	24·71	24	37	23·04	+ 1·67
91		Rangír	24	0	19·28	24	0	20·37	− 1·09
	216	Salímpur	27	46	36·23	27	46	36·46	− 0·23
	219	Sankráo	28	2	28·92	28	2	29·00	− 0·08
		Mean deflection of the plumb-line for stations of Region No. 3 ... =							+ 2·52

ASTRONOMICAL LATITUDES.

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 4.—Central India.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)
			°	′	″	°	′	″	″
	131	Bhaorása	24	8	5·13	24	8	3·74	+ 1·39
	138	Budhon	24	5	8·99	24	5	8·41	+ 0·58
	149	Daiádhari	24	38	18·79	24	38	17·59	+ 1·20
31		Gurária	24	25	31·98	24	25	32·46	− 0·48
40		Jetgarh	26	18	8·02	26	18	6·39	+ 1·63
42	168	Kaliánpur	* Station of origin						...
44		Kánkra	25	37	58·75	25	37	59·53	− 0·78
50		Kesri	25	46	41·57	25	46	35·81	+ 5·76
	186	Losalli	24	6	18·19	24	6	19·17	− 0·98
76		Pahárgarh	24	56	6·47	24	56	6·92	− 0·45
93		Rewat	26	53	54·74	26	53	53·98	+ 0·76
	222	Saugor	23	49	48·71	23	49	48·07	+ 0·64
	226	Sironj Base-line N. E. End	24	8	55·45	24	8	53·57	+ 1·88
	231	Súrantál	24	14	21·36	24	14	20·42	+ 0·94
	234	Tinsia	24	6	29·05	24	6	27·97	+ 1·08
Mean deflection of the plumb-line for stations of Region No. 4 ... =									+ 0·94

* For values of Astronomical Latitude *see* pages (33) and (34).

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 5.—North-West India.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A	Geodetic Latitude = G	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)
			° ′ ″	° ′ ″	″
	113	Agra-group east point	27 9 16·21	27 9 21·00	− 4·79
	114	Agra-group north point	27 14 10·31	27 14 14·10	− 3·79
	115	Agra-group south point	27 5 32·95	27 5 38·51	− 5·56
	116	Agra-group west point	27 9 41·43	27 9 45·86	− 4·43
	117	Agra Longitude station	27 9 34·62	27 9 39·93	− 5·31
	118	Agra parade point	27 8 52·18	27 8 57·47	− 5·29
	120	Akbar	30 53 38·53	30 53 43·27	− 4·74
	122	Alamkhán	24 49 30·50	24 49 31·23	− 0·73
	124	Amritsar	31 38 2·51	31 37 58·72	+ 3·79
10		Bánskho	26 50 2·37	26 50 7·89	− 5·52
	134	Bithnok	27 53 24·97	27 53 22·03	+ 2·94
	137	Bostán	28 30 54·25	28 30 59·64	− 5·39
	140	Chamu	26 39 53·44	26 39 52·74	+ 0·70
	141	Chandaos	28 5 0·71	28 5 1·59	− 0·88
	144	Chánga	24 58 47·25	24 58 47·00	+ 0·25
17		Datairi	28 43 58·67	28 44 4·49	− 5·82
	158	Dera Dín Panáh	30 33 59·63	30 34 1·87	− 2·24
	161	Didáwa	24 51 17·32	24 51 19·36	− 2·04
28		Garinda	27 55 30·05	27 55 30·55	− 0·50
38		Isanpur	30 38 16·03	30 38 20·01	− 3·98
	167	Jambo	27 16 31·94	27 16 28·88	+ 3·06
45		Karachi	24 49 50·14	24 49 50·25	− 0·11
	172	Károthol	24 53 44·78	24 53 46·69	− 1·91
51		Khámor	25 45 11·00	25 45 15·01	− 4·01
	174	Khankharia	24 36 58·17	24 36 56·19	+ 1·98
53		Khimúána	30 22 11·74	30 22 14·82	− 3·08
	176	Khirsar	28 29 43·75	28 29 40·91	+ 2·84
	177	Khori	25 0 30·60	25 0 31·53	− 0·93

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 5.—North-West India.—(*Continued*).

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A °	′	″	Geodetic Latitude = G °	′	″	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive) ″
	182	Ládimsir	29	21	39·83	29	21	41·58	− 1·75
	187	Lúnki	24	58	18·73	24	58	23·15	− 4·42
	194	Mooltan	30	10	56·15	30	10	58·70	− 2·55
73		Noh	27	50	53·13	27	50	53·08	+ 0·05
	201	Oria	24	37	47·63	24	37	50·96	− 3·33
87		Rákhi	29	17	20·76	29	17	21·28	− 0·52
88		Rámbágh	24	51	20·58	24	51	21·44	− 0·86
89		Rám Thal	28	29	38·81	28	29	39·27	− 0·46
	213	Ranjítgarh	32	35	6·52	32	35	12·11	− 5·59
	215	Rojhra	24	57	26·09	24	57	26·28	− 0·19
	217	Samdari	25	48	59·58	25	48	59·55	+ 0·03
94		Sangatpur	31	17	35·42	31	17	34·43	+ 0·99
95		Sawaipur	29	39	13·13	29	39	13·96	− 0·83
96		Sháhpur	32	1	34·23	32	1	33·77	+ 0·46
101		Tásing	27	52	59·49	27	52	59·47	+ 0·02
	232	Telu	28	56	12·41	28	56	11·34	+ 1·07
	233	Thob	26	3	2·90	26	3	5·85	− 2·95
106		Usira	26	57	0·50	26	57	6·22	− 5·72
	237	Virária	24	56	32·64	24	56	36·13	− 3·49
		Mean deflection of the plumb-line for stations of Region No. 5 ... =							− 1·82

Region No. 6.—Baluchistan.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	°	′	″	°	′	″	″
	208	Quetta	30	11	55·82	30	11	57·37	− 1·55

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 7.—Western India.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)
			°	′	″	°	′	″	″
	112	Achola	18	14	44·87	18	14	48·12	− 3·25
	119	Ahmadpur	23	36	18·42	23	36	20·88	− 2·46
1		Akampalle	17	10	50·39	17	10	53·96	− 3·57
3		Aramlia	24	25	2·66	24	25	7·27	− 4·61
5		Badgaon	20	44	15·54	20	44	23·06	− 7·52
	145	Chaniána	24	6	25·39	24	6	36·64	− 11·25
	147	Colába	18	53	39·15	18	53	49·48	− 10·33
16		Dámargída	18	3	14·92	18	3	17·35	− 2·43
	155	Deesa	24	15	21·15	24	15	29·35	− 8·20
19		Deo Dongri	23	26	43·17	23	26	47·79	− 4·62
20		Devanúr	17	10	56·88	17	11	0·43	− 3·55
21		Devaragat	16	6	31·98	16	6	37·27	− 5·29
23		Dhaigaon	19	30	30·82	19	30	35·04	− 4·22
24		Dhánura	20	44	3·35	20	44	10·84	− 7·49
	159	Dhauleshvar	18	25	42·84	18	25	41·64	+ 1·20
26		Dotra	20	41	22·25	20	41	28·91	− 6·66
29		Gattináráyantippa	16	7	48·95	16	7	54·81	− 5·86
33		Halda	19	9	24·41	19	9	29·38	− 4·97
34		Harnása	22	47	26·71	22	47	29·91	− 3·20
	169	Kámkhera	23	59	42·89	23	59	44·93	− 2·04
	170	Kanheri	18	29	21·84	18	29	30·75	− 8·91
49		Kem	18	10	45·68	18	10	48·90	− 3·22
52	175	Khánpisura	18	45	22·60	18	45	30·65	− 8·05
54		Kodangal	17	7	53·74	17	7	57·35	− 3·61
57		Kundgol	15	15	14·46	15	15	15·28	− 0·82
59		Ládi	23	8	39·10	23	8	44·13	− 5·03
60		Linganapalle	17	7	13·40	17	7	16·66	− 3·26

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 7.—Western India.—(*Continued*).

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A °	′	″	Geodetic Latitude = G °	′	″	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive) ″
62		Majala	16	46	55·45	16	46	56·82	− 1·37
64		Mandála	19	2	42·84	19	2	48·24	− 5·40
	193	Mándvi	18	37	47·94	18	37	51·11	− 3·17
66		Mávinhúnda	16	25	4·47	16	25	4·19	+ 0·28
70		Navalúr	15	25	28·48	15	25	31·17	− 2·69
	199	Nitali	18	17	2·74	18	17	7·16	− 4·42
80		Pĕddapád	16	17	14·13	16	17	20·38	− 6·25
81		Pialmudi	17	4	1·06	17	4	6·05	− 4·99
92		Rángrai	20	48	7·16	20	48	14·68	− 7·52
	229	Sonáda	23	7	15·61	23	7	19·89	− 4·28
98		Takalkhera	21	5	50·17	21	5	56·76	− 6·59
99		Talegaon	19	1	21·65	19	1	26·64	− 4·99
102		Thíkri	22	1	3·92	22	1	2·77	+ 1·15
104		Tŏnsalgutta	16	18	2·36	16	18	6·91	− 4·55
105		Tuagat	16	9	46·73	16	9	51·66	− 4·93
107		Valvádi	20	44	21·27	20	44	27·73	− 6·46
109		Voi	19	7	14·69	19	7	19·89	− 5·20

Mean deflection of the plumb-line for stations of Region No. 7 ... = − 4·65

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 8.—Eastern India.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A °	′	″	Geodetic Latitude = G °	′	″	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive) ″
	127	Ankora	19	24	26·63	19	24	34·75	− 8·12
	132	Bhímsain	20	57	28·54	20	57	35·96	− 7·42
	135	Bolarum	17	30	7·36	17	30	13·41	− 6·05
	136	Bolíkonda	17	42	29·08	17	42	35·82	− 6·74
	139	Burgpaili	18	54	3·48	18	54	7·20	− 3·72
	142	Chandípur	21	26	34·03	21	26	36·99	− 2·96
	148	Cuttack	20	28	52·05	20	29	0·68	− 8·63
	150	Dalea	22	19	30·25	22	19	33·62	− 3·37
	151	Dánapa	15	55	59·69	15	56	0·14	− 0·45
	154	Darutippa	15	0	33·52	15	0	36·47	− 2·95
	160	Dhúlipalla	16	25	53·47	16	25	56·75	− 3·28
	162	Díwai	19	49	26·87	19	49	32·57	− 5·70
	165	Háthbena	19	51	42·60	19	51	42·34	+ 0·26
	171	Karía	19	12	2·67	19	12	5·98	− 3·31
	178	Khundábolo	19	51	7·03	19	51	12·90	− 5·87
	184	Lingmára	21	42	55·36	21	43	3·07	− 7·71
	192	Mal	18	47	6·75	18	47	16·97	− 10·22
	197	Náharmau	23	30	13·14	23	30	18·15	− 5·01
	198	Niálamari	17	1	25·93	17	1	33·63	− 7·70
	200	Ongole	15	29	52·87	15	29	56·85	− 3·98
	202	Parampúdi	17	12	32·63	17	12	38·28	− 5·65
	203	Patháídi	21	48	43·06	21	48	45·96	− 2·90

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 8.—Eastern India.—(*Continued*).

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)
			°	′	″	°	′	″	″
	204	Patna	21	47	17·28	21	47	20·83	− 3·55
	206	Pirmulo	17	52	58·32	17	53	2·81	− 4·49
	210	Rájuli	20	12	51·25	20	12	55·45	− 4·20
	211	Ramai	20	56	50·31	20	56	51·47	− 1·16
	212	Rámgír	18	35	26·90	18	35	26·12	+ 0·78
	214	Ráwal	18	32	4·73	18	32	9·22	− 4·49
	218	Sánjib	17	31	12·32	17	31	18·68	− 6·36
	220	Sarey Khan	22	12	50·66	22	12	55·61	− 4·95
	225	Singáwáram	17	45	8·71	17	45	10·38	− 1·67
	228	Sítápár	21	24	43·83	21	24	50·54	− 6·71
	236	Vánákonda	17	36	0·22	17	36	6·87	− 6·65
	238	Vizagapatam Base-line N. End	18	0	56·66	18	1	2·93	− 6·27
	239	Waltair	17	43	20·44	17	43	29·31	− 8·87
Mean deflection of the plumb-line for stations of Region No. 8 ... =									− 4·86

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 9.—Southern India.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A °	′	″	Geodetic Latitude = G °	′	″	Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)	″
4		Arasákulam	8	13	41·96	8	13	39·52	+	2·44
6		Bandúr	14	57	44·41	14	57	42·32	+	2·09
7		Bangalore Base-line N. E. End	13	4	53·17	13	4	56 05	−	2·88
8		Bangalore Base-line S. W. End	13	0	36·12	13	0	40·91	−	4·79
11		Black Station	9	31	4·22	9	31	1·30	+	2·92
12		Bŏmmasandra	13	59	42·63	13	59	36 34	+	6·29
15		Chikalgurki	14	59	5·16	14	59	4·53	+	0·63
25		Dŏddagunta	12	59	51·52	12	59	55·76	−	4·24
	163	Gudali	14	1	10·65	14	1	9·45	+	1·20
35		Hŏnnavalli	14	16	30·76	14	16	32·46	−	1·70
36		Hŏnnúr	14	55	22·20	14	55	18·96	+	3·24
48		Kátpálaiyam	10	56	36·66	10	56	35·97	+	0·69
	180	Kistama	14	27	12·28	14	27	14·56	−	2·28
55		Koramúr	14	8	1·71	14	8	6·59	−	4·88
56		Kudankulam	8	10	23·41	8	10	21·55	+	1·86
58		Kutipárai	9	28	47·09	9	28	44·87	+	2·22
	189	Madras Observatory	13	4	8·97	13	4	4·17	+	4·80
65		Mangalore	12	52	17·76	12	52	14·76	+	3·00
69		Namthabad	15	5	51·75	15	5	52·40	−	0·65
71		Nimbágal	14	51	56·14	14	51	52·43	+	3·71
75		Pachapálaiyam	10	59	40·81	10	59	39·88	+	0·93
77		Pandalagudi	9	23	30·55	9	23	27·69	+	2·86
78		Pávagada	14	6	18·80	14	6	15·39	+	3·41
85		Punnæ	8	9	29·92	8	9	27·79	+	2·13
86		Rádhápuram	8	17	1·75	8	16	59·44	+	2·31
97		Shúlakarai	9	32	15·53	9	32	13·28	+	2·25
	230	St. Thomas's Mount	13	0	20·64	13	0	14·79	+	5·85

TABLE III.—Deflections of the Plumb-line at Latitude Stations arranged according to Regions.

Region No. 9.—Southern India.—(*Continued*).

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G (Northerly negative) (Southerly positive)
			°	′	″	°	′	″	″
100		Tanakarakulam	8	13	57·50	8	13	55·39	+ 2·11
103		Tiruvendipuram	11	44	43·40	11	44	37·64	+ 5·76
108		Vijayápati	8	12	10·67	8	12	8·34	+ 2·33
110		Yĕrragunta	14	48	27·31	14	48	23·26	+ 4·05
111		Yĕttimalai	11	3	52·10	11	3	50·00	+ 2·10

Mean deflection of the plumb-line for stations of Region No. 9 ... = + 1·56

Region No. 10.—Burma.

Reference Number: From Vol. XI	Reference Number: From present volume	Name of Station	Astronomical Latitude = A			Geodetic Latitude = G			Deflection of Plumb-line = A − G
			°	′	″	°	′	″	″
	121	Akyab	20	8	14·87	20	8	12·86	+ 2·01
	195	Moulmein	16	30	2·97	16	29	54·62	+ 8·35
	196	Nagarkhána	22	22	57·08	22	22	56·38	+ 0·70
	207	Prome	18	49	18·62	18	49	14·18	+ 4·44

Mean deflection of the plumb-line for stations of Region No. 10 ... = + 3·88

Abstract of *Table III.*

Region	No. of Stations	Mean Deflection of Plumb-line
		"
No. 1. Himalaya Mountains ...	19	− 35·29
No. 2. Plains at the foot of the Himalaya	8	− 10·90
No. 3. North-East India	29	+ 2·52
No. 4. Central India	14	+ 0·94
No. 5. North-West India	47	− 1·82
No. 6. Baluchistan	1	− 1·55
No. 7. Western India	44	− 4·65
No. 8. Eastern India	35	− 4·86
No. 9. Southern India	32	+ 1·56
No. 10. Burma	4	+ 3·88

APPENDICES.

APPENDIX.

No. 1.

ON DEFLECTIONS OF THE PLUMB-LINE IN INDIA.

BY REV. O. FISHER, M.A., F.G.S.,

Hon. Fellow of Jesus College, Cambridge, and of King's College, London.

In the Report of 1901* on the attraction of the Himalaya Mountains upon the plumb-line in India certain anomalies of deflection are described, which require to be accounted for: and in the Philosophical Magazine for January 1904 I published an article in which I claimed to have shown, that the chief of them may be explained upon the hypothesis of "isostacy" of the earth's crust. The following note is an amended and somewhat abridged edition of that article.

Prefixed to the Report is given a cross-section of outer Himalayan ranges on the meridian of 77° 25′, to the scale of one inch to four miles. This was constructed by Colonel St. G. C. Gore, R.E., Surveyor General of India. It appears from this section that through a distance of 124 miles the summits rise fairly regularly from the plains to a height of 18,000 feet. Now according to the maps the ranges in this meridian appear to be inclined at about 40° to the prime vertical. Since then the length of the meridian cross-section is 124 miles, that of the section perpendicular to the ranges will be about 95 miles. These outer ranges may therefore, as far as their attraction is concerned, be taken as approximately represented by an inclined plane, or slope, whose base is 95 miles and height 3·3 miles.

Beyond these ranges lies the Tibetan plateau, estimated to be on an average three miles high and 400 miles across. To facilitate calculation I suppose the entire area to be rectangular, and to extend to an equal distance on each side of the meridian of the station. Pratt estimated the area to be equal to that of a circle of radius 335 miles†. This would make the length of the rectangular area about 880 miles. I suppose this mass to have been accumulated out of the compression of a crust 25 miles thick, and that by far the greater volume of the crushed-together mass went down into the denser substratum upon which it is supported by isostacy. I take the density of the crust rock to be 2·68 (that of granite), and that of the substratum to be 2·96 (that of basalt). The consequence of this arrangement would be that for exact isostacy the "root" of the plateau would dip about 29 miles into the substratum, and that the root of the inclined plane of the outer ranges would be represented by an inverted plane having an angle of 24° 31′ 5″.

Major Burrard has calculated by the method of compartments the deflections which the mountains might be expected to produce at various stations in the meridian of Kaliánpur, and at p. 94 of the Report he has given a table containing an analysis of the calculated deflections, separating the components of the deflection due to the Himalayas from those due to other areas. This affords a criterion as to what extent our assumption respecting the form and position of the visible mass represents for our purpose the actual high land. Major Burrard has assumed 2·65 to be the density, while I have taken 2·68, to agree with the value used in 'Physics of the Earth's Crust,' but the discrepancy is immaterial.

The deflection in the meridian at Dehra Dún due to the mountain masses alone, as calculated by the method of compartments, Major Burrard finds to be 72″. Our hypothesis regarding the form and density of the highlands gives 70″ as the deflection at the foot of the outer ranges, which is nearly in that position. This shows that the hypothesis reproduces the correct attraction very closely.

There is however reason to doubt whether the "roots" of the slope and plateau would dip into the denser substratum quite so deeply as would be required for exact local isostacy, because Mr. Putnam's 'Transcontinental Gravity Measures, U.S.A.', seemed to show that "general continental elevations are compensated by a deficiency of density in the matter below sea-level, but that local topographical irregularities are not compensated for, but are maintained by the partial rigidity of the earth's crust"‡.

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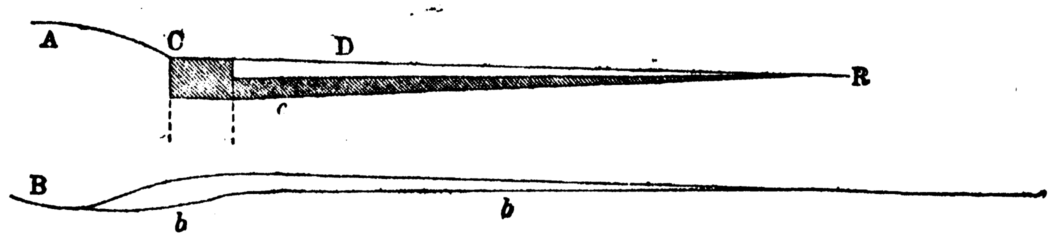
* By Major S. G. Burrard, R.E., Superintendent of the Trigonometrical Survey of India.
† 'Figure of the Earth,' 4th ed. art. 201.
‡ G. R. Putnam, Phil. Soc. Bulletin, Washington, U.S.A., vol. xiii.

Following up the suggestion made by Mr. Putnam we notice how Mr. Oldham tells us that "the very close resemblance between the upper Sivalik beds and the recent deposits of the Gangetic Plain leaves little room for doubt that the Sivalik beds were deposited subaerially by streams and rivers." "The thickness attained by the Sivalik series is immense. Mr. Wynne estimated it at 14,000 feet in the North-West Punjab. In the Sivalik Hills there are at least 15,000 feet of beds and the series is by no means complete, and similar vast thicknesses may be measured in any section." In Mr. Oldham's diagram (Man. Geol. India, p. 473) (fig. 1) he represents the Sivalik strata as lying beneath modern alluvium except at the northern edge where they have been disturbed and elevated into the Sub-Himalayan Sivalik range. Following the above description, we may assume a layer of rock of somewhat less than crust density three miles thick where it abuts on the foot of the Himalayan slope, and thinning out to nothing against the trappean area. It will be observed that a

Fig. I



"Diagram to illustrate the theory of the elevation of the Himalayas corresponding to the right-hand half of fig. 26 (copied from 'Physics of the Earth's Crust'). Horizontal scale about 60 miles, vertical about 30 miles to one inch. [This makes the crust much thinner than assumed in P.E.C.]

- A. Massif of the Himalayas.
- B. Root of the same.
- C. Earlier marginal deposits compressed and elevated.
- *c*. Continuation of the same, depressed and undisturbed.
- D. Subsequent deposits overlapping C.
- *b*. Sinking of lower surface of crust due to C and D."*

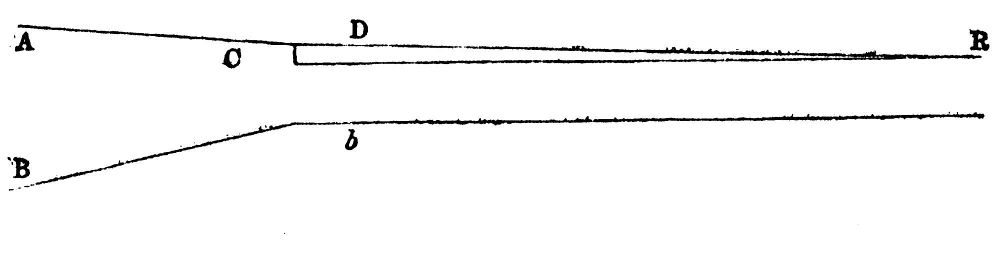
pile of rock three miles thick above the surface of the sphere would reach an altitude equal to that of the Tibetan plateau, but the Gangetic plains do not rise to as much as a thousand feet above the sea-level, and the recent alluvium has to be allowed for. The conclusion is that the crust of the earth must be depressed 15,000 feet at least into the substratum at the foot of the Himalayan slope. We need, therefore, to calculate the effect of this arrangement upon the plumb-line.

According to the present hypothesis, the Himalayas and Tibetan plateau are not supported solely by the root immediately beneath them, but partly by the depressed crust beneath the Sivalik rock of the plains. It follows that for isostacy the root of the plateau and slope will not need to be quite so deep; we may take the height of the plains above the sea-level as compensating their presumable defect of density from that of the general crust.

The width of the alluvium, where the meridian of Dehra Dún in Mr. Oldham's geological map crosses its boundary, appears to be about 230 miles. This will give for the base of the Sivalik beds an inverted inclined plane, whose depth is three miles and width 230. If we apply the principle of *general* isostacy to half of the area we are dealing with, that is,

Fig. 2.

Modification of Mr. Oldham's diagram to suit the present hypothesis.



Scale about 105 miles to an inch.

- **A. Slope of the Himalayas, including the marginal deposit C of Mr. Oldham's diagram.**
- **B. Root of the same.**
- **D. Sivaliks undisturbed and covered by subsequent deposits.**
- ***b*. Sunken lower surface of the crust contributing to the general support of half the highlands according to Mr. Putnam's theory.**

* 'Manual of the Geology of India,' 2nd. Ed., Calcutta, 1893, p. 476.

from the middle of the Tibetan plateau to the further edge of the alluvial deposit 230 miles from the foot of the slope, we find that the depth of the root of the plateau will be diminished by one mile and four tenths, or more exactly the depth of the root of the plateau for exact isostacy would be 28·71 miles, and the diminution for general isostacy 1·39 miles, which gives for the depth of the root of the plateau 27·32 miles, and for that of the slope at its culminating height 30·19 miles. By this change the attractions of the visible masses and of the crust will not be altered, but the negative attraction of the root will be slightly diminished, and the balance of attraction towards the range consequently increased.

Looked at in a general way, the visible masses of the highlands will attract the plumb-line towards them, their roots, where the denser substratum is displaced by the lighter crust, will repel the plumb-line, and the deflection at any station will be the balance of the two effects.

The effect of the plain will resemble that of the mountains' roots, because it will depress and displace the heavier substratum. Consequently at either edge the plain will produce a deflection away from itself, northward at the northern edge and southward at the southern, while at some intermediate place the effect of the plain will be *nil.*

To estimate the final deflection at any station we must strike the balance of all these effects.

It must be borne in mind that the object of this investigation is one of principle, and that no exact accordance with the results of the Survey is to be expected, because the natural data cannot be presented in a form amenable to mathematical treatment.

The following is a summary of the results of the hypothesis:—

At the foot of the slope the meridional deflection will be,

Due to the slope	30″·210
Due to the plateau	40 ·014
Total due to the visible masses	70 ·254
Negative deflection due to the root	51 ·825
Residual deflection, northward	18 ·429
Northward negative deflection due to the plain ...	3 ·837
Final result, northward	22 ·266

At 60 miles from the foot of the slope the meridian deflection will be,

Due to the slope	11″·804
Due to the plateau	28 ·924
Total due to the visible masses	40 ·728
Negative deflection due to the root	37 ·156
Residual deflection, northward	3 ·572
Southward deflection due to the plain	1 ·049
Final result, northward	2 ·523

The meridian deflection at the southern edge of the plain will be,

Due to the slope	3″·884
Due to the plateau	14 ·923
Total due to the visible masses	18 ·807
Negative deflection due to the root	17 ·333
Residual deflection, northward	1 ·474
Southward deflection due to the plain	3 ·006
Final result, southward	1 ·532

Thus the hypothesis of the general isostacy of the Himalayan region and the Gangetic plain combined gives the considerable meridian deflection of 22″ northward at the foot of the range. At a distance of 60 miles from the foot of the slope this deflection will be reduced to about 2″·5, and at a greater distance disappears altogether. These results are in accordance with Airy's prediction.* The deflection then changes its sign, and becomes southerly, and is 1″·5 in the meridian at the further edge of the plain. At a greater distance the effect of the plain would no doubt disappear, which would account for the deflection at the edge of the plain being more southerly than it is at Kaliánpur.

It is owing to the thickness of the crust that the attraction of the visible masses, though nearly compensated by the root at a distance from them, is much less so at places in their neighbourhood.

The extreme difference of the deflections in the meridian at the northern and southern edges of the plain will thus be about 24″. In the table following p. 14 of the Report it is, in the meridian of Kaliánpur, about 30″, as observed†.

It is obvious that the dense rock of the Deccan will tend to intensify the southerly deflection on the southern edge of the plain, and that, in general, irregularities in the geological structure of the country buried beneath the post-eocene deposits will be responded to by irregularities in the deflection of the plumb-line. That this must occur appears from the table, where, in the column of deflections, there are irregularities over the plain which seem inexplicable in any other way.

Nevertheless, on the whole the trend of the deflections from the foot of the slope to the southern edge of the plain in the meridian of Kaliánpur has been fairly well accounted for; and the existence of an area of southerly deflections, as indicated in the table following p. 14 of the Report, explained, without the necessity of assuming the presence of a chain of excessive density, seeing that it would be the natural consequence of the displacement of the dense substratum by the depression of the Gangetic plain in accordance with the general isostacy of the entire region.

Moreover, the hypothesis of general rather than local isostacy permits us to suppose that the root of the southern portion of the Himalayas is somewhat less deep, and that of the Tibetan plateau deeper than would be required for local isostacy, and the geological observation that compressive elevation is going on along the main axis‡ appears to support this view. If this be the case, the repulsive effect of the root would be diminished at the foot of the slope, on account of the greater distance of the mean mass of the root; and the deflection caused by the visible masses would be less nearly compensated. This would bring the excess of deflection at the foot of the slope above that at the southern edge of the plain more into accordance with the observed amount.

It must be remembered that certain gratuitous hypotheses have been made, which will affect the quantitative, though not the qualitative, results of this investigation. Such are the relative densities of the crust and substratum and the thickness of the crust. But the quantitative agreement of the results with the observed facts shows that the assumptions made are not very improbable.

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* Phil. Trans. vol. cxlv. p. 102.

† The following is taken from the above table. N signifying a northern and S a southern deflection as referred to Kaliánpur:—

	N. lat.	Deflection		N. lat.	Deflection
	° ′	″		° ′	″
Banog ...	30 28	33·04 N	Noh ...	27 51	0·26 N
Mussooree ...	30 27	36·84 N	Agra ...	27 10	5·72 N
Rajpur ...	30 24	47·65 N	Usira ...	26 57	6·03 N
Ámsot ...	30 22	29·15 N	Kesri ...	25 46	5·45 S
Dehra Dún ...	30 19	37·82 N	Pahárgarh ...	24 56	0·76 N
E. End ditto, Base	30 17	30·37 N	Daiádhari ...	24 38	1·01 S
Nojli ...	29 53	13·95 N	Súrantál ...	24 14	0·82 S
Kaliána ...	29 31	7·03 N	Sironj N.E. End Base	24 9	1·69 S
Datairi ...	28 44	6·13 N	Bhaorása ...	24 8	1·17 S
Bostán ...	28 31	5·67 N	Kaliánpur ...	24 7	0·0
Chandaos ...	28 5	1·16 N			

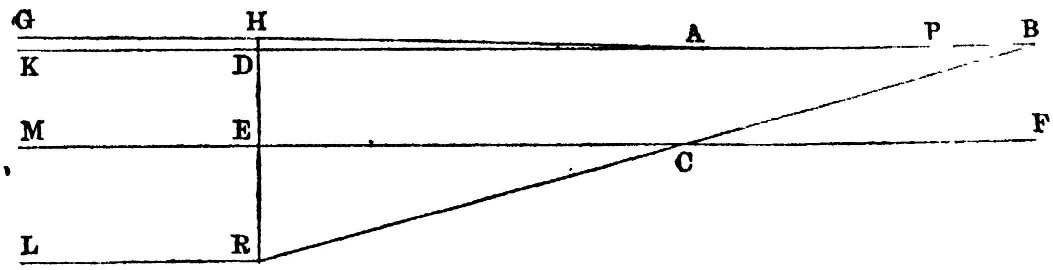
‡ "Ever since our great pioneer in Himalayan geology, Mr. Medlicott, first examined and described the Sub-Himalaya in his memoir (Mem. Geol. Surv. of India, vol. iii.) and since the Rev. O. Fisher wrote his far-seeing 'Physics of the Earth's Crust,' it has been gradually becoming evident to all who really examine the question in detail, that the Himalayas are and have been in a constant state of change: a state of elevation along the main axis and depression along the mountain foot, with intermediate zones of crushing, crumpling, and over-riding along shear and thrust planes. This is so evident that, if one desired to be very particular, one might say literally that the Himalayas of to-day are not the same as those of yesterday."—Memoirs of the Geological Survey of India, vol. xxvi. by C. S. Middlemiss, p. 285.

Mathematical Notes.

I.—*Attraction of the Mountains.*

The diagram (fig. 3) represents a section perpendicular to the range. It is drawn approximately on a scale of $\frac{1}{10}$ of an inch to 5 miles. K M C F B is the crust, out of which the mountains and their roots were formed, and is suppos-

Fig. 3



ed to be 25 miles thick. G H D K is the Tibetan plateau, three miles high and 400 miles across. D A H is the slope of the mountains, A D being 95 miles. D H is 3·3 miles. M L R E is the root of the plateau. E R equals 28·71 miles. E R C is the root of the slope.

We require to find the horizontal attraction at a station P on the surface of the crust. P may be either to the right or left of B. Sphericity is neglected. Then the horizontal attraction of the mountain and root together at P equals the horizontal attraction, positive of the slope, *plus* that of the plateau, combined with the horizontal attraction, negative produced by the substitution of their less dense roots for the more dense substratum. The crust, whether disturbed or not, will produce no horizontal attraction. The negative attraction of the root will be the same in amount as if the root was composed of matter whose density was equal to the excess of the density of the substratum over that of the crust, and the attraction of the root M L R C at P will be the same as would be produced by a mass K L R C B *minus* that which would be produced by a mass K M C B, each mass being of similar density. Consequently we need to calculate these several attractions. The attraction having been calculated from the formulæ, the corresponding deflection may be found by multiplying it by a factor whose logarithm is 0·3541084*.

$$\left.\begin{array}{r}\text{Attraction}\\ \text{of the slope}\end{array}\right\} = 2\rho\left\{(a \pm p\cos^2\alpha)\tan^{-1}\left(\frac{a}{a \pm p}\tan\alpha\right) \mp \frac{p}{2}\sin\alpha\cos\alpha\log_e\left(1 + \frac{a(a \pm 2p\cos^2\alpha)}{p^2\cos^2\alpha}\right) - \frac{ha}{2l^2}\left(\frac{a}{3} \pm \frac{p}{2}\right)\right\}.$$

The upper or lower sign is to be used according as the attracted particle P is to the right or left of the foot of the slope under consideration.

$$\text{Attraction of the plateau} = 2\rho\left\{x\tan^{-1}\frac{lh}{xv} - \frac{h}{2}\log_e\frac{v+l}{v-l} - \frac{l}{2}\log_e\frac{v+h}{v-h}\right\} + \text{const.}$$

The limits of x are the nearest and furthest distances of the base of the plateau from the station P, *viz.*, PD and PD + 400.

$v = \sqrt{l^2 + h^2 + x^2}$ and its limits depend upon those of x.

The unit of length is a mile.

$2l$ is the length of the range = 880.

(1) When the attraction of the slope HDA is required:

$\rho = 2{\cdot}68.$

$a = \text{DA} = 95$ miles†.

$h = 3{\cdot}3$ miles.

$$\tan\alpha = \frac{\text{HD}}{\text{DA}} = \frac{h}{a} = \frac{3{\cdot}3}{95}.$$

$l = 440.$

p is the distance from the foot of the slope A of the station where the attraction is required

* See Clarke's 'Geodesy,' p. 296

† Observe: In the Addendum DA is taken at 95 miles.

(2) When the attraction of DRB is required:

DE = 25.

$\rho = 2{\cdot}96 - 2{\cdot}68 = 0{\cdot}28.$

$h = \mathrm{ER} = 30{\cdot}191.$

$$\tan \alpha = \tan \mathrm{ECR} = \frac{\mathrm{ER}}{\mathrm{DA}} = \frac{30{\cdot}191}{95}.$$

$a = \mathrm{AD} + \mathrm{AB} = 95 + \mathrm{DE} \cot \alpha = 173{\cdot}666.$

p is the distance from B of the station.

(3) When the attraction of ACB is required:

$\rho = 0{\cdot}28.$

$$\tan \alpha = \frac{30{\cdot}191}{95}.$$

$a = 25 \cot \alpha = 78{\cdot}666.$

$h = 25.$

p is the distance from B of the station.

II.—*Attraction of the Plain.*

Referring to figure 2,

Let a be the width of the plain DR = 230 miles.

k the thickness of the crust = 25 miles.

p the distance from the southern edge of the plain of a station P where the deflection is required.

ρ the difference of the densities of the crust and the substratum = $0{\cdot}28$.

m the tangent of the angle at which the under side of the crust is depressed into the substratum $= \frac{3}{230}$.

l the length of the area supposed rectangular, and conterminous with the mountain range.

Then the attraction of the plain at P may be found from the following formula, it being premised that the attraction so obtained will be a negative attraction, due to the displacement of the dense substratum by the lighter crust thrust down into it. Consequently negative results will indicate deflections towards R, the southern edge of the plain, and positive ones deflections towards C, the foot of the slope of the Himalayas.

$$\text{Attraction of the plain} = 2\rho \left\{ a \tan^{-1} \frac{ma(a-p)}{(a-p)^2 + k(k+ma)} - \frac{mk-p}{1+m^2} \tan^{-1} \frac{a(mp+k)}{(p^2+k^2) + (mk-p)a} \right.$$

$$\left. - p \frac{ak}{k^2 - p(a-p)} + \frac{mp+k}{1+m^2} \frac{1}{2} \log_e \left(\frac{a(a(1+m^2) + 2(mk-p))}{p^2+k^2} + 1 \right) - \frac{k}{2} \log_e \frac{(a-p)^2+k^2}{p^2+k^2} - \frac{ma^2}{2l^2} \left(\frac{a}{3} - \frac{p}{2} \right) \right\}$$

If we put $\tan \alpha = \frac{h}{a}$, the expression for the attraction of the slope may be put into the form

$$2\rho \left\{ a \frac{a^2 + h^2 \pm ap}{a^2 + h^2} \tan^{-1} \frac{h}{a \pm p} \mp \frac{p}{2} \frac{ah}{a^2+h^2} \log_e \frac{(a \pm p)^2 + h^2}{p^2} - \frac{ha}{2l^2} \left(\frac{a}{3} \pm \frac{p}{2} \right) \right\};$$

which is slightly more convenient for computation. In the expression for the attraction of the plateau, when x is considerably larger than h, the sum of the first and third terms, *viz.*, $x \tan^{-1} \frac{lh}{xv} - \frac{l}{2} \log_e \frac{v+h}{v-h}$, may be taken as approximately equal to

$$-\frac{l}{3} \left(\frac{h}{v} \right)^3 \frac{(v+h)(v-h)}{x^2}.$$

In the case of the visible masses this sum is inappreciably small.

The attraction of the plain might also be found in a manner similar to that used for ECR, by taking a difference of two attractions.

Harlton Rectory,
Cambridge.

April, 1904.

O. Fisher.

APPENDIX.

No. 2.

DETERMINATION OF THE GEODETIC ELEMENTS OF THE LATITUDE STATIONS OF BAJAMARA, BAHAK, LAMBATACH AND KIDARKANTA.

1.

General Remarks.

The triangulation emanated from the side Banog-Sirkanda of the Principal Triangulation of the Great Trigonometrical Survey: the station of Nag Tiba was fixed in October 1902 by Captain Wood, R.E., observing with Troughton and Simms' 12-inch theodolite on 12 zeros.

In order to determine the geodetic elements of the Latitude Stations, Captain Cowie, R.E., observed the angles of two single triangles and one quadrilateral on 12 zeros with Troughton and Simms' 7-inch theodolite in October, November and December 1903, *vide* Triangulation chart attached.

2.

Descriptions of Stations.

BANOG HILL STATION is a principal station of the Great Arc Meridional Series, Section 24° to 30° and is situated on a detached peak of the lower range of the Himalaya Mountains, being thrown back about a mile to the north of the range whereon stands the sanitarium of Mussooree. The station is in the district of Dehra Dún.

The pillar is solid, and 2 feet high. It has a mark-stone at top, and another at bottom.

SIRKANDA HILL STATION (NEW) is a principal station of the Great Arc Meridional Series, Section 24° to 30°. It was made to coincide as nearly with the site of the old station of that name, described in Synoptical Volume II, as could be estimated from the remains of the platform found there, the isolated pillar together with the mark-stones having been removed by Natives visiting the temple to build a wall round it. The present mark is distant from the N.W. corner of the temple 26 feet 6 inches, from the S.W. corner 18 feet 7 inches, and from the S.E. corner 31 feet 2 inches.

The pillar is solid and two feet high, having a mark-stone embedded level with the surface, and is surrounded by a platform from which it is isolated. In 1902-03, the station was found to consist of an unisolated pillar of stones and mud. This was carefully pulled down and a small mark-stone was found at the bottom of the pillar close to a large rock *in sitú.* This mark-stone was not disturbed, but the ground on one side of it was excavated 2 feet lower down, but no other stones or remains of a pillar were found. This forms the lowest mark-stone of the new pillar.

A new pillar has been built of which the mark-stones are all vertically above that found *in sitú* and which forms the lower mark-stone of the new pillar. This is circular in shape, 40 inches in diameter and 3 feet $\frac{1}{4}$ inch high, built of rubble masonry, in lime, and isolated by an annulus 2 feet thick at the bottom and 1 foot at the top, and of similar height to the pillar, leaving a concentric space, 3 inches wide around the pillar. The lower and centre mark-stones are 3 feet 0·25 inch and 1 foot 6·5 inches respectively below the upper one. Around the annulus a platform of earth and stones 14 feet square has been built.

NAG TIBA HILL STATION is situated on the summit of the highest of three peaks known locally by that name on the watershed of the Bhágirathi and Jumna rivers, about $3\frac{1}{4}$ miles N.N.W. of Unthal village on a branch of the Uglar, a confluent of the latter, and $2\frac{3}{4}$ miles E. of Parbati on the Badri (Tehri-Garhwál). The hill can be approached from Mussooree in two marches by several different paths all of which are very steep in places. There is a site for a good camping ground on the spur running north from the station and water is found on the north side of the main ridge to the east.

A circle and dot inscribed on the upper surface of a stone embedded centrally in a circular masonry pillar 40 inches in diameter and 2 feet high. Vertically below this upper mark two other stones similarly inscribed are embedded at the centre and in the foundation of the pillar respectively. Around the pillar a circular masonry ring has been built, 1 foot thick, and of similar height as the pillar, leaving a concentric space 3 inches wide and surrounding this a platform of earth and stones 14 feet square has been constructed.

BAJAMARA HILL STATION is on the top of the peak locally known as Bajamara, on the watershed between the Tons and Jumna valleys. The station is not identical with Bájámárá h.s. of Synoptical Vol. VII, which is 170 feet lower and about a mile to the west. A cairn of stones and a pole, possibly triangulation signal, was found on the top, but no such mark was found on the top of the lower peak.

It is marked in the usual way by a circle and dot on a large stone found about 1 foot below the surface of the ground. Over this is built a circular masonry pillar 1½ feet high and 3 feet in diameter, carrying at its centre, on the upper surface, a second similar mark vertically over the lower. It lies in the lands of the village Khatt Kailana, District Dehra Dún, and is about 100 yards from the Chakráta-Mandali road which runs round the southern and eastern faces of the hill. The station is 2 miles from Deoban F. B. and 3½ miles from Mandali F.B. There is no good camping ground near the station, and good water is to be found only at a considerable distance.

The latitude station is 12 feet 6½ inches north and 46 feet 10 inches west of the trigonometrical station.

BAHAK HILL STATION is on the highest point of the hill of the same name in the lands of the village Kaprole, Patti Mungar Sauti (Tehri-Garhwál) on the watershed of the Bhágirathi and Jumna rivers, about 2¼ miles E. N. E. of Tehliank village on the Burni stream entering the latter, and 5½ miles N. W. of Gula village on stream entering the former between Gula and Thara villages.

The point is marked by the usual circle and dot inscribed on a stone. Over this lower mark is built a circular masonry pillar 2 feet 5 inches high and 3 feet in diameter carrying at the centre of its upper surface an upper mark vertically above the lower. Surrounding this pillar but isolated from it is a masonry platform 14 feet square and built to a level 3 inches higher than the top of the pillar.

The station is easily approached from the south from Chajoola village or from the west from Kaprole. There is a site for a small camp, a short distance west of and below the station, but the nearest good water is over 2 miles in the same direction.

The latitude station is 5 feet 11 inches south and 24 feet 3½ inches east of the trigonometrical station.

LAMBATACH HILL STATION is on the highest point of Lambatach hill, which lies N.E. from the junction of the Pabar and Tons Rivers, in the lands of village Manjni, Patti Pingal (Tehri-Garhwál), about 1¾ miles N.W. of Deota F.B., 1 mile N.E. of Maijon and Lambatach F.B.

The circle and dot are cut in a stone embedded in the upper surface of a masonry pillar 3 feet in diameter and one foot high. This mark is placed vertically over the mark defining Lambatach or Lambáthásh of the Secondary Triangulation (*vide* Synoptical Vol. VII). The pillar is isolated in the usual manner from the surrounding platform.

The easiest approach is *viá* Thadiar and Deota F.B.

The Latitude Station is 82 feet 1¾ inches north and 1 foot 8½ inches east of the trigonometrical station.

[There may be a slight local deflection of the plumb-line southwards, less than 1″ in amount probably. H.M.C.]

KIDARKANTA HILL STATION is on the highest point of Kidarkanta hill on the watershed between the Tons and Jumna valleys in the lands of village Durgaon, Patti Siktur (Tehri-Garhwál), and is about ¼ mile E. of the higher road from Onot and Bahshul villages to Shauro by Our village, about 3¼ miles N. N. E. of Our, 3¾ miles E. of Lodráo and 3½ miles S. a little W. of Shauro village.

The point is marked by a circle and dot cut on the upper surface of a stone embedded centrally in a circular masonry pillar 3 feet in diameter and 2 feet high. Vertically below the upper mark, a lower similar mark is embedded below the pillar. The pillar is isolated in the usual manner from the surrounding platform which is built up to the level of the upper surface of pillar.

The station is most easily approached from the north, the best route being Chakráta, Mandali, Thadiar, Sendra F.B., Naintwar F.B. (By Gainchra village) and Kidarkanta.

The Latitude station is 38 feet south and 32 feet east of the trigonometrical station.

[The station seems well placed as regards the mass of the hill itself, and no local disturbance of the plumb-line of any size need be expected. There is a small preponderance of mass to the south. H.M.C.]

TABLE A. TRIANGULATION FOR THE CONNECTION OF LATITUDE STATIONS.

Computation of Triangles.

Station of Observation		Observed Angle	Corrections for		Corrected Plane Angle	Distance in		
			Spherical Excess	Observation Error		Log Feet	Feet	Miles
		° ′ ″	″	″	° ′ ″			
Sirkanda	H.S.	40 24 24·87	− 0·351	− 0·375	40 24 24·144	4·76884497	58727·97	11·123
Banog	„	58 2 6·69	− 0·352	− 0·778	58 2 5·560	4·88571544	76862·67	14·557
Nag Tiba	h.s.	81 33 31·51	− 0·352	− 0·862	81 33 30·296	4·95239910	89618·80	16·973
Sums ...		180 0 3·07	− 1·055	− 2·015	180 0 0·0			
Banog	H.S.	66 18 25·33	− 0·471	+ 0·122	66 18 24·981	5·01149259	102681·6	19·447
Nag Tiba	h.s.	82 6 36·03	− 0·471	+ 0·410	82 6 35·969	5·04560316	111071·6	21·036
Bajamara	„	31 34 59·22	− 0·470	+ 0·300	31 34 59·050	4·76884497	58728·0	11·123
Sums		180 0 0·58	− 1·412	+ 0·832	180 0 0·0			
Nag Tiba	h.s.	71 47 3·90	− 0·495	− 0·744	71 47 2·661	5·01177600	102748·6	19·460
Bajamara	„	36 32 43·77	− 0·495	− 0·951	36 32 42·324	4·80895398	64410·1	12·199
Bahak	„	71 40 16·07	− 0·495	− 0·560	71 40 15·015	5·01149259	102681·6	19·447
Sums .		180 0 3·74	− 1·485	− 2·255	180 0 0·0			
Bajamara	h.s.	50 23 20·83	− 0·790	− 1·176	50 23 18·864	5·00051171	100117·9	18·962
Bahak	„	77 22 2·23	− 0·791	+ 0·108	77 22 1·547	5·10316022	126812·0	24·017
Kidarkanta	„	52 14 39·08	− 0·791	+ 1·300	52 14 39·589	5·01177600	102748·6	19·460
Sums ..		180 0 2·14	− 2·372	+ 0·232	180 0 0·0			
Bahak	h.s.	40 40 57·16	− 0·744	+ 0·059	40 40 56·475	4·96424154	92096·2	17·442
Bajamara	„	92 39 37·39	− 0·745	− 0·148	92 39 36·497	5·14961570	141128·8	26·729
Lambatach	„	46 39 28·06	− 0·745	− 0·287	46 39 27·028	5·01177600	102748·6	19·460
Sums ..		180 0 2·61	− 2·234	− 0·376	180 0 0·0			
Bahak	h.s.	36 41 5·07	− 0·665	+ 0·048	36 41 4·453	4·93103524	85316·9	16·159
Kidarkanta	„	98 48 13·48	− 0·665	+ 2·313	98 48 15·128	5·14961572	141128·8	26·729
Lambatach	„	44 30 38·82	− 0·665	+ 2·264	44 30 40·419	5·00051171	100117·9	18·962
Sums ..		179 59 57·37	− 1·995	+ 4·625	180 0 0·0			

TABLE B. TRIANGULATION FOR THE CONNECTION OF LATITUDE STATIONS.

Geodetic Latitudes, Longitudes and Azimuths.

Name of Latitude Station		Latitude North			Longitude East of Greenwich			Azimuth				
		°	′	″	°	′	″			°	′	″
BANOG	H.S.	30	28	36·91	78	3	23·14	Of Sirkanda	H.S	285	18	30·27
								„ Nag Tiba	h.s.	227	16	24·36
								„ Bajamara	„	160	57	58·91
SIRKANDA	H.S.	30	24	41·66	78	19	50·39	Of Banog	H.S.	105	26	50·51
								„ Nag Tiba	h.s.	145	51	15·01
NAG TIBA	h.s.	30	35	11·09	78	11	36·75	Of Banog	H.S.	47	20	35·12
								„ Sirkanda	„	325	47	4·47
								„ Bajamara	h.s.	129	27	11·56
								„ Bahak	„	201	14	14·72
BAJAMARA	h.s.	30	45	56·07	77	56	27·91	Of Banog	H.S.	340	54	27·41
								„ Nag Tiba	h.s.	309	19	27·89
								„ Bahak	„	272	46	45·07
								„ Kidarkanta	„	222	23	25·41
								„ Lambatach	„	180	7	7·83
BAHAK	h.s.	30	45	5·28	78	16	4·16	Of Nag Tiba	h.s.	21	16	31·12
								„ Bajamara	„	92	56	46·63
								„ Kidarkanta	„	170	18	48·97
								„ Lambatach	„	133	37	43·85
KIDARKANTA	h.s.	31	1	22·09	78	12	50·55	Of Bajamara	h.s.	42	31	49·95
								„ Bahak	„	350	17	9·57
								„ Lambatach	„	89	5	25·36
LAMBATACH	h.s.	31	1	7·65	77	56	30·11	Of Bajamara	h.s.	0	7	8·95
								„ Bahak	„	313	27	41·18
								„ Kidarkanta	„	268	57	0·10

TABLE C. DEDUCTION OF THE GEODETIC ELEMENTS OF THE LATITUDE STATIONS.

Name of Station	Latitude North			Longitude East of Greenwich			REMARKS.
	°	′	″	°	′	″	
Bajamara h.s.	30	45	56·07	77	56	27·91	Fixed by special triangulation (*vide Tables A* and *B*).
Reduction to Latitude Station ...		+	0·12		−	0·54	The Latitude Station is 12 feet 6¼ inches north and 46 feet 10 inches west of Bajamara h.s., *vide* page (10).
Bajamara Latitude Station ...	30	45	56·19	77	56	27·37	
Bahak h.s.	30	45	5·28	78	16	4·16	Fixed by special triangulation (*vide Tables A* and *B*).
Reduction to Latitude Station ...		−	0·06		+	0·28	The Latitude Station is 5 feet 11 inches south and 24 feet 3½ inches east of Bahak h.s., *vide* page (10).
Bahak Latitude Station	30	45	5·22	78	16	4·44	
Lambatach h.s. .. .	31	1	7·65	77	56	30·11	Fixed by special triangulation (*vide Tables A* and *B*)
Reduction to Latitude Station ..		+	0·81		+	0·02	The Latitude Station is 82 feet 1¾ inches north and 1 foot 8¼ inches east of Lambatach h.s., *vide* page (10).
Lambatach Latitude Station .	31	1	8·46	77	56	30·13	
Kidarkanta h.s. .. .	31	1	22·09	78	12	50·55	Fixed by special triangulation (*vide Tables A* and *B*).
Reduction to Latitude Station .		−	0·38		+	0·37	The Latitude Station is 38 feet south and 32 feet east of Kidarkanta h.s., *vide* page (10).
Kidarkanta Latitude Station ..	31	1	21·71	78	12	50·92	

APPENDIX.

No. 3.

ON THE (N—S) DIFFERENCE EXHIBITED

BY

ZENITH SECTOR NO. 1.

Extracted from the report of Captain Burrard for the Season 1892-93.

The instrument used this season was zenith sector No. 1. It was designed by Colonel Strange, and purchased by the Indian Government in 1871. It is a sister instrument to zenith sector No. 2, but is in many ways superior to the latter. Zenith sector No. 2 arrived in India in 1870, and was used by Colonel Herschel in 1870-71. Colonel Herschel suggested many valuable improvements and additions, which the makers had time to adopt in the construction of zenith sector No. 1.

Zenith sector No. 2 has been used on several occasions in the last twenty years, and has always given uniformly good results. On the other hand, zenith sector No. 1 was only used once, and that occasion was in 1871-72, when Colonel Campbell observed for latitude at eight stations of the Mangalore Meridional Series. At those eight stations the zenith sector exhibited a "(N—S) difference," by which is meant that a difference was found to exist between the results by north and south stars respectively; the latitude derived from observations by north stars was always given too small, whilst the latitude derived from south stars was always given too large.

Now for north stars—

$$\text{Latitude} = \text{declination} - \text{zenith distance},$$

and for south stars—

$$\text{Latitude} = \text{declination} + \text{zenith distance}.$$

It thus became apparent that this instrument, zenith sector No. 1, measured *all* zenith distances too large. Colonel Campbell writes in 1872: "Zenith sector No. 1 measures zenith distances in excess of their true value, and the most superficial examination shows that the error is a function of the zenith distance, being nearly exactly in direct proportion to it." In fact this (N—S) difference was apparently subject to a law: every zenith distance was observed too large, the error in a Z.D. of 10° being twice the error in a Z.D. of 5° and ten times the error in a Z.D. of 1°. On account of this (N—S) difference, zenith sector No. 1 has been laid aside for twenty-two years and never used since its first season.

In 1890 a zenith telescope arrived in India, and the method of observing astronomical latitudes was changed from the "sector" method to the "Talcott" method. By the sector method the absolute Z.D. of a star is observed, and the latitude deduced from the formula—

$$\text{Latitude} = \text{declination} \pm \text{zenith distance}.$$

By the Talcott method the *difference* of Z.D. is observed between a north and south star, and no absolute zenith distance is measured. Thus a pair of stars are chosen, one north and one south, that transit within a few minutes of each other, and that are as nearly as possible the same distance from the zenith. The telescope is set to the mean Z.D. of the pair, and pointed to whichever star of the pair transits first. The star is intersected by the micrometer. The telescope is then revolved on its vertical axis 180° in azimuth, but its setting is not disturbed. It will now be pointing to the second star of the pair: this star is also intersected by the micrometer. The difference of the micrometer readings is equal to the *difference* between the zenith distances of the two stars, and this quantity is all that we have to measure. If d_n, d_s = declinations of the two stars, and z_n, z_s their zenith distances, then the Talcott formula is—

$$\text{Latitude} = \frac{d_n + d_s}{2} - \frac{z_n - z_s}{2}.$$

We measure $(z_n - z_s)$, but do not require the absolute values of z_n and z_s.

The zenith telescope gave excellent results, and was consequently looked upon as a good instrument. But it became evident that zenith sector No. 1 would also have given excellent results, with no (N – S) difference, if it had been worked as a zenith telescope by the Talcott method.

In the formula—

$$\text{Latitude} = \frac{d_n + d_s}{2} - \frac{z_n - z_s}{2},$$

z_n and z_s would have been observed both too large, but z_n and z_s being nearly equal, the errors in their measurements would also have been equal, and their difference $(z_n - z_s)$ would have remained correct, for the peculiarity of the (N – S) difference was, that errors in equal zenith distances were equal. The state of the case was this then: zenith sector No. 1, a very valuable instrument, was lying discarded, because it showed a (N – S) difference with the sector method, though it clearly would have given excellent results if used with the Talcott method. On the other hand, the new zenith telescope was being constantly used, merely because it gave good results with the Talcott method, though it had never been tried with the sector method: for anything known to the contrary, this new zenith telescope might also exhibit a (N – S) difference, if worked with the sector method. For these reasons I obtained sanction from the Deputy Surveyor-General to be allowed to use the zenith sector No. 1 this season on the Jodhpore Meridional Series, and to work it both on the Talcott and sector method.

After a season's experience with this zenith sector, I am of opinion that the (N – S) difference is due to a constant error running throughout the graduation of the limb, and that it in nowise vitiates results.

This season, 1892-93, the same (N – S) difference to the last decimal place has appeared, as was discovered by Colonel Campbell in 1871. As flexure of the telescope tube has at times been suggested as the cause of the phenomenon, I should like to give my reasons for thinking that flexure has nothing to do with it.

The image of a star is seen on the centre wire, when the line joining the star with the centre wire passes through the centre of the object glass. If then the instrument be perfectly adjusted, and the telescope be set at an angle θ with the vertical, a star of zenith distance θ will be observed on the centre wire, provided the telescopic tube does not suffer from flexure. If however there is flexure of the object end, the object glass will be lower than in its correct position, and the line joining it with the centre wire will make a larger angle than θ with the vertical, though the angle of inclination, as read on the limb, remains unchanged at θ. If instead of the object end it is the eye-end that is suffering from flexure, the centre wire will fall lower than its correct position, and the line joining the centre wire with the centre of the object glass will consequently make an angle *less* than θ, the reading of the limb still remaining θ.

Therefore, if the telescope be permanently set at angle of θ with the vertical, the following cases occur: (*i*) If there is no flexure, the image of stars of zenith distance θ will appear on the centre wire; (*ii*) if there is flexure of the object end, the image of stars of a zenith distance somewhat *greater* than θ will appear on the centre wire; and (*iii*) if there is flexure of the eye-end, the image of stars of a zenith distance somewhat *less* than θ will appear on the centre wire. In other words, if there is flexure of the object end, the observed zenith distance will be *less* than the true zenith distance, whilst if there is flexure of the eye-end, the observed zenith distance will be *greater* than the true zenith distance. Now, in the zenith sector No. 1, the instrument under review, observed zenith distances are always too large, and hence if flexure be the cause of this phenomenon, it must be flexure of the eye-end.

The following considerations led me to abandon the theory of flexure and to seek another cause:—

(*a*) The telescope tube is elliptical in cross-section, and especially designed against flexure.

(*b*) The object end is longer than the eye-end, and is consequently more liable to flexure than the eye-end, but if the (N – S) difference be due to flexure, it must be flexure of the eye-end.

(*c*) As pointed out by Colonel Campbell, the (N – S) difference is clearly subject to a law, and varies accurately with the amount of the zenith distance. I cannot conceive a telescope, that waves from side to side after the manner of a fishing-rod, obeying any such law. The amount of flexure would not only depend on the zenith distance, but on the direction of motion, with which the telescope was brought up into position, and on the rapidity of this motion.

(*d*) After lying in its box, discarded as useless for twenty-two years, it is tried again, and in 1893 the (N – S) difference in its ratio to the zenith distance is precisely the same as it was in 1871. Can the bending properties of any metal act so accurately, and remain so constant?

Now, in one of the astronomical circles there was also a large (N – S) difference, but in this instrument zenith distances were measured in *defect* of the truth, as would be the case if there were flexure of the object end: moreover the amount of the error was subject to no traceable law whatever, and it was but reasonable to attribute the (N – S) difference to flexure.

I believe now that the (N−S) difference in zenith sector No. 1 is due to error of limb graduation. Zenith distances are all measured too large, and this is exactly what would occur *if the graduations of the limb of the vertical circle were all too small for the radius of the limb.* The amount of the (N−S) difference is such that an angle of $10°$ is measured on the vertical circle as $10° 0' 1''\cdot 80$. The effect on resulting values of latitude may be found thus: suppose a north star and a south star are both observed for latitude, both having a zenith distance of $10°$. In both cases their zenith distance, as observed, will be $10° 0' 1''\cdot 80$.

In the case of the north star: latitude = declination − Z D.; and the resulting latitude will be $1''\cdot 80$ too small. In the case of the south star: latitude = declination + Z.D.; and resulting latitude will be $1''\cdot 80$ too large.

The two values of latitude by the two stars will thus differ by $3''\cdot 60$: in the ordinary astronomical latitudes, as observed in India, it is quite common for results from forty stars (each observed four times) to all fall within a range of two seconds of arc, and differences of $3''\cdot 6$ are quite inadmissible: if moreover the two stars in the above example had each had a Z.D. of $15°$ instead of $10°$, the difference between their resulting values of latitude would be $5''\cdot 4$.

Now, the limb of the zenith sector is not a complete vertical circle, but consists of two segments of $50°$ each, struck, or intended to have been struck, with a radius of 18 inches.

The surface of the limb is, moreover, not in the plane of the circle of the limb: the sectors are "dished," and meet at an angle at their junction at the horizontal axis: the silver limb has been let into a groove cut on the face of the brass sectors: the surface of the limb is such that if it were produced inwards, it would form not a circle but a cone with its apex at the horizontal axis It seems apparent that the artificers' difficulties in centering and graduating such segmental arcs, and in placing them in their proper positions relatively to one another, must be greater than in the case of a theodolite with a complete plane horizontal circle. Yet in many of our best theodolites periodic errors amounting to $1''\cdot 8$ in $10°$ have been found.

Now, suppose the graduations of the two arcs of $55°$ have all been made at too small intervals from one another, and that on each arc the graduations for the whole $55°$ have been distributed through an angular space of only $54° 59' 50''\cdot 1$. In the zenith sector this error cannot be compensated, as the limb is not complete: in the horizontal circle of a theodolite it would be compensated. In this latter case, the whole circle must be eventually divided into 360 degrees, so that if the graduations are placed too near together at one part of the limb, they must be too far apart at another, and if the well-known method of changing zero be followed, angles measured with such a circle are unaffected by these periodic errors.

But with the zenith sector there is not only no means of changing zero, but the compensating portion of the limb is altogether absent: so that if there is any error in limb graduation, whether periodic or not, it cannot be got rid of.

Supposing the (N−S) difference to be due to graduation error, the amount of the artificer's error may be arrived at thus: the radius of the limb should have been 18 inches, so that the length of an arc of $10°$ measured along the limb *should* be 3·1416 inches: but by observation we have found that an angle of $10°$ at the centre is subtended at the limb by graduations of $10° 0' 1''\cdot 8$. This can have resulted in two ways: either the limb has been *graduated* with a radius of 17·9991 inches and then placed on the sectors with a radius of 18 inches, or else the graduations must have been made with a correct radius of 18 inches, but the limb through some miscalculation was shrunk on to the sectors with a radius of 18·0009 inches. One fact is clear, *viz.*, that *the radius of the limb is 0·0009 inch too large for its graduations.*

Suppose the two arcs of $55°$ are each produced circularly into arcs of $180°$, the graduations being made at the same intervals as at present. Then, when the graduations have been extended to $180°$, each arc of $180°$ will only subtend at the centre an angle of $179° 59' 27''\cdot 6$. At each of the two points of junction the final graduations instead of being coincident, as they ought to be, will be apart by 0·00282744 of an inch, the length on the limb that subtends an angle of $32''\cdot 4$.

The amount of the error of graduation has been found as follows:—

In Colonel Campbell's observations at eight stations, his mean Z. D. was $5° 54' 30''$, and his mean (N−S) difference was $2''\cdot 125$: that is, his final value of latitude deduced from north stars of a mean Z. D. of $5° 54' 30''$ was smaller by $2''\cdot 125$ than his final value of latitude deduced from south stars of a mean Z. D. of $5° 54' 30''$: thus both his north and south zenith distances (of $5° 54' 30''$) were each measured too large by $\frac{2''\cdot 125}{2}$. Colonel Campbell's observations thus give the error of the limb graduation to be $1''\cdot 063$ in $5° 54' 30''$, from which the following corrections can be deduced: (*i*). An angle of one degree is shown by the graduations on the limb as $1° 0' 0''\cdot 18$; (*ii*) an angle of $0° 1' 0''\cdot 00$ is graduated on the limb as $0° 1' 0''\cdot 003$; (*iii*) an angle of $1''$ is shown on the limb as $0° 0' 1''\cdot 00005$.

From my observations this season, the (N−S) difference is given at $2''\cdot 50$ for a mean Z.D. of $6° 39'$: from these data the amount of limb error is given as $0''\cdot 186$ for each degree, $0''\cdot 0031$ for each minute, and $0''\cdot 000052$ for each second.

Colonel Campbell's results have been used to deduce a "limb correction," and every *observed* zenith distance has been decreased by $0''\cdot 18$ for each degree, $0''\cdot 003$ for each minute, and $0''\cdot 00005$ for each second. This correction has been applied to observations taken this season by the sector method, and has brought them into accordance, eliminating all signs of a (N−S) equation.

APPENDIX.

No. 4.

ON THE VALUE OF THE MICROMETER OF THE ZENITH TELESCOPE.

BY CAPTAIN H. McC. COWIE, R.E.,
In charge of the Astronomical Party.

1.

A comparison of values determined by independent methods.

In 1902-03 the micrometer value was determined at five stations from measurements of known differences of declination.

Station	Value for one Revolution		Difference
	Which renders the latitude observations most accordant	Determined from observations of declination	
	"	"	"
Gúrmi	69.2327	69·2087	+ 0·0240
Majhár	·2115	...	...
Algi	·2116	·2116	0·0000
Andhjári	·2258	·2270	− 0·0012
Budhon	·2191	·2294	− 0·0103
Dargawa	·2387	·2305	+ 0·0082
Saugor	·2185	...	...
Náharmau	·2155	...	...
Mean	69·2217	69·2214	+ 0·0003

In order to eliminate from the final latitudes errors due to the use of an incorrect value, positive and negative micrometer quantities have been equalised, and the residual correction entering into the final result of the observations reduced to a minimum.

The differences shown in the above table between the values deduced from the latitude results and those determined by independent observations may be due to a combination of the following sources of error :—

(1). In the independent observations only micrometer wire B is used and in consequence the length of screw involved is from 20 to 40 revolutions.

In the latitude observations when the auxiliary wires A and C are utilized, the intervals AB and BC being approximately each 10 revolutions, a length of screw greater than 15 or 16 revolutions is rarely necessary. It is not difficult to suppose that the accumulated systematic errors of the 40 revolutions used in the first case, differ from those of the central 16 revolutions employed in the latitude observations, and consequently it is to be expected that the respective values for the micrometer given by the two methods should differ slightly.

(2). When the auxiliary wires A and C are made use of in the latitude observations, the value of the interval (A − C) will entér as a correction always of one sign when the micrometer correction is positive and always of the other sign when the correction is negative. Consequently the result of a discussion of the respective latitude values given by positive and negative micrometer corrections will be in error unless the interval (A − C) is known absolutely exactly.

(3). In consequence of the changes in the objective, in the telescope tube and in the micrometer screw owing to variations of temperature, unless the mean temperature during the latitude operations is the same as that for the independent micrometer observations, the values for a revolution of the screw deduced by the different methods will not agree.*

There is still another complication introduced in consequence of the effect of changes of temperature. The auxiliary wires A and C are carried by the brass sliding plate of the micrometer, actuated by the steel screw. The determination of the value AC in terms of the screw is made at a certain temperature. The value so determined is correct for that temperature only and by using it for observations taken at any other temperature, errors are introduced.* The method of determining this interval is such that it is difficult to get satisfactory results when the field is lighted only faintly by the axis lamp. It has therefore been usual to measure the interval during the day. If we suppose the temperature during the day observation to differ from the night temperature during the latitude operations an error will be introduced into every result obtained from observations into which the (A – C) interval enters. The sign of this error will be according as the sign of the (A – C) reduction is positive or negative and as the change of temperature is a fall or a rise.

From this it is apparent that it is not sufficient to balance positive and negative micrometer quantities without having regard at the same time to the number of times that AC enters as a positive and as a negative quantity. As well as balancing positive and negative corrections, we should effect cancelment of positive and negative (A – C) intervals.

I am of opinion, in view of the complications they introduce, that the advantages which these auxiliary micrometer wires exhibit in respect to convenience in observing and reduction of the wear of the screw, do not quite justify their employment.

2.

The examination of the micrometer screw of the Zenith Telescope under "G" microscope and the effect the errors, thus determined, would have on the micrometer correction.

The micrometer, detached from the zenith telescope, was securely mounted on one of the gun-metal "camels" of the apparatus for the comparison of standards, by means of which it could be moved vertically and also horizontally in the line of the micrometer screw. The microscope "G" was then mounted on one of the isolated masonry pillars of the Bar Room and adjusted as for the comparison of standards.

The camel carrying the micrometer was next placed under "G" in such a way as to bring the screw of the micrometer as nearly as possible parallel to the screw of the microscope "G". As only relative values for each revolution were required, it was not necessary that the two screws should be absolutely parallel; it was sufficient if the directions of motion in the two micrometers were so nearly parallel that the same part of "G"'s micrometer wire would always coincide with the same part of the zenith telescope wire.

The apparatus having been carefully prepared, "G" microscope adjusted, and the zenith telescope micrometer levelled in position, with its wire illumined and clearly focussed in the microscope, the observations were commenced. The procedure was as follows:—

"G" was set to a convenient reading about the centre of the field. The zenith telescope wire, *B*, was then set to the reading 35·00 revolutions, and by means of the "camel" screw, the whole micrometer traversed horizontally until *B* came into position between the two parallel intersecting wires of "G". The mean of several readings of "G" was then determined, corresponding to this position of the wire *B*. The zenith telescope micrometer was now set to read 36·00 revolutions and for the new position of *B*, a corresponding mean reading of "G" determined. The difference of the two readings thus gave a value in terms of "G" for the revolution 35 to 36.

"G" microscope was next set at its first reading,—that for zenith telescope 35·00—,and the zenith telescope micrometer remaining at the setting 36·00 revolutions was traversed horizontally, until *B* again came into position between the wires of "G". Readings were now taken as before for the revolution 36 to 37. This procedure was followed until the setting 65·00 revolutions was arrived at.

In this way values for each revolution of the zenith telescope micrometer between readings 35·00 and 65·00 were obtained in terms of the same portion of the screw of "G" microscope.

One complete set of observations having been taken the whole apparatus was dismantled, re-erected, the illumination changed and a second series of measures made; this time the observations were commenced with the zenith telescope reading 65·00 and finished at 35·00 revolutions.

Three series of observations were made in this way. Each value was then reduced to terms of the mean of the series to which it belonged, the mean being put equal to unity. The resulting quantities for each series are shewn in columns 2, 3 and 4 of Table *A*.

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* *See* penultimate paragraph, page (6), Chapter I of this Volume.

Column 5 gives the mean value for each revolution, and column 6 the difference of each from the mean revolution.

The values in column 6 were then plotted and a smooth curve drawn to represent these observed quantities. Column 7 gives the final errors of each revolution as measured from the curve. These quantities represent the difference of each from the mean revolution for that portion of the screw lying between readings 35 00 and 65 00. Column 8 gives the accumulated errors.

Table A.

1 Revolution From	1 Revolution to	2 1st Set	3 2nd Set	4 3rd Set	5 Mean of the three sets	6 Difference from unity	7 Difference as derived from smooth curve	8 Summation of Differences
					Revolution	Division	Division	Division
35	36	0·99730	0·99377	1·00262	0·99790	− 0·210	− 0·22	− 0·22
36	37	1·00058	0·99534	0·99547	0·99713	− 0·287	− 0·28	0·50
37	38	0·99518	0·99963	0·99846	0·99776	− 0·224	− 0·29	0·79
38	39	0·99946	0·99655	0·99467	0·99689	− 0·311	− 0·29	1·08
39	40	0·99551	0·99938	0·99767	0·99752	− 0·248	− 0·25	1·33
40	41	1·00017	0·99480	0·99434	0·99644	− 0·356	− 0·14	1·47
41	42	1·00274	1·00208	1·00058	1·00180	+ 0·180	+ 0·01	1·46
42	43	1·00112	1·00810	0·99983	1·00302	+ 0·302	+ 0·11	1·35
43	44	1·00440	1·00291	0·99954	1·00228	+ 0·228	+ 0·09	1·26
44	45	1·00179	1·00075	0·99904	1·00053	+ 0·053	+ 0·00	1·26
45	46	1·00096	0·99884	0·99497	0·99826	− 0·174	− 0·05	1·31
46	47	0·99925	1·00416	0·99663	1·00001	+ 0·001	− 0·07	1·38
47	48	0·99929	1·00000	1·00133	1·00021	+ 0·021	− 0·09	1·47
48	49	0·99958	0·99655	1·00283	0·99965	− 0·035	− 0·10	1·57
49	50	0·99713	0·99468	1·00166	0·99782	− 0·218	− 0·11	1·68
50	51	0·99796	1·00328	0·99617	0·99914	− 0·086	− 0·11	1·79
51	52	0·99360	0·99888	1·00250	0·99833	− 0·167	− 0·09	1·88
52	53	1·00382	0·99622	1·00936	1·00313	+ 0·313	− 0·04	1·92
53	54	0·99701	1·00079	0·99601	0·99794	− 0·206	+ 0·01	1·91
54	55	0·99929	0·99879	1·00553	1·00120	+ 0·120	+ 0·06	1·85
55	56	1·00432	0·99767	0·99963	1·00054	+ 0·054	+ 0·10	1·75
56	57	1·00399	1·00333	1·00183	1·00305	+ 0·305	+ 0·12	1·63
57	58	1·00000	1·00125	1·00404	1·00176	+ 0·176	+ 0·13	1·50
58	59	0·98604	1·00179	0·99784	0·99522	− 0·478	+ 0·12	1·38
59	60	1·00905	0·99601	0·99834	1·00113	+ 0·113	+ 0·11	1·27
60	61	1·00087	0·99377	1·00466	0·99977	− 0·023	+ 0·13	1·14
61	62	1·00312	...	1·00316	1·00314	+ 0·314	+ 0·17	0·97
62	63	0·99830	1.00657	0·99746	1·00078	+ 0·78	+ 0·25	0·72
63	64	1·00756	1·00894	1·00025	1·00558	+ 0·558	+ 0·34	− 0·38
64	65	1·00108	1·00540	1·00412	1·00353	+ 0·353	+ 0·39	+ 0·01

Before enquiring into the effect of the systematic errors it is necessary to ascertain the quantities entering into the micrometer correction and the methods by which they are determined.

In the micrometer of the zenith telescope, the travelling frame carries three wires A, B and C at intervals of approximately 10 revolutions. When intersecting a star, use is made of the wire lying nearest to it as it crosses the field, but the reading taken from the micrometer is the reading for the central wire B. Consequently to determine the true micrometer reading for an observation to a star, it is necessary to apply to the recorded reading of B, the value of the interval between B and the wire used. The corrected quantity for the intersection of a star is then of the form $B \pm i$ according as the wire C or A is used, and the difference of the micrometer readings for the two stars of a pair,—the quantity entering into the micrometer correction in the reduction of an observation for co-latitude,—will be of the form

$$(B_w \pm i_w) - (B_e \pm i_e)$$

the sign $\pm$ being according as the wire C or A was used in intersecting the star.

This general form covers four individual cases:

(a) when B_w is greater than B_e and wire C is used with B_w and A with B_e.

(b) when B_w is greater than B_e and wire A is used with B_w and C with B_e.

(c) when B_w is less than B_e and wire C is used with B_w and A with B_e.

(d) when B_w is less than B_e and wire A is used with B_w and C with B_e.

In the cases (a) and (c) expression (α) takes the particular form

$$(B_w - B_e) + (i_w + i_e)$$

and since the wire A is never used for an intersection at a point above and the wire C never for an intersection below 50·00 (β) is always a positive quantity.

In cases (b) and (d) equation (α) becomes

$$(B_w - B_e) - (i_w + i_e)$$

which is always a negative quantity. Thus it appears that of those micrometer corrections of which the A and C intervals form a part, into such as are positive, the values of these intervals enter as positive quantities and into those that are negative, as negative quantities.

Only a very few co-latitude observations do not involve the use of either wire A or wire C. In over 80 per cent, both wires are used. In the great majority of cases, then, the micrometer correction is composed of two quantities, one of which is actually measured on the screw, the other being the interval between the wires used in the two star intersections.

Let the micrometer correction applied in the reduction of observations for co-latitude be represented in amount by

$$\tfrac{1}{2}(M + I)\,\mu.$$

where M is the quantity $B_w - B_e$, actually measured on the screw.

I the quantity $i_w + i_e$, the sum of the wire intervals.

μ the value of a mean revolution of the micrometer.

If M be supposed in error by δM,

I „ „ δI,

μ „ „ $\delta\mu$,

The true correction would be

$$\tfrac{1}{2}(M + I + \delta M + \delta I)(\mu + \delta\mu).$$

The applied correction is in error by

$$\tfrac{1}{2}(\delta M + \delta I)(\mu + \delta\mu) + \tfrac{1}{2}(M + I)\,\delta\mu.$$

The term

$$\tfrac{1}{2}(\delta M + \delta I)\,\delta\mu \quad \text{is negligible.}$$

and the error in the applied correction may be taken as

$$\tfrac{1}{2}\,(\delta M + \delta I)\,\mu + \tfrac{1}{2}\,(M + I)\,\delta\mu$$

The quantity M, measured on the central portion of the screw, is distributed equally on either side of the point 50·00, the reference point of the micrometer. As regards its magnitude, a consideration of a number of records has given the following results:

In 18	per cent	of observations	M	lies between	0	and	5	revolutions.
19	"	"	"	"	5	"	10	"
25	"	"	"	"	10	"	15	"
18	"	"	"	"	15	"	20	"
8	"	"	"	"	20	"	25	"
8	"	"	"	"	25	"	30	"
4	"	"	"	"	over 30			

It appears that the most frequently occurring value of M is 12 revolutions. Suppose M to be 12 revolutions, that is, to have been measured on the portion of screw between readings 44·00 and 56·00.

From column 8 of Table A the systematic error of screw accumulated

at 44·00 is − 1·26 divisions

at 56·00 " − 1·75 "

The table thus shows that the portion of screw from revolution 44 to revolution 56 is equal to

12 mean revolutions − 0·49 division.

The quantity M which from the difference of the micrometer readings appears to be 12 revolutions is, then, too large by 0·49 division.

$$\delta M = + 0{\cdot}49 \text{ division.}$$

A consideration of the method by which the intervals AB and BC are determined will at once show that these quantities cannot be measured in terms of any particular portion of the screw we please. The portion of the screw involved is regulated by the position of the "speck" selected as the reference point. It thus has happened that for many seasons the interval AB has been determined in terms of revolutions 45 to 55 and BC in terms of revolutions 46 to 56.

Table A gives the systematic errors of these portions of the screw.

The accumulated error at revolution 45 is − 1·26 divisions.

" " " 55 − 1·85 "

The portion of screw between revolutions 45 and 55 is then less than 10 revolutions by 0·59 division, and the value AB deduced from the micrometer readings is too large by 0·59 division.

The value of BC similarly appears to be too large by 0·44 division.

The quantity I is therefore too large by 1·03 divisions.

$$\delta I = + 1{\cdot}03 \text{ divisions.}$$

In the last few seasons, the programme of observations for the determination of the micrometer value has been framed so as to deal particularly with the 30 central revolutions—that is, from revolution 35 to revolution 65. Hence for these seasons μ may be considered as fairly representing the standard revolution of Table A and $\delta\mu$ as an accidental error of observation.

The errors in the applied micrometer correction, due to systematic errors of the screw, are, as given above,

$$\tfrac{1}{2}\,(\delta M + \delta I)\,\mu + \tfrac{1}{2}\,(M + I)\,\delta\mu$$

In which the quantity δI has been shewn to be a constant error for all micrometer corrections of like sign. Taking the value of μ to be 69″ and δI as determined above.

$$\tfrac{1}{2}\ \delta I.\mu = 0''\cdot 36.$$

If we take as an example

$$M = 12 \text{ revolutions,}$$

$$\text{then } \delta M \text{ is} = +\ 0\cdot 49 \text{ division :}$$

$$\text{also taking } \delta\mu = 0''\cdot 01 \text{ an extreme value,}$$

the values of the terms of the expression above are seen to be

$$\tfrac{1}{2}\ (\delta M + \delta I)\ \mu = \quad +\ 0''\cdot 52$$

$$\tfrac{1}{2}\ (M + I)\ \delta\mu = \quad 0''\cdot 16.$$

The Table *A* gives the following values for δM for different values of M.

M in Revolutions	δM in divisions	δM in seconds of arc
2	+ 0·22	+ 0″·15
4	+ 0·41	+ 0 ·28
6	+ 0·54	+ 0 ·37
8	+ 0·60	+ 0 ·41
10	+ 0·59	+ 0 ·40
12	+ 0·49	+ 0 ·34
14	+ 0·28	+ 0 ·19
16	+ 0·04	+ 0 ·03
18	− 0·09	− 0 ·06
20	− 0·06	− 0 ·04
22	+ 0·06	+ 0 ·04
24	+ 0·18	+ 0 ·12
26	+ 0·22	+ 0 ·15
28	+ 0·16	+ 0 ·11
30	0·00	0 ·00

From this it is seen that to all intents δM is constant in sign——that sign being the same as for δI.

The error $\tfrac{1}{2}\ (\delta M + \delta I)\ \mu$ is then constant in sign for all micrometer corrections of like sign, and varies in amount from 0″·56 to 0″·33 according to the value of M.

All positive micrometer corrections are thus burdened with an error of constant sign and all negative corrections similarly affected by an error of opposite sign. In consequence, the consideration of the values for the co-latitude given respectively by +ve and −ve micrometer corrections with the object of determining the quantity $\delta\mu$ can lead to no reliable result, until the systematic errors of the screw have been determined and corrections for them applied in the reduction of the observations for latitude.

H. M. Cowie.

Dehra Dún,
March, 1905.

APPENDIX.

No. 5.

ON THE AZIMUTH OBSERVATIONS OF THE GREAT TRIGONOMETRICAL SURVEY OF INDIA.

BY

LIEUT.-COL. S. G. BURRARD, R.E., F.R.S.,
Superintendent of Trigonometrical Surveys.

(1). From 1802 to the present time rigorous astronomical observations for azimuth have been regularly taken at stations of the Principal Triangulation. The practice has been for the officer conducting the triangulation to observe for azimuth himself at every 40 or 50 miles. Although much time and trouble have in the aggregate been expended on the measurements and reductions, no use has so far been made of the undoubtedly valuable results. In this paper I have attempted to analyse the geodetic evidence furnished by our azimuth observations but I have not been wholly convinced that my investigation is worthy of publication. I have decided to publish it, firstly, because the results though imperfect are perhaps as good as are obtainable from present data, and secondly, because the narrative will place on record for future use the obstacles encountered, will explain the causes of failure, and will indicate the remedial steps, that will have to be taken as soon as observers are available.

(2). *The purposes served by Azimuth Observations.* In a geodetic survey astronomical observations for latitude and longitude serve two purposes, the measurement of the earth's axes, and the determination of the local direction of gravity. An azimuth observer has, however, no less than three objects in view, the measurement of the earth's axes, the determination of the local direction of gravity, and the deduction of the azimuthal error accumulated in the triangulation.

In comparing the values of latitude and longitude calculated through the triangulation with the observed values, we are confronted with the difficulty, that each difference is made up of two component parts, which we are required to separate: but a difference between an observed and a calculated azimuth has no less than three entangled components.

(3). *1799-1823.* Azimuth observations were taken by Colonel Lambton *for the purpose of determining the figure of the earth from arcs perpendicular to the meridian.* In his day the figure of the earth was not known to any degree of certainty, and in all probability the discrepancies then between geodetic and observed azimuths were mainly due to the errors in the adopted values of the earth's axes. Lambton did not utilise his observed azimuths to determine either deflections of the plumb-line or errors of triangulation.

(4). *1823-1843.* Colonel Everest regarded observed azimuths as checks upon the accuracy of the triangulation. On page 84 of his *Account of the Measurement of an Arc &c.*, 1830, he describes an observation for azimuth at Takalkhera, and computes from it with the aid of the triangulation an azimuth at Kaliánpur. "We get", he writes, "10° 27′ 32″·170 "for the computed azimuth of Soorental at Kullianpoor. But from twenty-seven observations of circumpolar stars the "azimuth * * * is observed to be * * * 10° 27′ 30″·717." "The difference of 1″·453 is", he says, "a quantity quite "within the limits to which so extensive a series could be expected to arrive."

In his determinations of the figure of the earth Colonel Everest took great pains to refer the sides of his triangles to the meridian before deducing the terrestrial arc: to carry out this operation he required an accurate knowledge of the azimuth of the triangulation, and he introduced several observed azimuths as "verificatory of each other."

He did not however regard his azimuth at Banog as verificatory: to the north-east of this station, he pointed out, were the Himalaya Mountains with nought on the south-west to counterbalance them but a flat plain: "the principal "attraction", he wrote, "being on the north-eastern side, the tendency would be to make the observed azimuths less "than those brought up by computation: whether the error of 4¾ seconds noted at Kaliana has arisen from an accumula-"tion of errors in the observed angles or is also attributable to the same cause it is impossible to say. I had hoped "to have placed that station far enough to be beyond the influence of that irregularity." *

* See *Account of the Measurement of two Sections of the Meridional Arc of India, 1847, Introduction, page* xlii.

(5). *1858.* When the figure of the earth was being determined by Col. Clarke from the triangulation of Great Britain, an equation of condition was formed from each observed azimuth, and the azimuthal errors of the triangulation were neglected. Discussing these equations on page 293 of his work on Geodesy, Col. Clarke writes:—

"The azimuth and longitude equations are from the nature of those observations entitled to much less weight "than the latitude equations: the azimuth equations in particular are directly affected by accumulation of errors of the "observed angles of the triangulation."

(6). *1861-1884.* In General Walker's time azimuth observations had come to be regarded in practice as determinations of the direction of gravity. Thus the fundamental azimuth at Kaliánpur was derived from a surrounding group of observed azimuths treated by the method of minimum squares: such a course could not have been pursued except on the assumption that the differences treated between observed and geodetic azimuths were due to accidental and local attractions.

Moreover the closing errors of the great circuits of the Principal Triangulation were adjusted by the method of minimum squares, and this course would not have been adopted, had it been suspected that the whole triangulation was being deflected from the true direction by an ever-increasing azimuthal error: for would it not have been considered inconsistent to introduce the complicated machinery of minimum squares to adjust the closing errors of circuits, which in South India averaged 2″ in amount*, if it had been suspected that the whole of the South Indian Triangulation was in error by 6″ in azimuth†.?

The following extracts from chapters xi and xii of Volume II of the *Account of the Operations of the Great Trigonometrical Survey of India* show General Walker's opinions:—

"The difference between the observed azimuth of any line at a station *B* and the geodetic azimuth of the same line "as brought up through the triangulation from a fundamental station *A*, may be due either to local deflections of the plumb-"line at *A* and *B*, or to errors in the astronomical determinations of the azimuths at those stations, or to errors in the "connecting triangulation; very possibly all three causes operate in every instance, but it is impossible to disentangle them, "and determine the value of each separately; practically the only thing to be done is to assume the astronomical observa-"tions and the triangulation to be errorless, and that the entire difference is due to deviations of the plumb-line."

"It will be seen that there is a large number of stations at which astronomical determinations of latitude and azimuth "have already been made, and the number of these may be expected to be somewhat increased before the triangulation "is completed; besides these there are a few stations at which electro-telegraphic differences of longitude have already "been made, and several at which they will probably be made hereafter. But all these observations are liable to be influ-"enced by local deflections of the plumb-line to a greater extent than the principal triangulation of the Survey is liable to "be influenced by errors generated in the measurement of the angles. The differences between the direct determinations "of the elements of any station and the computed values brought up to it from the origin, are due to errors of operation, "to errors in the adopted elements of the figure of the earth, and to local deflections of the plumb-line; and of all these "causes the last is, in this Survey, the most significant."

In his paper entitled *India's Contributions to Geodesy* and published in the Philosophical Transactions of the Royal Society in 1895, General Walker made no use of the Indian observed azimuths.

(7). In 1897 Capt. Lenox Conyngham, R.E., pointed out that the large differences between astronomical and geodetic azimuths, which obtained in South India, could not be attributed to local attractions.

(8). In 1900 I commenced a classification of all deflections of the plumb-line observed in India; and as more latitudes had been observed than longitudes I decided to equalise the numbers of deflections in the meridian and of those in the prime vertical by including the observed azimuths. I was not then conversant with the investigations carried out at Potsdam and published in *Lothabweichungen, Heft I: 1886* and in *Die Europäische Längengradmessung von Greenwich bis Warschau von Börsch and Krüger 1896.* I was only aware of what Colonel Clarke had written in chapter xii of his *Geodesy*; on page 291 he shows that "the observation of the difference of longitude gives us no information that is not also given by the observation of azimuth."

In appendix No. 2 to my paper on Himalayan attraction published in 1901, the azimuth observations of India were compiled and classified.

It was then found that at a few stations both longitude and azimuth observations had been taken. The two methods of observation, it was at once seen, did not yield accordant values of the deflection of the plumb-line, and it required but little insight to discover that the differences between the astronomical and calculated values of azimuth were largely due to the effect on the latter of the azimuthal errors accumulated in the triangulation.

The conclusion that I arrived at was that, though the difference in azimuth between two rays can be more accurately determined by triangulation than by astronomical observations when the rays are not distant from one another, yet the errors of triangulation tend to accumulate and at great distances from the origin the accumulated error of the triangulation may easily exceed the error that local attraction is liable to produce in an observed azimuth.

* Volumes XII and XIII of the *Account of the Operations of the G. T. Survey of India.*
† Survey of India.—Professional Paper No. 5 of 1901, part I, page 18.

On page 17 of the paper on Himalayan attraction will be found my first attempt to determine the azimuthal errors of the principal triangulation from comparisons of longitude and azimuth results. I had fully intended in that paper to take a step further and, by applying corrections to the geodetic azimuths, to render the azimuthal observations available for a discussion of the direction of gravity. But this course was not practicable: our azimuth observations had been taken on one plan by the triangulation parties and our longitude observations on another by independent astronomical parties, and when the results came to be compared, but three stations were found at which both an azimuth and a longitude had been observed. Colonel Clarke's proof that an observation of longitude gave no information that was not also given by an observation of azimuth had led observers to believe that the determination of both longitude and azimuth at one station would be a somewhat unprofitable duplication of results.

Nevertheless the table published on page 18 of the paper on Himalayan attraction gave a fair indication of the magnitude of the azimuthal errors of the triangulation: and this table convinced me that the azimuth observations accumulated by our survey would never be of use to anyone, until we had observed both for azimuth and longitude at a great number of selected stations. I had to abandon for the time all idea of utilising the observed azimuths: it was perhaps a first step to have got a complete list of azimuths compiled, but the possibility of making use of them seemed as far off as ever.

(9). *The supplementary Azimuth Observations of 1903-5.* Azimuth observations are simpler than those of longitude; they occupy less time and require but one observer; in order to supply the data that had been found wanting, it appeared at first sight only necessary to arrange for an azimuth to be observed at every longitude station, and in 1903 Captain H. Wood, R.E. undertook this task.

At the commencement of his work however a new difficulty was encountered. The longitude stations were selected by our predecessors for the purpose of measuring arcs of parallel and a comparison of longitude and azimuth results was not contemplated. The selection of longitude stations was based on two principles: (i) India was to be covered by a network of equal triangles formed by longitude arcs: (ii) each longitude station was to be placed at an important telegraph office.

The telegraphs of India have been widely extended since our longitude arcs were planned, and now-a-days we should possibly not experience much difficulty in obtaining "through" telegraphic communication from one longitude station to another, even if they were located at small telegraph offices. But formerly it was considered desirable to place each longitude station at a large central telegraph office where the telegraph master was of superior rank and able to order "through" communication and to prevent minor offices from breaking in.

The longitude stations were consequently often located at distances from the principal triangulation, and their geodetic positions were determined by secondary chains carried from the nearest stations of the principal triangles. It will be seen from the Appendices to Volumes IX and X of the *Account of the Operations of the Great Trigonometrical Survey of India* that triangular errors of 3″ and 5″ were common in the very small triangles which generally closed the secondary chains in the hearts of towns.

(10). In justice to our predecessors we have to admit that the special chains of secondary triangles satisfied all the requirements of the immediate object in view, *viz.*, the determination of the lengths of the earth's axes from the measurements of arcs of parallel. The use to which we are now putting our longitude observations was not considered in the original scheme.

The probable error of an observed arc of longitude is seldom less than 0″·05: and it is consequently unnecessary to determine the geodetic longitude of the arc's terminals to a greater degree of accuracy than 2 or 3 feet. The triangles in which triangular errors of 3″ and 5″ occur are invariably small; their sides are perhaps one or two miles in length and few only of such triangles occur in any single chain: it is consequently unlikely that the geodetic longitudes have been affected to a larger extent than one or two feet. A geodetic difference of longitude and a geodetic azimuth are both angular measurements, but they are affected in a different way by a linear displacement. The resulting error in the longitude is represented by the angle which the station's displacement subtends at the pole; the resulting error in the azimuth is the angle, which the station's relative displacement subtends at the next station of the triangle, distant perhaps a mile. In a triangle with an area of half a square mile and with a triangular error of 5″ the stations are fixed correctly within an inch, and are suitable for longitude work; but the azimuths of the sides are not known within 2″ or 3″ and are useless for geodetic purposes.

(11). To revise the secondary triangulation with which longitude stations had been fixed was found to be no simple matter. The longitude stations had been located in the gardens of telegraph offices near the centres of cantonments and cities: no triangulation would have been possible, until many valuable trees had been cut down, and even if these clearances had been sanctioned, the view would still have been obstructed by houses, which would have rendered small triangles necessary. Moreover in the case of some stations the chains of triangulation requiring revision were long; Mooltan was 46 miles from a principal station; Peshávar was 106 miles.

It is true that the secondary chains connecting these places with principal series had been, with the exception of their small terminal triangles, well-observed, but still they were secondary, and having regard to the accumulation of error in long chains I came to the conclusion, that if they were to be revised at all, they ought to be revised entirely.

With principal triangulation urgently required in Burma and Baluchistan, there is practically no early prospect of our being able to carry out the revisions to longitude stations, and in my opinion it will be better to extend the longitude work to the existing principal triangulation than to extend the triangulation to the existing longitude stations: it will too be cheaper to select new longitude stations and to observe new longitude arcs. When therefore two astronomical observers are next available, and the long prospected longitude arcs of Burma come to be undertaken, the utilisation of our azimuths should be kept in view, and supplementary longitude stations should be selected at the critical points of our principal triangulation.

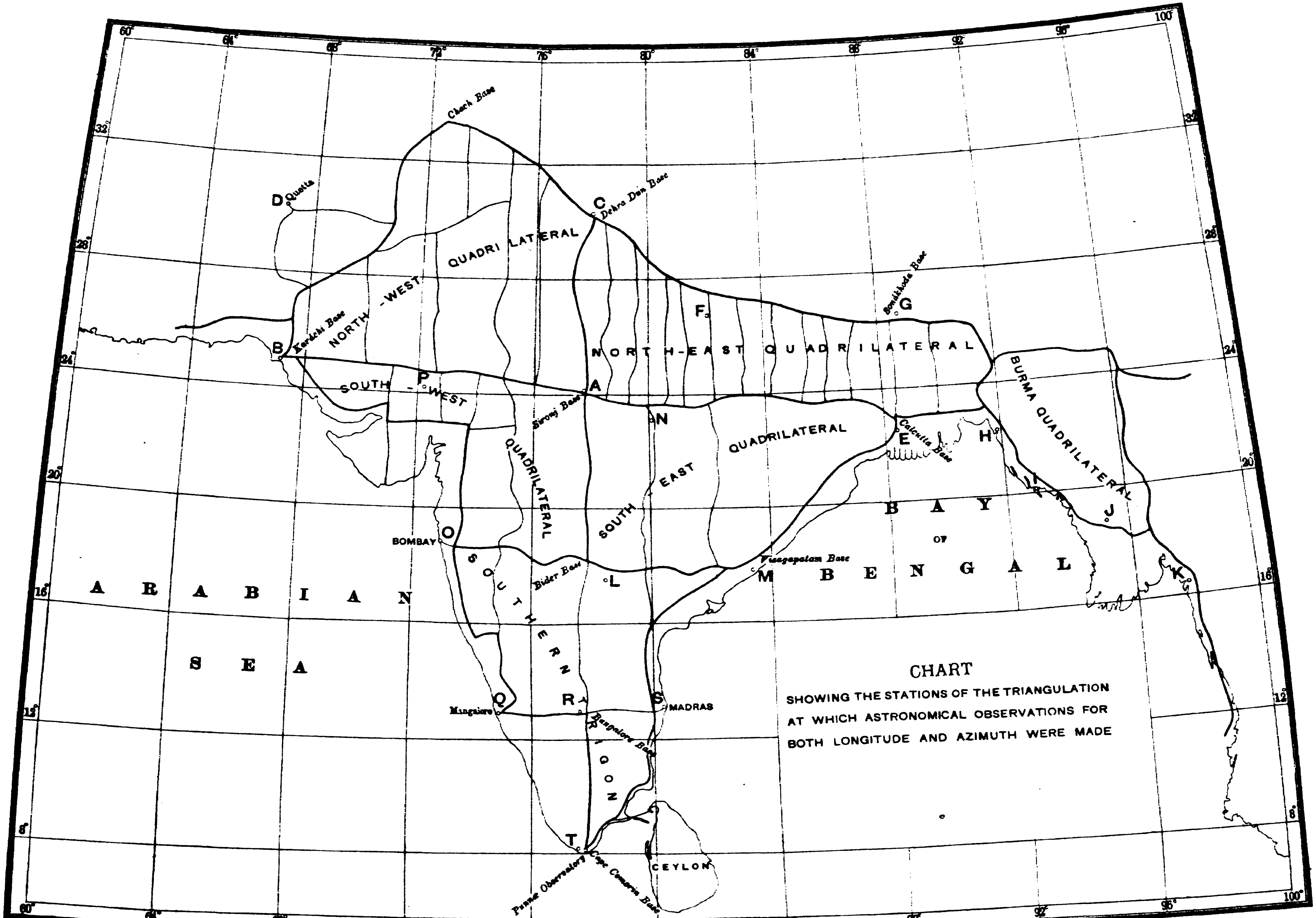
(12). Meanwhile Capt. Wood had to proceed with his programme of azimuths and to make the most of the secondary triangulation at his disposal. His original intention had been to observe for azimuth over the marks of the longitude stations, but this ideal procedure he was unable to carry through, and he had to fall back on a compromise.

Let us suppose that a longitude station is situated on a flat plain in the heart of a city, and that the principal triangulation has determined an accurate geodetic azimuth at a station two miles distant outside the walls. To observe for azimuth at such a longitude station is useless, because the geodetic azimuths of the sides of the small urban triangles are not known within 2″ or 3″; the only simple way out of the difficulty is to observe for azimuth at the nearest station of the principal triangulation, and then to compare the resulting deflection of gravity with the deflection at the longitude station itself. In following such a course we are abandoning our ideal plan, and we are making the assumption that the local attraction is identical at both stations. Such an assumption would perhaps be admissible if the two stations were near each other, if the country was flat, and if no geological disturbances were apparent; but the maximum permissible interval between longitude and azimuth stations, whose results are to be used for the formation of Laplace's equation, is not a subject suitable for discussion. There ought, we know, to be no interval: that is the only proper course and every other is a make-shift.

In order to secure a reliable value of geodetic azimuth in the case of weak terminal triangles, Captain Wood was authorised to admit an interval of 5 miles between the longitude and azimuth stations, when the country was flat, and one of 2 miles when hills were visible on the horizon: in hilly country no interval was regarded as permissible.

Captain Wood was unable to observe for azimuth at all the longitude stations in one field season, and on his return it was found that his result at Prome rendered an intervening Laplace station between India and Burma necessary; in 1904 Captain H. McC. Cowie, R.E. was able to furnish such a station by observing for azimuth near Chittagong.

(13). Table I shows the stations at which Laplace equations have been formed: Table II shows the longitude stations which were too far from the principal triangulation to be utilised. The positions of the stations of Table I are shown on the attached chart.



Note.— The letters, A, B, C, &c. refer to the Stations given in Table 1 of Appendix 5.

TABLE I.—Names and Descriptions of accepted Stations.

Reference Letter	Longitude Station	Nearest Azimuth Station	Distance between Longitude and Azimuth Stations		Description of surrounding country
			In metres	In miles	
A	Kaliánpur	Kaliánpur H.S.	11	0·0	*Vide* Professional Paper No. 5 Appendix I page i.
B	Karachi T.O.	Karachi Observatory	2513	1·6	Flat: on the west coast.
C	Dehra Dún Obsy. (new)	Dehra Dún Obsy. (old) S.	966	0·6	A Sub-Himalayan station.
D	Quetta T O.	Quetta T.O. s.	7	0·0	Surrounded by high hills.
E	Calcutta	Calcutta Base-line South End T.S.	7800	4·8	Quite flat.
F	Fyzabad T.O.	Orejhár S.	6502	4·0	Quite flat.
G	Jalpaiguri	Jalpaiguri s.	74	0·0	The Himalayas rise about 30 miles North. Surrounding country in the immediate vicinity flat.
H	Chittagong T.O.	Nagarkhána H.S.	5690	3·5	Hilly.
I	Akyab ,,	Dattaung ,,	14381	8·9	On coast: immediate surroundings flat · but not very distant from Arakan mountains.
J	Prome	Kyaunggyi s.	184	0·1	Low hills to the E. Higher range towards W.
K	Moulmein	Taungzun H.S.	8921	5·5	Flat
L	Bolarum	Bolarum P.W.D. Office s.	68	0·0	The surrounding country is undulating with no marked features.
M	Waltair	Vizagapatam Base-line N. End S.	33732	21·0	Is situated on the sea-coast near the Eastern Gháts.
N	Jubbulpore T O	Karaundi H S.	4570	2·8	Mountainous.
O	Bombay	Colába Observatory S.	59	0·0	On west coast near the foot of the Western Gháts.
P	Deesa T.O.	Deesa T.O. s.	32	0·0	With the exception of the Abu Hills which lie to the N E., 20 miles away, the surrounding country is quite flat.
Q	Mangalore	Mangalore S.	19	0·0	Flat.
R	Bangalore	Bangalore Base-line S.W. End S.	12	0·0	On a high plateau.
S	Madras	St. Thomas's Mount Trestle S.	9126	5·7	On east coast: country flat.
T	Nagarkoil	Kudankulam Observatory ,,	27680	17·2	Hilly.

Notes.—T.O. denotes Telegraph Office. T S. denotes Tower Station, principal. H.S. denotes Hill Station, principal. S. denotes Station, principal, in the plains. s. denotes station, secondary, in the plains.

The stations of Waltair and Nagarkoil have been included in Table I on account of the importance of their positions in the triangulation; but the distances at both places between the longitude and azimuth stations are excessive.

TABLE II.—Names and descriptions of rejected Stations.

Longitude Station		Nearest Azimuth Station		Distance between Longitude and Azimuth Stations		Description of surrounding country
				In metres	In miles	
Agra	T.O.	Usira	H.S.	44100	27	
Amritsar	„	Sangatpur	T.S.	37100	23	The Himalayas visible to N.E.
Bellary	„	Darúr	H.S.	143400	89	
Mooltan	„	Dera Dín Panáh	P.S.	74200	46	Sulemán mountain peaks just visible all along the horizon from N.W. to S.W. on very clear days.
Peshávar	„	Jáoli	H.S.	170800	106	

(14). *General Walker's initial azimuth.* We have for our data the results of longitude and azimuth observations at 20 stations: but before we can proceed to form equations we have to consider another difficulty. When the calculations of the principal triangulation were being undertaken, General Walker deduced a value for the initial azimuth from a great group of observed azimuths. In taking this step General Walker hoped to free the fundamental azimuth, on which the orientation of the whole triangulation depended, from the effects of local attraction. The course pursued has since been regretted: the complications introduced have added greatly to the difficulties of subsequent investigation, and nothing was gained, for we now realise that the initial azimuth at Kalíánpur was not freed from the effects of local attraction.

When in India we compare a geodetic and an observed difference of *longitude*, the observed difference is measured from the astronomical meridian of Kalíánpur: but when we compare a geodetic and an observed *azimuth*, the geodetic azimuth has been brought up from Walker's meridian at Kalíánpur, and this meridian is not coincident with the astronomical meridian.

For purposes of this investigation I have had to adopt a new value of the initial azimuth and to recompute through the triangulation all the geodetic longitudes and azimuths employed. The value of initial azimuth now adopted is $190° 27' 6''\cdot29$, being the mean of the observed values as deduced on page 7 of Professional Paper No. 5 of 1901. In the comparisons now to be instituted between longitude and azimuth results both sets of observation will be referred to the astronomical meridian at Kalíánpur.

This course has the disadvantage of bringing into use different geodetic values of longitude and azimuth from those published in our preceding volumes. Every member of an old survey knows the objections to incessant changes of data; and I hope it will be clearly understood that no general recomputation is at present contemplated, and that the geodetic data in the following tables have been only deduced for the one particular purpose.

Notes.—T.O. denotes Telegraph Office. H.S. denotes Hill Station, principal. T.S. denotes Tower Station, principal. P.S. denotes Platform Station, principal.

TABLE III.—Recalculation of Geodetic Azimuths of Sides of the Triangulation.

Reference Letter	Station of Observation		Initial Azimuth as deduced and adopted by General Walker	The observed and uncorrected value of the initial Azimuth	Geodetic Azimuths of sides as computed from Walker's initial value	Corrections to be applied to Walker's values of Azimuths	Resulting values of geodetic Azimuths
			° ′ ″	° ′ ″	° ′ ″	″	° ′ ″
A	Kaliánpur	H.S.	190 27 5·10	190 27 6·29			
B	Karachi Observatory				221 39 10·9	+ 1·2	221 39 12·1
C	Dehra Dún Observatory (old)	S.			165 11 10·7	+ 1·2	165 11 11·9
D	Quetta T.O.	s.			166 31 17·0	+ 1·2	166 31 18·2
E	Calcutta Base-line South End	T.S			177 10 36·2	+ 1·2	177 10 37·4
F	Orejhár	S.			308 36 23·0	+ 1·2	308 36 24·2
G	Jalpaiguri	s			321 33 30·0	+ 1·2	321 33 31·2
H	Nagarkháua	H.S.			155 47 22·0	+ 1·1	155 47 23·1
I	Dattaung	„			171 27 31·9	+ 1·0	171 27 32·9
J	Kyaunggyi	s.			109 26 48·1	+ 1·0	109 26 49·1
K	Taungzun	H.S.			31 16 31·8	+ 1·0	31 16 32·8
L	Bolarum P.W.D Office	s			25 57 36·9	+ 1·2	25 57 38·1
M	Vizagapatam Base-line N. End	S.			203 44 25·9	+ 1·2	203 44 27·1
N	Karaundi	H.S.			206 22 39·6	+ 1·2	206 22 40·8
O	Colába Observatory	S.			288 5 26·7	+ 1·2	288 5 27·9
P	Deesa T.O.	s.			241 16 19·9	+ 1·2	241 16 21·1
Q	Mangalore	S.			205 52 53·6	+ 1·2	205 52 54·8
R	Bangalore Base-line S.W. End	„			224 31 27·0	+ 1·2	224 31 28·2
S	St. Thomas's Mount Trestle	„			12 30 9·3	+ 1·2	12 30 10·5
T	Kudankulam Observatory	„			185 55 26·5	+ 1·1	185 55 27·6

Notes.—T.O. denotes Telegraph Office. T.S. denotes Tower Station, principal. H.S. denotes Hill Station, principal. S. denotes Station, principal, in the plains. s. denotes station, secondary, in the plains.

TABLE IV.—Deflections of the plumb-line in the prime vertical as deduced from comparisons of Observed and Geodetic Azimuths.

Reference Letter	Station of observation	Observed Azimuth = A	Geodetic Azimuth = G as computed from the			(A − G) cot λ		
			Everest Spheroid (Table III)	Clarke Spheroid	Bessel-Clarke Spheroid*	Everest Spheroid†	Clarke Spheroid	Bessel-Clarke Spheroid
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	″	″	″
A	Kaliánpur H.S.	190 27 6·29						
B	Karachi Observatory	221 39 9·5	221 39 12·1	221 39 14·8	221 39 14·6	E 5·6	E 11·4	E 11·0
C	Dehra Dún Obsy. (old) S.	165 10 58·8	165 11 11·9	165 11 11·8	165 11 11·8	„ 22·4	„ 22·2	„ 22·2
D	Quetta T.O. „	166 31 12·1	166 31 18·2	166 31 21·2	166 31 21·0	„ 10·5	„ 15·7	„ 15·3
E	Calcutta Base-line South End T.S.	177 10 27·3	177 10 37·4	177 10 34·8	177 10 35·0	„ 24·2	„ 18·0	„ 18·5
F	Orejhár S.	308 36 18·9	308 36 24·2	308 36 23·0	308 36 23·1	„ 10·5	„ 8·1	„ 8·3
G	Jalpaiguri s.	321 33 25·3	321 33 31·2	321 33 28·3	321 33 28·5	„ 11·8	„ 6·0	„ 6·4
H	Nagarkhána H.S.	155 47 13·3	155 47 23·1	155 47 19·7	155 47 19·9	„ 23·8	„ 15·6	„ 16·0
I	Dattaung „	171 27 28·3	171 27 32·9	171 27 29·4	171 27 29·6	„ 12·5	„ 3·0	„ 3·5
J	Kyaunggyi s.	109 26 42·1	109 26 49·1	109 26 45·2	109 26 45·4	„ 20·5	„ 9·1	„ 9·7
K	Taungzun H.S.	31 16 18·9	31 16 32·8	31 16 28·6	31 16 28·8	„ 47·1	„ 32·9	„ 33·6
L	Bolarum P.W.D. Office s.	25 57 35·8	25 57 38·1	25 57 37·9	25 57 37·9	„ 7·3	„ 6·7	„ 6·7
M	Vizagapatam Base-line N. End S.	203 44 24·5	203 44 27·1	203 44 25·9	203 44 26·0	„ 8·0	„ 4·3	„ 4·6
N	Karaundi H.S.	206 22 35·6	206 22 40·8	206 22 40·2	206 22 40·3	„ 12·2	„ 10·8	„ 11·0
O	Colába Observatory S.	288 5 27·7	288 5 27·9	288 5 29·0	288 5 28·9	„ 0·6	„ 3·8	„ 3·5
P	Deesa T.O. s.	241 16 15·3	241 16 21·1	241 16 22·5	241 16 22·4	„ 12·9	„ 16·0	„ 15·8
Q	Mangalore S.	205 52 50·8	205 52 54·8	205 52 55·3	205 52 55·3	„ 17·5	„ 19·7	„ 19·7
R	Bangalore Base-line S.W. End S.	224 31 21·7	224 31 28·2	224 31 28·2	224 31 28·2	„ 28·1	„ 28·1	„ 28·1
S	St. Thomas's Mount Trestle S.	12 30 5·3	12 30 10·5	12 30 10·0	12 30 10·0	„ 22·5	„ 20·4	„ 20·4
T	Kudankulam Observatory „	185 55 18·8	185 55 27·6	185 55 27·6	185 55 27·6	„ 61·3	„ 61·3	„ 61·3

Notes.—T.O. denotes Telegraph Office. T.S. denotes Tower Station, principal. H.S. denotes Hill Station, principal. S. denotes Station, principal, in the plains. s. denotes station, secondary, in the plains.

* By the "Bessel-Clarke Spheroid" is meant the spheroid which results from a combination of the major axis of Clarke and the ellipticity of Bessel.

† It will be found that the quantities in this column do not agree exactly with the values published on page 17 of Professional Paper No. 5 of 1901: the discrepancies have arisen, firstly, because the observed azimuths in Table IV above have been recomputed with the latest values of declination, secondly, because the observed azimuths have now been corrected for aberration, and, thirdly, because the geodetic azimuths in Table II have been calculated from the astronomical meridian at Kaliánpur instead of from an assumed meridian.

TABLE V.—Deflections of the plumb-line in the prime vertical deduced from comparisons of Observed and Geodetic differences of Longitude.

Reference Letter	Station of observation	Observed differences of longitude in arc from Kaliánpur = A	Geodetic differences of longitude in arc from Kaliánpur = G as computed from the			A − G			Deflections of the plumb-line = (A − G) cos λ as computed from the		
			Everest Spheroid	Clarke Spheroid	Bessel-Clarke Spheroid	Everest Spheroid	Clarke Spheroid	Bessel-Clarke Spheroid	Everest Spheroid	Clarke Spheroid	Bessel-Clarke Spheroid
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	″	″	″	″	″	″
A	Kaliánpur										
B	Karachi T.O.	10 38 24·8	10 38 24·3	10 38 17·8	10 38 18·2	+ 0·5	+ 7·0	+ 6·6	E 0·5	E 6·4	E 6·0
C	Dehra Dún Longitude Station	0 23 38·9	0 24 4·6	0 24 4·3	0 24 4·4	− 25·7	− 25·4	− 25·5	„ 22·2	„ 21·9	„ 22·0
D	Quetta T.O.	10 38 48·3	10 38 45·8	10 38 39·1	10 38 39·6	+ 2·5	+ 9·2	+ 8·7	„ 2·2	„ 7·9	„ 7·5
E	Calcutta	10 42 0·3	10 42 11·3	10 42 4·8	10 42 5·1	− 11·0	− 4·5	− 4·8	„ 10·1	„ 4·1	„ 4·4
F	Fyzabad T.O.	4 28 50·1	4 28 50·6	4 28 47·8	4 28 48·0	− 0·5	+ 2·3	+ 2·1	„ 0·4	W 2·0	W 1·9
G	Jalpaiguri	11 4 34·8	11 4 55·2	11 4 48·4	11 4 48·8	− 20·4	− 13·6	− 14·0	„ 18·3	E 12·2	E 12·5
H	Chittagong T.O.	14 10 47·4	14 10 59·0	14 10 50·4	14 10 50·9	− 11·6	− 3·0	− 3·5	„ 10·7	„ 2·8	„ 3·2
I	Akyab „	15 14 21·0	15 14 32·0	15 14 22·8	15 14 23·3	− 11·0	− 1·8	− 2·3	„ 10·3	„ 1·7	„ 2·2
J	Prome	17 33 24·6	17 33 40·3	17 33 29·7	17 33 30·2	− 15·7	− 5·1	− 5·6	„ 14·9	„ 4·8	„ 5·3
K	Moulmein	19 58 5·9	19 58 23·0	19 58 11·0	19 58 11·6	− 17·1	− 5·1	− 5·7	„ 16·4	„ 4·9	„ 5·5
L	Bolarum	0 51 50·3	0 51 53·6	0 51 53·1	0 51 53·1	− 3·3	− 2·8	− 2·8	„ 3·1	„ 2·7	„ 2·7
M	Waltair	5 39 42·6	5 39 45·8	5 39 42·4	5 39 42·6	− 3·2	+ 0·2	0·0	„ 3·0	W 0·2	0·0
N	Jubbulpore T.O.	2 17 34·8	2 17 45·0	2 17 43·6	2 17 43·7	− 10·2	− 8·8	− 8·9	„ 9·4	E 8·1	E 8·2
O	Bombay	4 50 21·8	4 50 28·6	4 50 25·7	4 50 25·8	− 6·8	− 3·9	− 4·0	W 6·5	W 3·7	W 3·8
P	Deesa T.O.	5 28 16·4	5 28 12·7	5 28 9·3	5 28 9·6	+ 3·7	+ 7·1	+ 6·8	E 3·4	E 6·5	E 6·2
Q	Mangalore	2 48 32·9	2 48 35·1	2 48 33·4	2 48 33·5	− 2·2	− 0·5	− 0·6	W 2·1	W 0·5	W 0·6
R	Bangalore	0 4 20·3	0 4 17·6	0 4 17·6	0 4 17·6	+ 2·7	+ 2·7	+ 2·7	E 2·6	E 2·6	E 2·6
S	Madras	2 35 29·6	2 35 36·6	2 35 35·1	2 35 35·1	− 7·0	− 5·5	− 5·5	„ 6·8	„ 5·3	„ 5·3
T	Nagarkoil	0 13 15·8	0 13 14·2	0 13 14·1	0 13 14·1	+ 1·6	+ 1·7	+ 1·7	„ 1·6	„ 1·7	„ 1·7

Notes.—1. T.O. denotes Telegraph Office.

2. The geodetic values of longitude have been specially recomputed for the purposes of this table: the observed azimuth at Kaliánpur has been substituted for Walker's azimuth in the recomputation.

(15). We are now in a position to deduce the azimuthal errors generated in the principal triangulation as follows :—

TABLE VI.—Deduction of the Azimuthal errors accumulated in the Triangulation.

Reference Letter	Name of Longitude Station	Name of Azimuth Station	Deflections of the plumb-line in the prime vertical deduced from: Long. observations (Table V): Everest Spheroid	Long. observations (Table V): Clarke Spheroid	Long. observations (Table V): Bessel-Clarke Spheroid	Azimuth observations (Table IV): Everest Spheroid	Azimuth observations (Table IV): Clarke Spheroid	Azimuth observations (Table IV): Bessel-Clarke Spheroid	Errors in the deductions from azimuth observations: Everest Spheroid	Clarke Spheroid	Bessel-Clarke Spheroid	Corrections to Geodetic Azimuths: Everest Spheroid	Clarke Spheroid	Bessel-Clarke Spheroid
			"	"	"	"	"	"	"	"	"	"	"	"
A	Kalíánpur	Kalíánpur H.S.												
B	Karachi T.O.	Karachi Observatory	E 0·5	E 6·4	E 6·0	E 5·6	E 11·4	E 11·0	− 5·1	− 5·0	− 5·0	− 2·3	− 2·3	− 2·3
C	Dehra Dún Longitude Station	Dehra Dún Obsy. (old) S.	,, 22·2	,, 21·9	,, 22·0	,, 22·4	,, 22·2	,, 22·2	− 0·2	− 0·3	− 0·2	− 0·1	− 0·2	− 0·1
D	Quetta T.O.	Quetta T.O. s.	,, 2·2	,, 7·9	,, 7·5	,, 10·5	,, 15·7	,, 15·3	− 8·3	− 7·8	− 7·8	− 4·8	− 4·5	− 4·5
E	Calcutta	Calcutta Base-line South End T.S.	,, 10·1	,, 4·1	,, 4·4	,, 24·2	,, 18·0	,, 18·5	−14·1	−13·9	−14·1	− 5·9	− 5·8	− 5·9
F	Fyzabad T.O.	Orejhár S.	,, 0·4	W 2·0	W 1·9	,, 10·5	,, 8·1	,, 8·3	−10·1	−10·1	−10·2	− 5·1	− 5·1	− 5·1
G	Jalpaiguri	Jalpaiguri s.	,, 18·3	E 12·2	E 12·5	,, 11·8	,, 6·0	,, 6·4	+ 6·5	+ 6·2	+ 6·1	+ 3·2	+ 3·1	+ 3·0
H	Chittagong T.O.	Nagarkhána H.S.	,, 10·7	,, 2·8	,, 3·2	,, 23·8	,, 15·6	,, 16·0	−13·1	−12·8	−12·8	− 5·4	− 5·3	− 5·3
I	Akyab ,,	Dattaung ,,	,, 10·3	,, 1·7	,, 2·2	,, 12·5	,, 3·0	,, 3·5	− 2·2	− 1·3	− 1·3	− 0·8	− 0·5	− 0·5
J	Prome	Kyaunggyi s.	,, 14·9	,, 4·8	,, 5·3	,, 20·5	,, 9·1	,, 9·7	− 5·6	− 4·3	− 4·4	− 1·9	− 1·5	− 1·5
K	Moulmein	Taungsun H.S.	,, 16·4	,, 4·9	,, 5·5	,, 47·1	,, 32·9	,, 33·6	−30·7	−28·0	−28·1	− 9·1	− 8·3	− 8·3
L	Bolarum	Bolarum P.W.D. Office s.	,, 3·1	,, 2·7	,, 2·7	,, 7·3	,, 6·7	,, 6·7	− 4·2	− 4·0	− 4·0	− 1·3	− 1·3	− 1·3
M	Waltair	Vizagapatam Base-line N. End S.	,, 3·0	W 0·2	0·0	,, 8·0	,, 4·3	,, 4·6	− 5·0	− 4·5	− 4·6	− 1·6	− 1·5	− 1·5
N	Jubbulpore T.O.	Karaúndi H.S.	,, 9·4	E 8·1	E 8·2	,, 12·2	,, 10·8	,, 11·0	− 2·8	− 2·7	− 2·8	− 1·2	− 1·2	− 1·2
O	Bombay	Colába Observatory S.	W 6·5	W 3·7	W 3·8	,, 0·6	,, 3·8	,, 3·5	− 7·1	− 7·5	− 7·3	− 2·4	− 2·6	− 2·5
P	Deesa T.O.	Deesa T.O. s.	E 3·4	E 6·5	E 6·2	,, 12·9	,, 16·0	,, 15·8	− 9·5	− 9·5	− 9·6	− 4·3	− 4·3	− 4·3
Q	Mangalore	Mangalore S.	W 2·1	W 0·5	W 0·6	,, 17·5	,, 19·7	,, 19·7	−19·6	−20·2	−20·3	− 4·5	− 4·6	− 4·6
R	Bangalore	Bangalore Base-line S.W. End S.	E 2·6	E 2·6	E 2·6	,, 28·1	,, 28·1	,, 28·1	−25·5	−25·5	−25·5	− 5·9	− 5·9	− 5·9
S	Madras	St. Thomas's Mount Trestle S.	,, 6·8	,, 5·3	,, 5·3	,, 22·5	,, 20·4	,, 20·4	−15·7	−15·1	−15·1	− 3·6	− 3·5	− 3·5
T	Nagarkoil	Kudankulam Observatory ,,	,, 1·6	,, 2·7	,, 1·7	,, 61·3	,, 61·3	,, 61·3	−59·7	−59·6	−59·6	− 8·6	− 8·6	− 8·6

(16). We have now deduced the azimuthal errors of the triangulation at several points : our remaining tasks are :—

(i). to determine by interpolation the azimuthal errors of the triangulation at intermediate azimuth stations.

(ii). to correct the geodetic azimuths at these stations for the errors so determined.

(iii). to deduce finally the deflection of the plumb-line in the prime vertical from comparisons between the corrected geodetic and the observed azimuths.

In Table VII these last steps have been taken.

Notes.—T.O. denotes Telegraph Office. H.S. denotes Hill Station, principal. T.S. denotes Tower Station, principal. S. denotes Station, principal, in the plains. s. denotes station, secondary, in the plains.

TABLE VII.—*Final deduction of deflections of the plumb-line from azimuth observations, the geodetic azimuths being based on the observed azimuth at Kaliánpur and corrected for errors accumulated in the triangulation. The Spheroid of reference is that of Everest.*

Reference Letter or Number	Name of Azimuth Station		Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for: Walker's initial error (Table III)	Correction for: Accumulated error of Δn (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
						° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
A	Kaliánpur	H.S.	B. or T.S. 36″ B. 24″ No. 2	G. Everest and G.P.L. Conyngham	Dec. 1836 Jan. 1837 Jan. 1898	24 7	77 42	1765	190 27 5·10	+ 1·2	...	...	190 27 6·29	...	...
1	Losalli	S.	T.S. 36″	T. Renny	Jan. 1849	24 6	77 36	1749	149 5 50·5	+ 1·2	0·0	149 5 51·7	149 5 51·8	+ 0·1	W 0·2
2	Salot	H.S.	„	„	March „	24 15	77 17	1834	175 58 10·9	+ 1·2	− 0·1	175 58 12·0	175 58 10·2	− 1·8	E 4·0
3	Mátá-ká-húra	„	„	T. Renny and A. Strange	April „	24 14	76 39	1645	181 31 34·6	+ 1·2	− 0·2	181 31 35·6	181 31 34·7	− 0·9	„ 2·0
4	Gurária	„	„	A. Strange	Nov. „ Dec. „	24 26	76 7	1360	300 41 56·6	+ 1·2	− 0·3	300 41 57·5	300 41 56·5	− 1·0	„ 2·2
5	Rámpura	„	„	„	Nov. „	24 29	75 29	1920	260 5 35·5	+ 1·2	− 0 5	260 5 36·2	260 5 35·5	− 0 7	„ 1·5
6	Aramlia	S.	„	„	Feb. 1850	24 25	75 2	1532	244 38 59·5	+ 1·2	− 0·6	244 39 0·1	244 39 1·2	+ 1·1	W 2·4
7	Sánd	H.S.	„	„	„ „	24 43	74 35	1910	284 36 4·6	+ 1·2	− 0·7	284 36 5·1	284 36 7·5	+ 2·4	„ 5·2
8	Ṭiki	„	„	„	Jan. 1851	24 56	73 53	2369	106 4 24·2	+ 1·2	− 0·8	106 4 24·6	106 4 26·8	+ 2·2	„ 4 7
9	Kánnagar	„	„	„	Dec. 1850	24 58	73 21	3607	266 45 19·9	+ 1·2	− 0·9	266 45 20·2	266 45 15·8	− 4·4	E 9·5
10	Gúru Sikkar	„	„	„	Nov. „	24 39	72 49	5650	248 53 37·1	+ 1·2	− 1·1	248 53 37·2	248 53 38·1	+ 0·9	W 2·0
11	Birona	S.	„	A. Strange and C. Lane	Nov 1851	24 27	72 16	673	121 43 12·0	+ 1·2	− 1·2	121 43 12·0	121 43 10·4	− 1.6	E 3·5
12	Khankharia	„	„	A. Strange	Mar. „ Apr. „	24 37	71 56	362	182 0 16·4	+ 1·2	− 1·2	182 0 16·4	182 0 14·5	− 1·9	„ 4·1
13	Sarla	„	„	„	Nov. „	24 47	71 37	132	244 27 44·4	+ 1·2	− 1 3	244 27 44·3	244 27 47·3	+ 3·0	W 6 5
14	Didáwa	H.S.	„	„	Dec. „	24 51	71 21	212	72 32 15·3	+ 1·2	− 1·4	72 32 15·1	72 32 16·4	+ 1·3	„ 2·8
15	Virária	„	„	„	„ „	24 57	71 5	460	106 12 47·7	+ 1·2	− 1·4	106 12 47·5	106 12 49·5	+ 2·0	„ 4·3
16	Lúnki	„	„	„	„ „	24 58	70 42	588	255 8 59·7	+ 1·2	− 1·5	255 8 59·4	255 9 1·1	+ 1·7	„ 3·7
17	Rojhra	„	„	„	„ „	24 57	70 17	518	254 1 46·4	+ 1·2	− 1·6	254 1 46·0	254 1 46 5	+ 0·5	„ 1·1
18	Chánga	„	„	„	Jan. 1852	24 59	69 54	349	238 0 10·8	+ 1·2	− 1·6	238 0 10·4	238 0 7·1	− 3 3	E. 7·1
19	Mairáb-ka-Shahar	T.S.	„	„	„ „	24 50	69 23	44	181 11 36·4	+ 1·2	− 1·8	181 11 35·8	181 11 36·4	+ 0·6	W 1·3
20	Khori	„	•	C. Lane	Feb. „	25 1	69 6	63	247 8 34·7	+ 1·2	− 1·9	247 8 34·0	247 8 33·2	− 0·8	E 1·7
21	Alaṃkhán	„	„	A. Strange and J. F. Tennant	Dec. „	24 50	68 46	67	174 28 41·0	+ 1·2	− 1·9	174 28 40·3	174 28 43·0	+ 2·7	W 5·8
22	Chútli	„	„	J. F. Tennant	Jan. 1853	24 46	68 26	72	141 22 37·1	+ 1·2	− 2·0	141 22 36 3	141 22 39 8	+ 3·5	„ 7·6
23	Károthol	H.S.	„	A. Strange	Feb. „	24 54	67 56	260	121 36 57·5	+ 1 2	− 2·1	121 36 56·6	121 36 57·7	+ 1·1	„ 2·4
B	Karachi Observatory		.	J F. Tennant	Oct. 1855	24 50	67 4	35	221 39 10·9	+ 1·2	− 2·3	221 39 9 8	221 39 9·2	− 0 6	E. 1·3

Notes—H.S. denotes Hill Station, principal. S. denotes Station, principal, in the plains. T.S. denotes Tower Station, principal.

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station	Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for: Walker's initial error (Table III)	Correction for: Accumulated error of Δn (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
					° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
A	Kaliánpur H.S.	...	...	...	...	...	...	...	+ 1·2	...	...	...	...	...
24	Pahárgarh „	T.S. 36″	G. Everest and A. S. Waugh	Dec. 1836 Jan. 1837	24 56	77 44	1641	236 19 17·9	+ 1·2	0·0	236 19 19·1	236 19 19·8	+ 0·7	W 1·5
25	Kesri „	B. or T.S. 36″	G. Everest	Dec. 1836	25 47	77 43	1487	206 41 40·2	+ 1·2	0·0	206 41 41·4	206 41 38·5	− 2·9	E 6·0
26	Usira „	„	G. Everest and G. Logan	Feb. 1838	26 57	77 40	810	146 55 26·1	+ 1·2	0·0	146 55 27·3	146 55 26·9	− 0·4	„ 0·8
27	Noh T.S.	„	G. Everest	Apr. 1837	27 51	77 41	710	50 22 33·7	+ 1·2	− 0·1	50 22 34·8	50 22 36·2	+ 1·4	W 2·6
28	Datairi „	„	„	Jan. 1836	28 44	77 41	767	28 44 34·5	+ 1·2	− 0·1	28 44 35·6	28 44 34·0	− 1·6	E 2·9
29	Kaliána S.	„	„	Oct. 1836	29 31	77 42	828	164 18 47·3	+ 1·2	− 0·1	164 18 48·4	164 18 46·1	− 2·3	„ 4·1
30	Banog H.S.	„	„	Sept. 1836	30 29	78 3	7433	71 6 9·2	+ 1·2	− 0·1	71 6 10·3	71 5 54·7	− 15·6	„ 26·5
C	Dehra Dún Obsy. (old)	T.S. 24″ No. 2	J. Mulhearn	Mar. 1853 Apr. „	30 20	78 6	2289	165 11 10·7	+ 1·2	− 0·1	165 11 11·8	165 10 58·5	− 13·3	„ 22·7
B	Karachi Observatory	...	...	...	...	...	...	...	+ 1·2	− 2·3	...	...	...	...
1	Karachi Base-line S. End S.	T.S. 36″	A. Strange	Mar. 1853	24 53	67 12	69	205 23 31·6	+ 1·2	− 2·3	205 23 30·5	205 23 30·2	− 0·3	E 0·6
2	Yúsuf P.S.	W. 24″ No. 1	H. Keelan	Dec. 1858	27 51	68 29	215	195 51 18·5	+ 1·2	− 1·9	195 51 17·8	195 51 19·7	+ 1·9	W 3·6
3	Bhanar T.S.	„	„	Apr. 1859	28 9	69 20	256	197 50 2·6	+ 1·2	− 1·8	197 50 2·0	197 50 8·5	+ 6·5	„ 12·2
4	Miáni „	„	„	Dec. 1859	28 34	69 53	300	188 2 6·3	+ 1·2	− 1·7	188 2 5·8	188 2 16·3	+ 10·5	„ 19·3
5	Dájil P.S.	T.S. 36″	J. Herschel and H. R. Thuillier	Apr. 1860	29 33	70 25	412	239 25 54·6	+ 1·2	− 1·5	239 25 54·3	239 26 6·4	+ 12·1	„ 21·3
6	Dera Dín Panáh „	„	J. P. Basevi	„ 1859	30 34	70 59	490	209 21 8·7	+ 1·2	− 1·4	209 21 8·5	209 21 14·4	+ 5·9	„ 10·0
7	Jharkil T.S.	„	„	Dec. 1858 Jan. 1859	31 21	71 2	554	208 7 4·8	+ 1·2	− 1·2	208 7 4·8	208 7 8·9	+ 4·1	„ 6·7
8	Jáoli H.S.	W. 24″ No. 1	G. Logan	Dec. 1851	33 17	73 13	1918	214 27 23·1	+ 1·2	− 0·8	214 27 23·5	214 27 23·1	− 0·4	E 0·6
9	Medwáni „	„	„	Jan. 1853 Feb. „	31 18	76 14	1935	64 43 42·3	+ 1·2	− 0·3	64 43 43·2	64 43 36·2	− 7·0	„ 11·5
C	Dehra Dún Obsy. (old)	...	...	...	...	...	...	...	+ 1·2	− 0·1	...	...	...	...
B	Karachi Observatory	...	...	...	...	...	...	...	+ 1·2	− 2·3	...	...	...	...
10	Andar H.S.	T.S. 12″ No. 1	J. M. Burn	Dec. 1895	26 1	67 15	4047	181 7 4·1	+ 1·2	− 2·8	181 7 2·5	181 7 6·2	+ 3·7	W 7·6
11	Piaro „	12″	„	Nov. 1896	26 3	66 37	1438	159 22 15·2	+ 1·2	− 2·8	159 22 13·6	159 22 15·0	+ 1·4	„ 2·9
D	Quetta T.O. Station	T.S. 12″ No. 2	H. Wood	Apr. 1904	30 12	67 3	5500	166 31 17·0	+ 1·2	− 4·8	166 31 13·4	166 31 12·1	− 1·3	E 2·2
A_4	Gurária H.S.	...	...	...	...	...	...	...	+ 1·2	− 0·3	...	...	...	...
1	Kánkra „	W. 24″ No. 1	H. Keelan	Mar. 1862 Apr. „	25 38	76 10	1652	145 33 7·3	+ 1·2	− 0·3	145 33 8·2	145 33 8·4	+ 0·2	W 0·4
2	Bánskho „	„	„	Apr. 1861	26 50	76 11	1870	148 40 52·4	+ 1·2	− 0·3	148 40 53·3	148 40 55·3	+ 2·0	„ 4·0
3	Tásing „	„	„	Dec. 1860	27 53	76 15	2050	77 55 32·1	+ 1·2	− 0·3	77 55 33·0	77 55 36·2	+ 3·2	„ 6·0
4	Rákhi T.S.	„	„	„ 1856	29 17	76 9	785	208 30 56·1	+ 1·2	− 0·3	208 30 57·0	208 30 57·9	+ 0·9	„ 1·6
5	Kheri „	„	C. Lane	Jan. 1856 Feb. „	30 5	76 8	822	212 55 17·9	+ 1·2	− 0·3	212 55 18·8	212 55 16·3	− 2·5	E 4·3
6	Bowra „	„	G. Logan	Apr. 1853	30 21	76 9	855	208 37 13·1	+ 1·2	− 0·3	208 37 14·0	208 37 14·9	+ 0·9	W 1·5
B_3	Medwáni „	...	...	...	...	...	...	...	+ 1·2	− 0·3	...	...	...	...

Note.—P.S. denotes Platform Station.

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station	Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for Walker's initial error (Table III)	Correction for Accumulated error of an (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
					° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
A_6	Aramlia S.	...	...	...	...	...	...	...	+ 1·2	− 0 6	...	...	...	...
1	Rájgarh H.S.	W. 24″ No. 1	H. Keelan	Mar. 1863	26 18	74 38	2618	156 43 40·5	+ 1·2	− 0 6	156 43 41·1	156 43 40·7	− 0·4	E 0·8
2	Garinda S.	"	"	"	27 56	75 4	1204	115 55 42·9	+ 1·2	− 0·7	115 55 43·4	115 55 45·0	+ 1 6	W 3·0
3	Sirsa "	W. 24″ No. 2	G. Shelverton	Apr. 1861	29 32	75 4	738	17 10 58 8	+ 1·2	− 0·7	17 10 59·3	17 10 59·9	+ 0·6	" 1·1
4	Sangatpur T.S.	"	"	Mar. 1860 } Apr. " }	31 18	75 5	779	61 34 49·9	+ 1 2	− 0·7	61 34 50·4	61 34 52 5	+ 2·1	" 3·4
B_8	Jáoli H.S	...	...	...	...	...	...	...	+ 1·2	− 0 8	...	...	...	...
A_{10}	Gúru Sikkar H S.	...	...	...	...	...	...	...	+ 1·2	− 1·1	...	...	...	...
1	Thob "	B. 24″ No. 2	M. W. Rogers	Mar. 1873	26 3	72 25	856	322 26 21·4	+ 1 2	− 1·1	322 26 21·5	322 26 25·2	+ 3·7	W 7 6
2	Jambo "	"	J. Hill	Feb 1874 } Mar. " }	27 16	72 34	772	153 23 43·2	+ 1·2	− 1·0	153 23 43 4	153 23 42·6	− 0·8	E 1·6
3	Mugrala "	"	M W Rogers	Feb. 1875	28 31	72 25	517	171 53 33·0	+ 1·2	− 1·0	171 53 33 2	171 53 30·9	− 2 3	" 4·2
4	Ládimsir T.S	T S. 36″	J Herschel	Jan. 1862	29 22	72 2	468	195 0 23·1	+ 1·2	− 0 9	195 0 23 4	195 0 22·8	− 0·6	" 1·1
5	Mandresa "	"	"	Mar. 1862 } Apr. " }	29 55	73 2	512	298 34 6·7	+ 1·2	− 0·9	298 34 7 0	298 34 6 8	− 0·2	" 0·3
6	Jhambhera "	"	G. Shelverton	Dec 1862	30 6	73 52	630	185 27 30 8	+ 1·2	− 0·9	185 27 31 1	185 27 27·2	− 3·9	" 6 7
7	Akbar P.S.	B. 36″	J. F. Tennant	Jan 1857	30 54	73 20	641	216 51 26 3	+ 1·2	− 0·9	216 51 26 6	216 51 25·5	− 1·1	" 1·8
B_8	Jáoli H.S.	...	...	...	...	...	...	...	+ 1·2	− 0·8	...	...	...	...
A_{17}	Rojhra H S	...	...	...	...	...	...	...	+ 1·2	− 1·6	..	...	...	...
1	Malar "	B. 24″ No. 2	M. W Rogers	Jan. 1877	26 2	70 6	328	161 26 24 9	+ 1 2	− 1·4	161 26 24 7	161 26 22·1	− 2·6	E 5 3
2	Asu "	"	"	Feb. 1880	27 11	70 13	479	201 37 33·1	+ 1·2	− 1·2	201 37 33·1	201 37 32·3	− 0·8	" 1·6
3	Vijnot T S.	T S. 24″ No. 1	B. R Branfill	Dec. 1880 } Jan. 1881 }	28 2	69 53	276	159 35 11 3	+ 1·2	− 1·1	159 35 11·4	159 35 15 3	+ 3·9	W 7·3
4	Dáowála "	"	"	Feb 1881	28 20	69 53	282	28 49 22·6	+ 1. 2	− 1·1	28 49 22 7	28 49 27·6	+ 4·9	" 9·1
5	Paphra "	T.S. 36″	J. Herschel	Mar. 1861 } Apr. " }	23 6	70 52	341	273 22 57 9	+ 1·2	− 0 9	273 22 58 2	273 23 1·7	+ 3·5	" 6·3
A_{10} (4)	Ládimsir "	...	...	...	...	...	...	...	+ 1·2	− 0 9	...	...	...	...
A	Kaliánpur H S.	...	...	...	...	...	..	...	+ 1 2	0 0	...	...	...	...
31	Budhon "	T S. 36″	G Shelverton	Mar. 1861	24 5	78 34	1867	265 22 28 1	+ 1·2	− 0 5	265 22 28·8	265 22 27 8	− 1 0	E 2·2
32	Rangír (old) "	Cary's 18″ L	A S Waugh	Jan 1834	24 0	79 28	1180	106 1 25 0	+ 1 2	− 1·0	106 1 25 2	106 1 10 7	−14 5	" 32 6
33	Amúa "	T.S. 18″ No. 1	T Renny	"	24 0	80 32	2113	260 4 20 4	+ 1·2	− 1 6	260 4 20·0	260 4 21·1	+ 1·1	W 2·5
34	Karára "	"	R Shortrede	Apr. 1842	24 5	81 18	1966	269 18 36 7	+ 1·2	− 2 0	269 18 35 9	269 18 28·4	− 7 5	E 16·8
35	Gurwáni "	S M.M 18″	J. S Du' Vernet	Dec. 1845	24 1	82 20	2083	210 29 51·6	+ 1·2	− 2 6	210 29 50 2	210 29 53·5	+ 3·3	W 7 4
36	Gora "	H & B 15″	P. Garforth	"	24 5	83 17	1828	282 48 30·2	+ 1 2	− 3 1	282 48 28·3	282 48 23 6	− 4 7	E 10 5
37	Huríláong "	T S. 18″ No 1	J W. Armstrong	Dec. 1848 } Jan. 1849 }	24 2	84 24	1378	128 18 27·1	+ 1·2	− 3·7	128 18 24 6	128 18 18 0	− 6·6	" 14·8
38	Chendwár (old) "	T S 18″ No. 2	G Logan	Dec. 1843	23 57	85 29	2820	92 35 24 0	+ 1 2	− 4 3	92 35 20 9	92 35 20·0	− 0·9	" 2·0
39	Párasnáth "	B. 24″ No 1	J. O. Nicolson	Dec. 1850	23 58	86 11	4481	145 7 26 6	+ 1 2	− 4 7	145 7 23 1	145 7 20 7	− 2·4	" 5·4
40	Tilabani "	T.S 18″ No 2	C T Hill	Dec 1845	23 25	86 36	1329	272 58 27·0	+ 1 2	− 4 9	272 58 23 3	272 58 23·2	− 0·1	" 0·2
41	Malúncha "	Cary's 15″	T Renny	Apr. 1844	23 54	87 8	970	74 46 40 0	+ 1·2	− 5·2	74 46 36 0	74 46 32 0	− 4·0	" 9·0
42	Madhpur T S.	W. 24″ No. 1	H Keelan	Dec. 1868	23 10	87 47	180	206 49 10 4	+ 1 2	− 5 6	206 49 6 0	206 49 8·8	+ 2·8	W 6·6
43	Aknápur "	"	"	Mar. 1869	22 54	88 6	98	147 41 20 9	+ 1·2	− 5·7	147 41 16 4	147 41 14 2	− 2·2	E 5·2
E	Calcutta Base-line S. End "	T.S. 18″ No. 1	J. Peyton	Dec. 1844 } Jan 1845 }	22 37	88 25	13	177 10 36 2	+ 1·2	− 5 9	177 10 31·5	177 10 27·0	− 4·5	" 10·8

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station	Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for: Walker's initial error (Table III)	Correction for: Accumulated error of an (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
					° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
C	Dehra Dún Obsy. (old)	...	...	...	...	...	...	...	+ 1·2	− 0·1	...	...	...	...
1	Kaliánpur T.S.	T.S. 24″ No. 2	G. Logan	Mar. 1850 } Apr. " }	28 35	79 47	629	185 30 19·5	+ 1·2	− 2·2	185 30 18·5	185 30 18·1	− 0·4	E 0·7
2	Rámuápur (old) "	" 18″ "	C. Murphy	Dec. 1838	28 23	80 31	546	302 56 33·6	+ 1·2	− 2·8	302 56 32·0	302 56 33·4	+ 1·4	W 2·6
3	Mási "	" 24″ "	G. Logan	" 1849 } Jan. 1850 }	27 38	81 26	426	153 5 56·0	+ 1·2	− 3·7	153 5 53·5	153 5 50·2	− 3·3	E 6·3
4	Bansídíla "	Barrow's 36″	"	Apr. 1849	27 24	82 19	377	106 15 12·5	+ 1·2	− 4·5	106 15 9·2	106 15 8·4	− 0·8	" 1·5
F	Orejhár s.	T.S. 12″ No. 2	H. Wood	Jan. 1904	26 47	82 15	392	308 36 23·0	+ 1·2	− 5·1	308 36 19·1	308 36 18·9	− 0·2	" 0·4
F	Orejhár s.	...	...	...	...	...	...	...	+ 1·2	− 5·1	...	...	...	...
1	Naonangarhi "	B. 24″ No. 2	J. W. Armstrong	June 1852	26 59	84 26	344	107 52 50·1	+ 1·2	− 2·3	107 52 49·0	107 52 42·8	− 6·2	E 12·2
2	Chúni T.S.	T.S. 36″	R. Walker	Dec. 1846	26 11	87 5	197	185 49 48·1	+ 1·2	+ 1·0	185 49 50·3	185 49 39·1	− 11·2	" 22·7
3	Rámganj "	B. 24″ No. 2	J. O. Nicolson	" 1852 } Jan. 1853 }	26 19	88 20	249	218 52 6·1	+ 1·2	+ 2·6	218 52 9·9	218 51 55·9	− 14·0	" 28·3
G	Jalpaiguri s.	T.S. 12″ No. 2	H. Wood	" 1904	26 31	88 47	280	321 33 30·0	+ 1·2	+ 3·2	321 33 34·4	321 33 25·3	− 9·1	" 18·2
E	Calcutta Base-line S. End T.S.	...	...	...	...	...	...	...	+ 1·2	− 5·9	...	...	...	...
1	Anandbás "	T.S. 18″ No. 1	J. Peyton	Dec. 1845 } Jan. 1846 }	23 21	88 25	67	6 59 2·8	+ 1·2	− 4·3	6 58 59·7	6 58 54·9	− 4·8	E 11·1
2	Madhupur "	"	"	Dec. "	23 57	88 32	92	172 57 34·6	+ 1·2	− 2·8	172 57 33·0	172 57 25·2	− 7·8	" 17·6
G	Jalpaiguri s.	...	...	...	...	...	...	...	+ 1·2	+ 3·2	...	...	...	...
A_{31}	Budhon H.S.	...	...	...	...	...	...	...	+ 1·2	− 0·5	...	...	...	...
1	Gúrmi T.S.	T.S. 18″ No. 2	C. Murphy	Dec. 1842	26 36	78 33	575	155 50 9·2	+ 1·2	− 0·3	155 50 10·1	155 50 7·7	− 2·4	E 4·8
2	Sankráo "	"	T. Renny	Feb. 1843	28 2	78 35	670	185 44 19·2	+ 1·2	− 0·3	185 44 20·1	185 44 20·6	+ 0·5	W 0·9
3	Sirsa "	Cary's 15″	W. N. James	" "	28 55	78 55	739	149 55 21·0	+ 1·2	− 0·2	149 55 22·0	149 55 16·8	− 5·2	E 9·4
C	Dehra Dún Obsy. (old)	...	...	...	...	...	...	...	+ 1·2	− 0·1	...	...	...	...
A_{32}	Rangír (old) H.S.	...	...	...	...	...	...	...	+ 1·2	− 1·0	...	...	...	...
1	Muhammadabad T.S.	B. 15″	J. W. Armstrong	Dec. 1840	27 18	79 28	565	291 58 52·9	+ 1·2	− 1·9	291 58 52·2	291 59 0·6	+ 8·4	W 16·3
C_1	Kaliánpur "	...	...	...	...	...	...	...	+ 1·2	− 2·2	...	...	...	...
A_{33}	Amúa H.S.	...	...	...	...	...	...	...	+ 1·2	− 1·6	...	...	...	...
1	Nimkár T.S.	T.S. 18″ No. 1	T. Renny	Apr. 1838	27 21	80 32	486	178 58 23·0	+ 1·2	− 2·5	178 58 21·7	178 58 27·7	+ 6·0	W 11·6
C_2	Rámuápur (old) "	...	...	...	...	...	...	...	+ 1·2	− 2·8	...	...	...	...

Note.—s. denotes station, secondary, in the plains.

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station		Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for: Walker's initial error (Table III)	Correction for: Accumulated error of Δn (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
						° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
A_{34}	Karára	H.S.	...	...	...	...	...	...	...	+ 1·2	− 2·0	...	...	...	...
1	Pabhosa	„	H. & B. 15″	J. W. Armstrong	June 1845 / July „	25 21	81 22	565	187 38 7·1	+ 1·2	− 2·6	187 38 5·7	187 38 3·8	− 1·9	E 4·0
2	Sora	T.S.	S. M. M. 18″	A. S. Waugh	Oct. 1845	26 17	81 15	409	239 42 53·8	+ 1·2	− 3·1	239 42 56·9	239 43 3·3	+ 6·4	W 12·9
C_3	Mási	„	...	...	...	...	...	...	...	+ 1·2	− 3·7	...	...	...	...
A_{35}	Gurwáni	H.S.	...	...	...	...	...	...	...	+ 1·2	− 2·6	...	...	...	...
1	Marár	T.S.	S. M. M. 18″	J. S. Du' Vernet	Apr. 1846	25 41	82 17	371	42 20 16·8	+ 1·2	− 3·9	42 20 14·1	42 20 12·9	− 1·2	E 2·5
2	Bisaul	„	W. 24″ No. 1	„	Jan. 1847 / Feb. „	26 41	82 23	342	128 40 19·9	+ 1·2	− 5·0	128 40 16·1	128 40 15·6	− 0·5	„ 1·0
F	Orejhár	S.	...	...	...	...	...	...	...	+ 1·2	− 5·1	...	...	...	...
A_{36}	Gora	H.S.	...	...	...	...	...	...	...	+ 1·2	− 3·1	...	...	...	...
1	Hirdepur	T.S.	H. & B. 15″	P. Garforth	Mar. 1846 / Apr. „	25 24	83 17	289	304 4 36·8	+ 1·2	− 3·6	304 4 34·4	304 4 32·8	− 1·6	E 3·4
2	Samenda	„	„	„	Dec. 1846	26 0	83 16	285	304 8 52·1	+ 1·2	− 3·9	304 8 49·4	304 8 49·9	+ 0·5	W 1·0
3	Rájábári	„	„	„	Apr. 1847	26 54	83 18	296	104 47 13·8	+ 1·2	− 4·3	104 47 10·7	104 47 9·5	− 1·2	E 2·4
C_4	Bansídíla	„	...	...	...	...	...	...	...	+ 1·2	− 4·5	...	...	...	...
A_{37}	Hurīláong	H.S.	...	...	...	...	...	...	...	+ 1·2	− 3·7	...	...	...	...
1	Mednipur	T.S.	T.S. 18″ No. 2	J. W. Armstrong	Feb. 1850	25 5	84 25	335	215 46 36·4	+ 1·2	− 3·2	215 46 34·4	215 46 29·7	− 4·7	E 10·1
2	Jalálpur	„	B. 24″ No. 2	„	„ 1852	26 4	84 26	232	111 52 42·6	+ 1·2	− 2·8	111 52 41·0	111 52 41·2	+ 0·2	W 0·4
F_1	Naonangarhi	S.	...	...	...	...	...	...	...	+ 1·2	− 2·5	...	...	...	...
A_{38}	Chendwár (old)	H.S.	...	...	...	...	...	...	...	+ 1·2	− 4·3	...	...	...	...
1	Pota	T.S.	B. 36″	G. Logan	Apr. 1846	26 23	85 29	222	180 4 11·1	+ 1·2	− 2·7	180 4 9·6	180 4 4·7	− 4·9	E 9·9
F_1	Naonangarhi	S.	...	...	...	...	...	...	...	+ 1·2	− 2·3	...	...	...	...
A_{39}	Párasnáth	H.S.	...	...	...	...	...	...	...	+ 1·2	− 4·7	...	...	...	...
1	Bichwi	„	B. 24″ No. 1	J. O. Nicolson	Dec. 1851	25 10	86 11	321	357 49 35·6	+ 1·2	− 1·6	357 49 35·2	357 49 29·4	− 5·8	E 12·4
F_2	Chúni.	T.S.	...	...	...	...	...	...	...	+ 1·2	+ 1·0	...	...	...	...

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station		Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Geodetic Azimuth = G: Correction for: Walker's initial error (Table III)	Geodetic Azimuth = G: Correction for: Accumulated error of Δn (Table VI)	Geodetic Azimuth = G: Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
						° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
A_{41}	Malúncha	H.S.	...	...	...	...	...	...	...	+ 1·2	− 5·2	...	...	...	...
1	Sirkanda	T.S.	Cary's 15″	R. Walker	Apr. 1846	25 28	87 11	132	145 34 23·5	+ 1·2	− 1·0	145 34 23·7	145 34 16 9	− 6·8	E 14·3
F_2	Chúni	„	...	...	...	...	...	...	...	+ 1·2	+ 1·0	...	...	...	...
E	Calcutta Base-line S. End	T.S.	...	...	...	...	...	...	...	+ 1·2	− 5·9	...	...	...	...
3	Daulatpur	„	T.S. 24″ No. 2	H. R. Thuillier	Dec. 1868	23 9	89 45	60	202 38 55·6	+ 1·2	− 5·7	202 38 51·1	202 38 51·0	− 0·1	E 0·2
4	Gangapur	„	„	„	Apr. 1866	23 0	90 30	54	151 19 55·5	+ 1·2	− 5·7	151 19 51·0	151 19 48·6	− 2·4	„ 5·7
5	Lakhinagar	„	„	„	Dec. „	23 1	90 48	51	85 27 46·1	+ 1·1	− 5·6	85 27 41·6	85 27 44·4	+ 2·8	W 6·6
6	Semu Tán	H.S.	B. 24″ No. 1	C. Lane	Jan. 1865	22 49	91 50	226	272 21 2·5	+ 1·1	− 5·5	272 20 58·1	272 20 55·1	− 3·0	E 7·1
H	Nagarkhána	„	T.S. 12″ No. 2	H. M. Cowie	Feb. 1905	22 23	91 51	290	155 47 22·0	+ 1·1	− 5·4	155 47 17·7	155 47 13·3	− 4·4	„ 10·7
E_3	Daulatpur	T.S.	...	...	...	...	...	...	...	+ 1·2	− 5·7	...	...	...	...
1	Tepri	„	T.S. 24″ No. 2	H. R. Thuillier	Dec. 1869	23 57	89 55	67	156 35 59·9	+ 1·2	− 3·6	156 35 57·5	156 35 52·5	− 5·0	E 11·3
2	Aloákándi	„	„	T. T. Carter	Mar. 1873	24 45	89 41	88	205 17 30·7	+ 1·2	− 1·5	205 17 30 4	205 17 22·1	− 8·3	„ 18·0
3	Halkáchar	„	„	„	Apr. „	25 10	89 45	103	145 54 50·0	+ 1·2	− 0·4	145 54 50·8	145 54 37·7	−13·1	„ 27·9
4	Alangjáni	„	„	„	Feb. 1874	25 59	89 48	143	293 0 56·7	+ 1·2	+ 1·8	293 0 59·7	293 0 45·9	−13·8	„ 28·3
5	Ataro Bánki	„	B. 24″ No. 1	J. O. Nicolson	Dec. 1855 Jan. 1856	26 5	89 31	133	70 52 31·2	+ 1·2	+ 2·1	70 52 34·5	70 52 20·1	−14·4	„ 29·4
G	Jalpaiguri	s.	...	...	...	...	...	...	...	+ 1·2	+ 3·2	...	...	...	...
E_6	Semu Tán	H.S.	...	...	...	...	...	...	...	+ 1·1	− 5·5	...	...	...	...
1	Dawa	„	B. 24″ No. 1	C. Lane	Dec. 1863 Jan. 1864	23 45	91 23	205	173 18 58·3	+ 1·1	− 4·0	173 18 55·4	173 18 51·0	− 4·4	E 10·0
2	Rangsanobo	„	„	W. C. Rossenrode	Oct. 1861 Nov. „	25 15	91 46	4455	125 49 21·2	+ 1·2	− 1·7	125 49 20·7	125 49 11·6	− 9·1	„ 19·3
3	Raikusni	„	„	C. Lane	Nov. 1858	26 8	90 42	803	136 38 24·6	+ 1·2	+ 0·5	136 38 26·3	136 38 12·6	−13·7	„ 27·9
E_3 (4)	Alangjáni	T.S.	...	...	...	...	...	...	...	+ 1·2	+ 1·8	...	...	...	...
H	Nagarkhána	H.S.	...	...	...	...	...	...	...	+ 1·1	− 5·4	...	...	...	...
1	Fi Tán	„	B. 24″ No. 1	W. C. Rossenrode	Dec. 1865	21 49	92 11	563	256 23 33·4	+ 1·1	− 4·3	256 23 30·2	256 23 22·4	− 7·8	E 19·5
I	Dattaung	„	„	„	Nov. 1866 Dec. „	20 13	93 4	455	171 27 31·9	+ 1·0	− 0·8	171 27 32·1	171 27 28·3	− 3·8	„ 10·3
J	Kyaunggyi	s.	T.S. 12″ No. 2	H. Wood	Feb. 1904	18 49	95 15	...	109 26 48·1	+ 1·0	− 1·9	109 26 47·2	109 26 42·1	− 5·1	„ 14·9
K	Taungzun	H.S.	B. 24″ No. 2	G. Strahan	Mar. 1884	16 26	97 43	854	31 16 31·8	+ 1·0	− 9·1	31 16 23·7	31 16 18·6	− 5·1	„ 17·3
	Southern Moscos	„	W. 24″ No. 1	J. Hill	Dec. 1877	13 50	97 58	1186	162 21 4·7	+ 1·0	− 9·1	162 20 56·6	162 20 54·2	− 2·4	„ 9·7
	Mergui Base-line E. End	T.S.	T.S. 24″ No. 1	M. W. Rogers	Jan. 1882	12 22	98 49	20	72 29 58·5	+ 1·0	− 9·1	72 29 50·4	72 29 47·6	− 2·8	„ 12·8
	„ W. End	„	„	M. G. Talbot	„ „	12 22	98 46	18	252 29 25·0	+ 1·0	− 9·1	252 29 16·9	252 29 13·7	− 3·2	„ 14·6
	Natkalintaung	H.S.	„	B. R. Branfill and M. G. Talbot	Dec. 1881	12 26	98 46	888	127 46 46·8	+ 1·0	− 9·1	127 46 38·7	127 46 35·6	− 3·1	„ 14·1
	Minthantaung	„	„	„	„ „	12 20	98 50	1054	157 5 52·4	+ 1·0	− 9·1	157 5 44·3	157 5 40·6	− 3·7	„ 16·9

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station	Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for: Walker's initial error (Table III)	Correction for: Accumulated error of An (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot A
					° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
J	Kyaunggyi s.	...	...	...	..	..	..	.	+ 1·0	− 1·9	.	...	...	...
1	Myayabengkyo H.S.	T.S. 12″ A/1886	J. Eccles	Nov. 1889	18 22	93 25	1411	169 33 53·9	+ 1·0	− 1·9	169 33 53·0	169 33 42·1	−10·9	E 32·8
2	Tonngoo S.	„	„	Feb. 1890	18 56	96 28	186	30 46 52·2	+ 1·0	− 1·9	30 46 51·3	30 46 36·6	−14·7	„ 42·9
3	Letpataung H.S.	„	C. F. Close	„ 1891	19 34	96 31	3975	174 46 41·0	+ 1·0	− 1·9	174 46 40·1	174 46 24·2	−15·9	„ 44·7
4	Taungpila „	T.S. 12″ No. 1	„	Mar. „	20 42	95 56	1012	240 23 26·2	+ 1·1	− 1·8	240 23 25·5	240 23 15·2	−10·3	„ 27·3
5	Mingun „	T.S. 12″ No. 2	J. M. Burn	Feb. 1892 / Mar „	22 3	96 2	1343	174 24 12·6	+ 1·1	− 1·8	174 24 11·9	174 23 57·4	−14·5	„ 35·8
6	Sheinmaga „	T.S. 12″ No. 1	C. F. Close	Feb 1892	22 17	96 1	456	354 23 40·3	+ 1·1	− 1·8	354 23 39·6	354 23 23·5	−16·1	„ 39·3
7	Malè „	„	„	Mar. „	23 3	96 0	848	316 32 8·8	+ 1·1	− 1·8	316 32 8·1	316 31 54·1	−14·0	„ 32·9
8	Ubyètaung „	T.S. 12″ No. 2	A. J. Pilcher	Apr. 1894	23 41	96 0	2766	303 38 57·3	+ 1·1	− 1·8	303 38 56·6	303 38 45·4	−11·2	„ 25·5
9	Thonbinzin „	T.S. 12″ No. 1	J. M. Burn	Feb. „	24 11	96 1	1932	277 46 28·4	+ 1·1	− 1·8	277 46 27·7	277 46 12·8	−14·9	„ 33·1
10	Seikpa „	T.S. 12″ No. 2	A. J. Pilcher	Jan. 1895	24 36	95 48	3857	258 32 44·2	+ 1·1	− 1·8	258 32 43·5	258 32 24·8	−18·7	„ 40·8
11	Tamunja „	„	H. A. D. Fraser	Mar 1896	24 39	94 39	3387	116 36 33·7	+ 1·1	− 1·8	116 36 33·0	116 36 26·4	− 6·6	„ 14·4
12	Thyolching „	T.S. 12″ No. 3	„	Dec. 1898	25 0	94 46	6566	113 3 12·8	+ 1·2	− 1·7	113 3 12·3	113 3 3·6	− 8·7	„ 18·6
13	Loijing „	„	H. H. Turner	Feb. 1899 / Mar. „	24 41	93 46	6635	120 58 21·7	+ 1·2	− 1·7	120 58 21·2	120 58 11·7	− 9·5	„ 20·6
E_5 (2)	Rangsanobo „	...	...	..	...	...	..	...	+ 1·2	− 1·7	...	...	...	...
J_5	Ubyètaung H.S.	.	..	...	.	...	.	...	+ 1·1	− 1·8	...	...	..	...
	Sinpitaung „	T.S. 12″ No. 3	H. H. Turner	Jan. 1901	23 39	96 48	2649	162 2 33·0	+ 1·1	− 1·8	162 2 32·3	162 2 20·0	−12·3	E 28·3
	Lai Hpa-Lang „	T.S. 12″ No. 2	H. Wood	Jan 1903 / Feb. „	23 14	97 40	3591	158 35 56·6	+ 1·1	− 1·8	188 35 55·9	188 35 42·5	−13·4	„ 31·2
A	Kaliánpur H.S.	...	...	...	...	..	...	...	+ 1·2	0·0	...	...		...
44	Ahmadpur „	B. 36″	T. Renny	Dec 1838	23 36	77 13	1713	185 10 53·9	+ 1·2	− 0·1	185 10 55·0	185 10 54·7	− 0·3	E 0·7
45	Bhimbat „	„	„	„ „	22 50	77 40	2120	194 33 58·8	+ 1·2	− 0·2	194 33 59·8	194 34 0·4	+ 0·6	W 1·4
46	Nilgarh „	„	„	Feb. 1839	21 46	77 42	2533	321 4 44·5	+ 1·2	− 0·5	321 4 45·2	321 4 43·4	− 1·8	E 4·5
47	Badgáon „	T.S. 36″	A. S. Waugh	Jan „	20 44	77 39	1128	183 9 0·0	+ 1·2	− 0·7	183 9 0·5	183 9 0·6	+ 0·1	W 0·3
48	Sákri „	„	„	Dec 1838	20 0	77 45	1810	175 24 36·0	+ 1·2	− 0·8	175 24 36·4	175 24 37·4	+ 1·0	„ 2·8
49	Somtána „	„	„	Apr 1838 / Nov. „	19 5	77 42	1714	186 51 49·0	+ 1·2	− 1·0	186 51 49·2	186 51 46·6	− 2·6	E 7·5
50	Dámargida S.	„	„	Oct. 1838	18 3	77 43	1946	188 12 0·7	+ 1·2	− 1·2	188 12 0·7	188 11 58·8	− 1·9	„ 5·8
L	Bolarum P.W.D. Office s.	T.S. 12″ No. 2	H. Wood	Mar 1904	17 30	78 34	1971	25 57 36·9	+ 1·2	− 1·3	25 57 36·8	25 57 35·8	− 1·0	„ 3·2
L	Bolarum P.W.D. Office s.	...	..	..		.		...	+ 1·2	− 1·3		...	...	..
1	Pirmulo H.S.	T.S. 36″	G. Shelverton	Feb 1869	17 53	78 38	2003	105 0 50·2	+ 1·2	− 1·3	105 0 50·1	105 0 47·7	− 2·4	E 7·4
2	Vánákonda „	„	„	Feb 1869 / Mar „	17 36	79 25	1664	180 4 16·5	+ 1·2	− 1·4	180 4 16·3	180 4 14·2	− 2·1	„ 6·6
3	Singáwáram „	„	„	Feb 1871	17 45	80 59	714	249 3 7·8	+ 1·2	− 1·5	249 3 7·5	249 3 4·6	− 2·9	„ 9·0
4	Kaungkonda „	„	W. C. Rossenrode	Jan 1872	17 50	82 21	4034	189 41 26·1	+ 1·2	− 1·5	189 41 25·8	189 41 24·7	− 1·1	„ 3·4
5	Sánjib „	B. 24″ No. 2	J. P. Basevi	Dec 1870	17 31	82 44	2142	135 38 17·3	+ 1·2	− 1·6	135 38 16·9	135 38 15·7	− 1·2	„ 3·8
M	Vizagapatam Base-line N. End S	T.S. 24″ No. 1	B. R. Branfill	Jan 1863 / Feb. „	18 1	83 16	181	203 44 25·9	+ 1·2	− 1·6	203 44 25·5	203 44 24·0	− 1·5	„ 4·6

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station	Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for Walker's initial error (Table III)	Correction for Accumulated error of Δn (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
					° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
E	Calcutta Base-line S. End T.S.	...	...	...	...	...	...	...	+ 1·2	− 5·9	...	...	...	...
7	Patna „	T.S. 24″ No. 1	J. Peyton	Apr. 1852	21 47	87 14	80	207 39 3·1	+ 1·2	− 5·0	207 38 59·3	207 38 55·7	− 3·6	E 9·0
8	Chandípur „	„	„	Dec. 1854	21 27	87 5	51	96 49 59·4	+ 1·2	− 4·9	96 49 55·7	96 49 54·4	− 1·3	„ 3·3
9	Cuttack H.S.	„	„	Oct. „	20 29	85 54	132	155 35 57·7	+ 1·2	− 3·8	155 35 55·1	155 35 54·3	− 0·8	„ 2·1
10	Khundábolo „	„	A. Strange	Jan. 1857	19 51	85 1	3115	196 41 25·9	+ 1·2	− 3·1	196 41 24·0	196 41 20·9	− 3·1	„ 8·6
11	Ráwal „	B. 24″ No. 2	„	Dec. 1859 } Jan. 1860 }	18 32	83 36	874	317 29 6 8	+ 1·2	− 2·0	317 29 6·0	317 29 4·7	− 1·3	„ 3·9
M	Vizagapatam Base-line N. End S.	...	...	...	...	...	...	...	+ 1·2	− 1·6	...	...	...	...
N	Karaundi H.S.	T.S. 36″	G. Shelverton	Jan. 1865 } Feb. „ }	23 11	80 2	1625	206 22 39·6	+ 1·2	− 1·2	206 22 39·6	206 22 35·6	− 4·0	E 9·4
1	Sarandi Pat „	„	„	Mar. 1865 } Apr. „ }	22 13	80 6	1627	159 45 21·7	+ 1·2	− 1·2	159 45 21·7	159 45 20·5	− 1·2	„ 2·9
2	Bhímsain „	„	„	Dec. 1866	20 58	79 49	1490	297 55 3·5	+ 1·2	− 1·2	297 55 3·5	297 55 2·5	− 1·0	„ 2·6
3	Díwai „	„	„	Jan. 1867	19 50	79 35	967	154 17 56·3	+ 1·2	− 1·3	154 17 56·2	154 17 53·9	− 2·3	„ 6·4
4	Burgpaili „	„	„	Feb. „	18 54	79 44	983	142 8 9·9	+ 1·2	− 1·3	142 8 9·8	142 8 7·2	− 2·6	„ 7·6
L	Bolarum P.W.D. Office s.	...	...	...	...	...	...	...	+ 1·2	− 1·3	...	...	...	...
A_{34}	Karára H.S.	...	...	...	...	...	...	...	+ 1·2	− 2·0	...	...	...	...
1	Patháídi T.S.	W. 24″ No. 1	H. Keelan	Dec. 1871	21 49	82 19	879	198 23 45·0	+ 1·2	− 1·8	198 23 44·4	198 23 42·5	− 1·9	E 4·8
2	Ramai H.S.	„	„	„ 1872	20 57	82 11	1313	223 15 25·4	+ 1·2	− 1·8	223 15 24·8	223 15 22·9	− 1·9	„ 5·0
3	Karía „	T.S. 36″	W. C. Rossenrode	Jan. 1873	19 12	82 10	2014	201 43 19·4	+ 1·2	− 1·7	201 43 18·9	201 43 17·1	− 1·8	„ 5·2
L_5	Sánjib „	...	...	...	...	...	...	...	+ 1·2	− 1·6	...	...	...	...
A_{49}	Tilabani H.S.	...	...	...	...	...	...	...	+ 1·2	− 4·9	...	...	...	...
1	Kalsíbhánga T.S.	T.S. 24″ No. 1	R. Clarkson	Dec. 1849	22 20	87 11	303	115 7 22·1	+ 1·2	− 5·0	115 7 18·3	115 7 19·9	+ 1·6	W 3·9
E_7	Patna „	...	...	...	...	...	...	...	+ 1·2	− 5·0	...	...	...	...
L	Bolarum P.W.D. Office s.	...	...	...	...	...	...	...	+ 1·2	− 1·3	...	...	...	...
6	Achola H.S.	D. 15″	W. S. Jacob	Dec. 1840	18 15	77 2	2274	272 47 59·9	+ 1·2	− 1·6	272 47 59·5	272 47 57·1	− 2·4	E 7·3
7	Nitali „	„	„	Nov. „	18 17	76 19	2289	239 23 7·3	+ 1·2	− 1·7	239 23 6·8	239 23 1·0	− 5·8	„ 17·6
8	Kanheri „	„	„	Dec. 1837	18 30	75 46	2610	311 59 55·0	+ 1·2	− 1·8	311 59 54·4	311 59 50·3	− 4·1	„ 12·3
9	Alsunda „	B. 24″ No. 2	C. T. Haig	Mar. 1863	18 27	75 3	2163	227 32 3·5	+ 1·2	− 2·0	227 32 2·7	227 31 58·1	− 4·6	„ 13·8
10	Khánpisura „	D. 15″	H. Rivers	Oct. 1846	18 46	74 49	2751	191 14 45·7	+ 1·2	− 2·0	191 14 44·9	191 14 39·0	− 5·9	„ 17·3
11	Dhauleshvar „	„	W. S. Jacob	Apr. 1838	18 26	74 12	2939	198 21 26·3	+ 1·2	− 2·1	198 21 25·4	198 21 22·3	− 3·1	„ 9·3
12	Mándvi „	„	„	Mar. 1841	18 38	73 35	4121	271 15 9·9	+ 1·2	− 2·3	271 15 8 8	271 15 3·6	− 5·2	„ 15·4
13	Karanja „	„	Shortrede	„ 1839	18 51	72 59	997	173 9 58·2	+ 1·2	− 2·4	173 9 57·0	173 10 2·2	+ 5·2	W 15·2
O	Colába Observatory S.	„	„	Apr. „	18 54	72 51	63	288 5 26·7	+ 1·2	− 2·4	288 5 25·5	288 5 28·0	+ 2·5	„ 7·3

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station	Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for: Walker's initial error (Table III)	Correction for: Accumulated error of Δn (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
					° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
P	Deesa T.O. s.	T.S. 12″ No. 2	H. Wood	Mar. 1904	24 16	72 14	443	241 16 19·9	+ 1·2	− 4·3	241 16 16·8	241 16 15·3	− 1·5	E 3·3
1	Sanoda T.S.	„ 18″ „	H. Rivers	Dec. 1851	23 7	72 48	250	334 35 14·0	+ 1·2	− 3·9	334 35 11·3	334 35 17·8	+ 6·5	W 15·2
2	Patángri H.S.	„ 18″ „	C. T. Haig	„ 1861	22 52	73 56	922	16 47 29·9	+ 1·2	− 3·8	16 47 27·3	16 47 30·6	+ 3·3	„ 7·8
3	Sáler „	Dollond's 15″	H. Rivers	Mar. 1845	20 43	73 59	5140	151 26 53·1	+ 1·2	− 3·0	151 26 51·3	151 26 55·4	+ 4·1	„ 10·8
4	Párnera „	„	„	Feb. 1843	20 33	72 59	614	349 0 16·2	+ 1·2	− 3·0	349 0 14·4	349 0 27·0	+ 12·6	„ 33·6
5	Kalsubai „	„	„	Dec. 1842	19 36	73 45	5400	73 2 14·2	+ 1·2	− 2·6	73 2 12·8	73 2 14·2	+ 1·4	„ 3·9
O	Colába Observatory S.	...	...	...	...	...	...	...	+ 1·2	− 2·4	...	...	...	...
B	Karachi Observatory	...	...	...	...	...	...	...	+ 1·2	− 2·3	...	...	...	...
12	Háthria H.S.	T.S. 18″ No. 2	D. J. Nasmyth	Oct. 1856	23 27	69 5	696	154 56 37·7	+ 1·2	− 2·9	154 56 36·0	154 56 32·6	− 3·4	E 7·9
13	Dungarpur „	„	„	Dec. 1852	22 48	71 2	404	199 56 36·2	+ 1·2	− 3·4	199 56 34·0	199 56 38·4	+ 4·4	W 10·5
14	Ingrori T.S.	„	H. Rivers	Apr. „	22 57	71 51	152	198 26 43·0	+ 1·2	− 3·7	198 26 40·5	198 26 44·2	+ 3·7	„ 8·7
P_1	Sanoda „	...	...	...	...	...	...	...	+ 1·2	− 3·9	...	...	...	...
B_{13}	Dungarpur H.S.	...	...	...	...	...	...	...	+ 1·2	− 3·4	...	...	...	...
	Konkáwáo T.S.	T.S. 18″ No. 2	D. J. Nasmyth	Oct. 1853	21 39	70 59	622	161 59 38·9	+ 1·2	− 3·4	161 59 36·7	161 59 39·7	+ 3·0	W 7·6
A_4	Aramlia S.	...	...	...	...	...	...	...	+ 1·2	− 0·6	...	...	...	...
5	Indráwan T.S.	D. 15″	H. Rivers	Mar. 1847, Apr. „	22 49	75 13	1834	273 34 2·9	+ 1·2	− 1·0	273 34 3·1	273 34 2·4	− 0·7	E 1·7
6	Valvádi H.S.	„	„	Dec. 1846	20 44	75 14	1125	166 52 1·2	+ 1·2	− 1·5	166 52 0·9	166 52 5·9	+ 5·0	W 13·2
L_{10}	Khánpisura „	...	...	...	...	...	...	...	+ 1·2	− 2·0	...	...	...	...
L	Bolarum P.W.D. Office s.	...	...	...	...	...	...	...	+ 1·2	− 1·3	...	...	...	...
14	Kodangal „	B. 24″ No. 2	M. W. Rogers	Jan. 1872	17 8	77 41	1906	62 29 20·0	+ 1·2	− 1·7	62 29 19·5	62 29 16·0	− 3·5	E 11·3
15	Darúr H.S.	„	„	Mar. 1871	16 14	77 42	1796	132 36 1·9	+ 1·2	− 2·6	132 36 0·5	132 35 56·9	− 3·6	„ 12·3
R	Bangalore Base-line S.W. End S.	„	„	May 1870	13 1	77 37	3126	224 31 27·0	+ 1·2	− 5·9	224 31 22·3	224 31 21·4	− 0·9	„ 3·9
Q	Mangalore S.	B. 24″ No. 1	B. R. Branfill	Mar. 1873	12 52	74 53	185	205 52 53·6	+ 1·2	− 4·5	205 52 50·3	205 52 50·5	+ 0·2	W 0·9
1	Nughallibětta H.S.	T.S. 24″ „	„	Nov. 1871	13 2	76 31	3140	54 31 46·4	+ 1·2	− 5·3	54 31 42·3	54 31 38·8	− 3·5	E 15·1
R	Bangalore Base-line S.W. End S.	...	...	...	...	...	...	...	+ 1·2	− 5·9	...	...	...	...
R	Bangalore Base-line S.W. End S.	...	...	...	...	...	...	...	+ 1·2	− 5·9	...	...	...	...
1	Anandalamalai H.S.	T.S. 24″ No. 1	B. R. Branfill	Jan. 1866	12 56	79 26	923	171 57 41·5	+ 1·2	− 4·3	171 57 38·4	171 57 36·0	− 2·4	E 10·4
2	Injambákam „	„	„	Feb. 1880	12 55	80 18	29	99 4 43·9	+ 1·2	− 3·5	99 4 41·6	99 4 38·8	− 2·8	„ 12·2
3	St. Thomas's Mount Trestle S.	„	„	„ „	13 0	80 14	250	12 30 9·3	+ 1·2	− 3·6	12 30 6·9	12 30 4·5	− 2·4	„ 10·4

TABLE VII.—(Continued).

Reference Letter or Number	Name of Azimuth Station	Instrument used	Observer	Date of Observation	Latitude N.	Longitude E.	Height in feet above Sea-level	Geodetic Azimuth = G: Walker's Value	Correction for: Walker's initial error (Table III)	Correction for: Accumulated error of Δ*n* (Table VI)	Corrected Value	Observed Azimuth = A	Difference of Observed and Geodetic Azimuths = (A − G)	Deflection of the plumb-line in the prime vertical = (A − G) cot λ
					° ′	° ′		° ′ ″	″	″	° ′ ″	° ′ ″	″	″
S	St. Thomas's Mount Trestle S.	...	...	...	...	...	...	...	+ 1·2	− 3·6	...	...	...	...
1	Kistama H.S.	T.S. 24″ No. 1	B. R. Branfill	Dec. 1864	14 27	79 48	458	80 1 58·3	+ 1·2	− 3·2	80 1 56·3	80 1 53·8	− 2·5	E 9·7
2	Dánapa ,,	,,	,,	,, 1863	15 56	79 59	1010	265 47 41·8	+ 1·2	− 2·7	265 47 40·3	265 47 35·7	− 4·6	,, 16·1
3	Dhúlipalla S.	T.S. 36″	G. Shelverton	Apr. 1868 / May ,,	16 26	80 8	244	125 53 42·2	+ 1·2	− 2·6	125 53 40·8	125 53 37·3	− 3·5	,, 11·9
4	Parampúdi H.S.	T.S. 24″ No. 1	J. P. Basevi	Dec. 1861	17 13	81 15	685	114 12 15·1	+ 1·2	− 2·2	114 12 14·1	114 12 3·9	− 5·2	,, 16·8
M	Vizágapatam Base-line N. End	...	...	...	...	...	...	...	+ 1·2	− 1·6	...	...	...	...
O	Colába Observatory S.	...	...	...	...	...	...	...	+ 1·2	− 2·4	...	...	...	...
1	Páchvad H.S.	B. 24″ No. 2	C. T. Haig	Mar. 1865	17 31	74 42	3138	331 12 32·3	+ 1·2	− 2·9	331 12 30·6	331 12 27·1	− 3·5	E 11·1
2	Karabgati ,,	,,	,,	Dec. ,,	16 8	74 50	2544	179 9 29·9	+ 1·2	− 3·4	179 9 27·7	179 9 24·6	− 3·1	,, 10·7
3	Koramúr ,,	T.S. 24″ No. 1	J. B. McCullagh	Mar. 1873	14 8	75 1	2525	235 28 13·3	+ 1·2	− 4·1	235 28 10·4	235 28 6·5	− 3·9	,, 15·5
Q	Mangalore S.	...	...	...	...	...	...	...	+ 1·2	− 4·5	...	...	...	...
O	Colába Observatory S.	...	...	...	...	...	...	...	+ 1·2	− 2·4	...	...	...	...
4	Mirya H.S.	D. 15″	H. Rivers	Oct. 1844	17 2	73 18	473	167 2 9·9	+ 1·2	− 2·7	167 2 8·4	167 2 11·1	+ 2·7	W 8·8
5	Chaukola ,,	,,	,,	Dec. 1843	15 56	74 2	2794	166 14 15·8	+ 1·2	− 3·0	166 14 14·0	166 14 13·1	− 0·9	E 3·2
6	Kumbhári ,,	,,	,,	Jan. 1844	15 9	74 20	2898	154 15 36·1	+ 1·2	− 3·2	154 15 34 1	154 15 36·2	+ 2·1	W 7·7
O_2	Karabgati ,,	...	...	...	...	...	...	...	+ 1·2	− 3·4	...	...	...	...
R	Bangalore Base-line S.W. End S.	...	...	...	...	...	...	...	+ 1·2	− 5·9	...	...	...	...
3	,, Base-line N.E. End ,,	B. 24″ No. 2	M. W. Rogers	May 1870	13 5	77 42	3016	44 32 24·8	+ 1·2	− 5 9	44 32 20·1	44 32 19·4	− 0·7	E 3·0
4	Kanjamalai H.S.	T.S. 24″ No. 1	B. R. Branfill	Nov. 1869 / Dec. ,,	11 37	78 6	3236	38 12 6·4	+ 1·2	− 6·6	38 12 1·0	38 11 58·8	− 2·2	,, 10·7
5	Pachapálaiyam Station	,,	,,	Feb. 1870	11 0	77 40	970	167 34 7·9	+ 1·2	− 7·0	167 34 2·1	167 34 2·1	0·0	0·0
6	Kutipárai S.	,,	,,	Dec. 1873	9 29	78 3	351	25 17 14·0	+ 1·1	− 7·9	25 17 7·2	25 17 5·9	− 1·3	,, 7·8
7	Rádhápúram ,,	,,	,,	Mar. 1869	8 17	77 45	170	5 55 31·9	+ 1·1	− 8·5	5 55 24·5	5 55 25·1	+ 0·6	W 4·1
T	Kudankulam Observatory ,,	B. 24″ No. 2	M. W. Rogers	,, ,,	8 10	77 44	177	185 55 26·5	+ 1·1	− 8·6	185 55 19·0	185 55 18·1	− 0·9	E 6·3
S	St. Thomas's Mount Trestle S.	...	...	...	...	...	...	...	+ 1·2	− 3·6	...	...	...	...
5	Kallápat Trestle ,,	T.S. 24″ No. 1	B. R. Branfill	Mar. 1879	11 57	79 36	199	214 44 23·9	+ 1·2	− 4·8	214 44 20·3	214 44 18·7	− 1·6	E 7·6
6	Nayinipiriyán Trestle ,,	,,	,,	Jan. ,,	11 8	79 23	158	152 57 1·9	+ 1·2	− 5·4	152 56 57·7	152 56 59·8	+ 2·1	W 10·7
7	Patharankota ,, ,,	,,	T. T. Carter	Mar. 1877	10 28	79 15	120	179 40 48·0	+ 1·2	− 6·0	179 40 43·2	179 40 40·3	− 2·9	E 15·7
8	Manĕgandi ,, ,,	,,	B. R. Branfill	Feb. 1876	9 46	78 58	56	178 0 56·3	+ 1·1	− 6·7	178 0 50·7	178 0 46·9	− 3·8	,, 22·1
9	Ramnad ,,	,,	G. Belcham	Mar. 1875	9 22	78 52	48	57 58 2·6	+ 1·1	− 7·1	57 57 56·6	57 57 54·6	− 2·0	,, 12·1
T	Kudankulam Observatory ,,	...	...	...	...	...	...	...	+ 1·1	− 8·6	...	...	...	...

APPENDIX.

No. 6.

A CATALOGUE OF THE PUBLICATIONS OF THE GREAT TRIGONOMETRICAL SURVEY OF INDIA.

*An Account of the Measurement of an Arc of the Meridian between the parallels of 18° 3′ and 24° 7′, being a continuation of the Grand Meridional Arc of India, as detailed by the late Lieut.-Colonel Lambton, in the Volumes of the Asiatic Society of Calcutta. London, 1830.**

*An Account of the Measurement of two Sections of the Meridional Arc of India, bounded by the parallels of 18° 3′ 15″; 24° 7′ 11″; and 29° 30′ 48″. London, 1847.**

Account of the Operations of the Great Trigonometrical Survey of India:

*Vol. I. The Standards of Measure and the Base-Lines, also an Introductory Account of the early Operations of the Survey during the period 1800-1830. Dehra Doon, 1870.**

Appendix No. 1. Description of the method of comparing, and the apparatus employed.

Appendix No. 2. Comparisons of the Lengths of 10-feet Standards A and B, and determinations of the Difference of their Expansions.

Appendix No. 3. Comparisons between the 10-feet Standards I_B I_S and A.

Appendix No. 4. Comparisons of the 6-inch Brass Scales of the Compensated Microscopes.

Appendix No. 5. Determination of the Length of the Inch [7.8] on Cary's 3-foot Brass Scale.

Appendix No. 6. Comparisons between the 10-feet Standard Bars I_S and A for determining the Expansion of bar A.

Appendix No. 7. Final determination of the Differences in Length between the 10-feet Standards I_B I_S and A.

Appendix No. 8. On the Thermometers employed with the Standards of Length.

Appendix No. 9. Determination of the Lengths of the Sub-divisions of the Inch [a. b].

Appendix No. 10. Report on the Practical Errors of the Measurement of the Cape Comorin Base.

*Vol. II. History and General Description of the Principal Triangulation and of its Reduction. Dehra Dún, 1879.**

Appendix No. 1. Investigations applying to the Indian Geodesy.

Appendix No. 2. The Micrometer Microscope Theodolites.

Appendix No. 3. On Observations of Terrestrial Refraction at certain stations situated on the plains of the Panjab.

Appendix No. 4. On the Periodic Errors of Graduated Circles, &c.

Appendix No. 5. On certain Modifications of Colonel Everest's System of Observing introduced to meet the specialities of particular instruments.

Appendix No. 6. On Tidal Observations at Kurrachee in 1855.

Appendix No. 7. An alternative Method of obtaining the Formulæ in Chapters VIII and XV employed in the Reduction of Triangulation.—Additional Formulæ and Demonstrations.

Appendix No. 8. On the Dispersion of Circuit Errors of Triangulation after the Angles have been corrected for Figural Conditions.

Appendix No. 9. Corrections to Azimuthal Observations for imperfect Instrumental Adjustments.

Appendix No. 10. Reduction of the N. W. Quadrilateral—the Non-Circuit Triangles and their Final Figural Adjustments.

Appendix No. 11. The Theoretical Errors of the Triangulation of the North-West Quadrilateral.

Appendix No. 12. Simultaneous Reduction of the N. W. Quadrilateral—the Computations.

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* Out of print.

Vol. III. *The Principal Triangulation—the Base-Line Figures, the Karáchi Longitudinal, N. W. Himalaya, and Great Indus Series of the North-West Quadrilateral. Dehra Doon, 1873.**

Vol. IV. *The Principal Triangulation—the Great Arc (Section 24°-30°), Rahún, Gurhágarh and Jogí-Tíla Meridional Series and the Sutlej Series of the North-West Quadrilateral. Dehra Dún, 1876.*

Vol. IVA. *General Description of the Principal Triangulation of the Jodhpore and the Eastern Sind Meridional Series of the North-West Quadrilateral, with the Details of their Reduction and the Final Results. Dehra Dún, 1886.*

Vol. V. *Details of the Pendulum Operations and of their Reduction. Dehra Dún and Calcutta, 1879.*

Appendix No. 1. Account of the Remeasurement of the Length of Kater's Pendulum at the Ordnance Survey Office, Southampton.

Appendix No. 2. On the Relation between the Indian Pendulum Operations, and those which have been conducted elsewhere.

1. General Considerations on Pendulum Operations.
2. General Considerations on the Reduction of Pendulum Observations.
3. On a proposed Method of treatment of the Results of Pendulum Operations, with a view to facilitating the Solution of the General Problem of Local Variation.
4. Sketch of the Method of Solution from the Data as proposed in foregoing Sections.
5. Notes for a History of the Use of Invariable Pendulums.
6. On the Estimation of the Provisional Equatorial Numbers of different Pendulums.
7. Account and Explanation of the Table of Provisional Equatorial Vibration-numbers of Invariable Pendulums.
8. General Synopsis of Determinations.

Appendix No. 3. On the Theory, Use and History of the Convertible Pendulum.

1. The Convertible Pendulum as used by Kater.
2. The Theory of the Convertible Pendulum.
3. Application of the Theory in the case of Kater's and Sabine's Experiments.
4. Application of the Theory to the use of the Reversible Pendulum.
5. On the Constancy or otherwise of the Difference *A*—*B*.
6. Relation of the Subject to the Use of Invariable Pendulums.

Appendix No. 4. On the Length of the Seconds Pendulum determinable from Materials now existing.

1. Review of the Operations with Kater's Convertible Pendulum.
2. Final Comparison of Experiments with Kater's Convertible Pendulum.
3. Other Values of the Length of the Seconds Pendulum.

Appendix No. 5. A Bibliographical List of Works relating to Pendulum Operations in connection with the Problem of the Figure of the Earth.

Vol. VI. *The Principal Tringulation of the South-East Quadrilateral, including the Great Arc—Section 18° to 24°, the East Coast Series, the Calcutta and the Bider Longitudinal Series, the Jabalpur and the Biláspur Meridional Series, and the Details of their Simultaneous Reduction. Dehra Dún, 1880.**

* Out of print.

Vol. VII. *General Description of the Principal Triangulation of the North-East Quadrilateral, including the Simultaneous Reduction and the Details of five of the component Series, the North-East Longitudinal, the Budhon Meridional, the Rangír Meridional, the Amua Meridional, and the Karára Meridional. Dehra Dún, 1882.*

Appendix No. 1. The Details of the Separate Reduction of the Budhon Meridional Series, or Series J of the North-East Quadrilateral.

Appendix No. 2. Reduction of the North-East Quadrilateral. The Non-circuit Triangles and their Final Figural Adjustments.

Appendix No. 3. On the Theoretical Errors Generated Respectively in Side, Azimuth, Latitude and Longitude in a Chain of Triangles.

Appendix No. 4. On the Dispersion of the Residual Errors of a Simultaneous Reduction of Several Chains of Triangles.

Vol. VIII. *Details of the Principal Triangulation of eleven of the component Series of the North-East Quadrilateral, including the following Series; the Gurwáni Meridional, the Gora Meridional, the Huriláong Meridional, the Chendwár Meridional, the North Parasnáth Meridional, the North Malúncha Meridional, the Calcutta Meridional, the East Calcutta Longitudinal, the Brahmaputra Meridional, the Eastern Frontier—Section 23° to 26°, and the Assam Longitudinal. Dehra Dún, 1882.*

Vol. IX. *Electro-Telegraphic Longitude Operations executed during the years 1875-77 and 1880-81. Dehra Dún, 1883.*

Appendix to Part I. 1. Determination of the Geodetic Elements of Longitude Stations.

2. Descriptions of Points used for Longitude Stations.

3. Comparison of Geodetic with Electro-Telegraphic Arcs of Longitude.

4. Circuit Errors of Observed Arcs of Longitude.

5. Results of Idiometer Observations made during Season 1880-81.

Appendix to Part II. 1. Situations of the Longitude Stations at Bombay, Aden and Suez.

2. Survey Operations at Aden.

3. Results of the Triangulation.

4. Right Ascensions of Clock Stars.

Vol. X. *Electro-Telegraphic Longitude Operations executed during the years 1881-82, 1882-83 and 1883-84. Dehra Dún, 1887.*

Appendix to Part I. 1. Determination of the Geodetic Elements of the Longitude Stations.

2. Descriptions of Stations of the Connecting Triangulation and of those at which the Longitude Observations were taken.

3. On the Errors in ΔL caused by Armature-time and the Retardation of the Electric Current.

4. On the Rejection of some doubtful Arcs of Season 1881-82.

5. On the probable Causes of the Errors of Arc-measurements, and on the Nature of the Defects in the Transit Instruments which might produce them.

Vol. XI. *Astronomical Observations for Latitude made during the period 1805 to 1885, with a General Description of the Operations and Final Results. Dehra Dún, 1890.*

Vol. XII. *General Description of the Principal Triangulation of the Southern Trigon, including the Simultaneous Reduction, and the Details of two of the component Series, the Great Arc Meridional—Section 8° to 18°, and the Bombay Longitudinal. Dehra Dún, 1890.*

Vol. XIII. *Details of the Principal Triangulation of five of the component Series of the Southern Trigon, including the following Series; the South Konkan Coast, the Mangalore Meridional, the Madras Meridional and Coast, the South-East Coast, and the Madras Longitudinal. Dehra Dún, 1890.*

Vol. XIV. *General Description of the Principal Triangulation of the South-West Quadrilateral, including the Simultaneous Reduction and the Details of its component Series. Dehra Dún, 1890.*

Vol. XV. Electro-Telegraphic Longitude Operations executed during the years 1885-86, 1887-88, 1889-90 and 1891-92, and the Revised Results of Arcs contained in Volumes IX and X; also the Simultaneous Reduction and the Final Results of the whole of the Operations. Dehra Dún, 1893.

Appendix No. 1. Determination of the Geodetic Elements of the Longitude Stations.

Appendix No. 2. On Retardation (a numerical mistake was made in this appendix in the conversion of a formula from kilometres to miles: the conclusious drawn cannot therefore be upheld).

Vol. XVI. Details of the Tidal Observations taken during the period from 1873 to 1892 and a Description of the Methods of Reduction. Dehra Dún, 1901.

Vol. XVII. Electro-Telegraphic Longitude Operations executed during the years 1894-95-96. The Indo-European Arcs from Karachi to Greenwich. Dehra Dún, 1901.

Appendix No. 1. Descriptions of Points used for Longitude Stations.

Appendix No. 2. The Longitude of Madras.

Vol. XVIII. Astronomical Observations for Latitude made during the period 1885 to 1905 and the Deduced Values of the Deflections of the Plumb-line. Dehra Dún, 1906.

Appendix No. 1. On Deflections of the Plumb-line in India.

Appendix No. 2. Determination of the Geodetic Elements of the Latitude Stations of Bajamara, Bahak, Lambatach and Kidarkanta.

Appendix No. 3. On the (N - S) Difference exhibited by Zenith Sector No. 1.

Appendix No. 4. On the Value of the Micrometer of the Zenith Telescope.

Appendix No. 5. On the Azimuth Observations of the Great Trigonometrical Survey of India.

Appendix No. 6. A Catalogue of the Publications of the Great Trigonometrical Survey of India.

Synopses of the Results of the Operations of the Great Trigonometrical Survey of India, comprising Descriptions, Co-ordinates, &c., of the Principal and Secondary Stations and other Fixed Points of the Several Series of Triangles. For the use of Surveyors in the field.

Vol. I. The Great Indus Series, or Series D of the North-West Quadrilateral. Dehra Doon, 1874.

Vol. II. The Great Arc—Section 24° to 30°, or Series A of the North-West Quadrilateral. Dehra Doon, 1874.

Vol. III. The Karáchi Longitudinal Series, or Series B of the North-West Quadrilateral. Dehra Doon, 1874.

Vol. IV. The Gurhágarh Meridional Series, or Series F of the North-West Quadrilateral. Dehra Dún, 1875.

Vol. V. The Rahún Meridional Series, or Series E of the North-West Quadrilateral. Dehra Dún, 1875.

Vol. VI. The Jogí-Tíla Meridional Series, or Series G, and the Sutlej Series, or Series H of the North-West Quadrilateral. Dehra Dún, 1875.

Vol. VII. *The North-West Himalaya Series, or Series C of the North-West Quadrilateral; and the Triangulation of the Kashmir Survey. Dehra Dún, 1879.* (Vol. VII is of great use to mountaineers).

Vol. VIIA. *The Jodhpore Meridional Series and the Eastern Sind Meridional Series of the North-West Quadrilateral. Dehra Dún, 1887.*

Vol. VIII. *The Great Arc—Section 18° to 24°, or Series A of the South-East Quadrilateral. Dehra Dún, 1878.*

Vol. IX. *The Jabalpur Meridional Series, or Series E of the South-East Quadrilateral. Dehra Dún, 1878.*

Vol. X. *The Bider Longitudinal Series, or Series D of the South-East Quadrilateral. Dehra Dún, 1880.*

Vol. XI. *The Bilâspur Meridional Series, or Series F of the South-East Quadrilateral. Dehra Dún, 1880.*

Vol. XII. *The Calcutta Longitudinal Series, or Series B of the South-East Quadrilateral. Dehra Dún, 1880.*

Vol. XIII. *The East Coast Series, or Series C of the South-East Quadrilateral. Dehra Dún, 1880.*

Vol. XIIIA. *The South Párasnáth Meridional Series and the South Malúncha Meridional Series of the South-East Quadrilateral. Dehra Dún, 1885.*

Vol. XIV. *The Budhon Meridional Series, or Series J of the North-East Quadrilateral. Dehra Dún, 1883.*

Vol. XV. *The Rangír Meridional Series, or Series K of the North-East Quadrilateral. Dehra Dún, 1883.*

Vol. XVI. *The Amua Meridional Series, or Series L, and the Karára Meridional Series, or Series M of the North-East Quadrilateral. Dehra Dún, 1883.*

Vol. XVII. *The Gurwáni Meridional Series, or Series N, and the Gora Meridional Series, or Series O of the North-East Quadrilateral. Dehra Dún, 1883.*

Vol. XVIII. *The Huriláong Meridional Series, or Series P, and the Chendwár Meridional Series, or Series Q of the North-East Quadrilateral. Dehra Dún, 1883.*

Vol. XIX. *The North Párasnáth Meridional Series, or Series R, and the North Malúncha Meridional Series, or Series S of the North-East Quadrilateral. Dehra Dún, 1883.*

Vol. XX. *The Calcutta Meridional Series, or Series T, and the Brahmaputra Meridional Series, or Series V of the North-East Quadrilateral. Dehra Dún, 1883.*

Vol. XXI. *The East Calcutta Longitudinal Series, or Series U, and the Eastern Frontier Series—Section 23° to 26°, or Series W of the North-East Quadrilateral. Dehra Dún, 1883.*

Vol. XXII. *The Assam Valley Triangulation, E. of Meridian 92°, emanating from the Assam Longitudinal Series, or Series X of the North-East Quadrilateral. Preliminary Issue. Dehra Dún, 1891.*

Vol. XXIII. *The South Konkan Coast Series, or Series C of the Southern Trigon. Dehra Dún, 1891.*

Vol. XXIV. *The Mangalore Meridional Series, or Series D of the Southern Trigon. Dehra Dún, 1891.*

Vol. XXV. *The South-East Coast Series, or Series F of the Southern Trigon. Dehra Dún, 1891.*

Vol. XXVI. The Bombay Longitudinal Series, or Series B of the Southern Trigon. Dehra Dún, 1892.

Vol. XXVII. The Madras Longitudinal Series, or Series G of the Southern Trigon. Dehra Dún, 1892.

Vol. XXVIII. The Madras Meridional and Coast Series, or Series E of the Southern Trigon. Dehra Dún, 1892.

Vol. XXIX. The Great Arc Meridional Series—Section 8° to 18°, or Series A of the Southern Trigon. Dehra Dún, 1899.

Vol. XXX. The Abu Meridional Series, or Series I, and the Gujarát Longitudinal Series, or Series K of the South-West Quadrilateral. Dehra Dún, 1892.

Vol. XXXI. The Khánpisura Meridional Series, or Series G of the South-West Quadrilateral. Dehra Dún, 1893.

Vol. XXXII. The Singi Meridional Series, or Series H of the South-West Quadrilateral. Dehra Dún, 1893.

Vol. XXXIII. The Cutch Coast Series, or Series L of the South-West Quadrilateral. Dehra Dún 1893.

Vol. XXXIV. The Káthiáwár Meridional Series, or Series J of the South-West Quadrilateral. Dehra Dún, 1894.

Spirit-Levelling Operations of the Great Trigonometrical Survey of India.

Heights in Sind, the Punjab, N. W. Provinces and Central India, Seasons 1858-62:—

From Kurrachee to Attock *viá* Sehwan, Shikárpur, Mithankot and Dera Gházi Khan: from Mithankot to Sironj *viá* Baháwalpur, Baháwalgarh, Ferozepore, Ludhiána, Umballa, Sahåranpur, Meerut, Aligarh, Agra, Dholpur and Gwalior: and from Saháranpur to Dehra Dún.

Heights in the N. W. Provinces and Bengal, Seasons 1862-65:—

From Agra to Calcutta *viá* Túndla, Cawnpore, Fatehpur, Allahabad, Mirzapur, Benares, Buxar, Arrah, Dinapore, Bankipore, Patna, Monghyr Bhágalpur, Nalháti, Burdwan, Pandua, Chinsura, Serampore and Howrah.

Heights in the Punjab and N. W. Provinces, Season 1866-67, Sections I to IV:—

From Ferozepore to Lahore and Meean Meer *viá* Anarkali: from Mooltan to Khemwála *viá* Muzaffargarh: from Delhi to Meerut *viá* Gházíabad: and from Saháranpur to Khanna *viá* Sarsáwa and Umballa.

Heights in the N. W. Provinces, Season 1867-68, Section V:—

From Meerut to Pilibhít *viá* Moradabad and Bareilly.

Heights in the N. W. Provinces and Oudh, Season 1868-69, Section VI:—

From Bareilly to Cawnpore *viá* Sháhjahánpur, Sítapur and Lucknow.

Heights in the N. W. Provinces and Oudh, Seasons 1868-70, Section VII:—

From Lucknow to Dildárnagar *viá* Bara Banki, Fyzabad, Basti, Gorakhpur, Azamgarh and Ghazipur.

Heights in the N. W. Provinces and Bengal, Season 1870-71, Section VIII:—

From Gorakhpur to Parsurman *viá* Bettiah, Segowlie, Motihari, Muzaffarpur and Darbhanga.

Heights in Bengal, Season 1871-72, Section IX:—

From Parsurman to Pírpainti *viá* Sahibganj, Purnea and Karagola Ghát: and from Purnea to Sonakhoda Base-line *viá* Kishanganj.

Heights in the Bombay Presidency, No. 1, Seasons 1874-78 :—

From Navánár to Bombay *viá* Shikárpur, Viramgám, Ahmedabad, Kaira, Cambay, Baroda, Broach and Surat: from Shikárpur to Okha *viá* Wawánya, Hanstal and Jorya: and from Jorya to Viramgám *viá* Rajkot and Wadhwán.

Heights in the Bombay Presidency and Nizam's Dominions, Nos. 2 and 3, Seasons 1877-80 :—

From Bombay to Bidar *viá* Thána, Kalyán, Lonauli, Poona, Lake Fife, Kedgaon, Diksál, Kem, Sholápur and Gulbarga: from Kedgaon to Hubli *viá* Supa, Diksál, Bárámati, Níra, Sátára, Kolhápur, Belgaum and Dhárwár: from Sholápur to Bijápur *viá* Jhalki and Hippargi, and from Gulbarga to Ráichur *viá* Yádgiri.

Heights in the Bombay Presidency and Central India Agency, No. 4, Seasons 1877-78 and 1881-84 :—

From Kalyán to Sironj *viá* Násik, Manmád, Nándgaon, Dhulia, Mhow, Indore and Bhopal: and from Dhond to Shirsoli *viá* Ahmednagar, Manmád, Nándgaon and Chálisgaon.

Heights in the Bengal Presidency, Seasons 1881-83 and 1887-88 :—

From False Point to Nadia *viá* Kendrapara, Jajpur, Bhadrak, Balasore, Jellasore, Contai, Kukrahâti, Ulubaria, Howrah, Chinsura, Tribeni and Culna: from Calcutta to Saugor Island *viá* Phalta and Diamond Harbour, and from Howrah to the mouth of the Rasulpur river *viá* Kidderpore, Diamond Harbour, Kukraháti, Phulbária and Kejri.

Heights in the Madras Presidency, No. 1, Seasons 1869-85 :—

From Madras to Kárwár *viá* Arkonam, Kodúr, Cuddapah, Tadpatri, Gooty, Bellary and Hubli: from Ráichur to Arkonam *viá* Ádoni, Gooty, Bellary, Túmkúr, Bangalore, Jalárpet and Vellore, from Jalárpet to Beypore *viá* Salem, Erode, Coimbatore and Pálghát: and from Tuticorin to Cape Comorin *viá* Palamcottah.

Heights in the Madras Presidency, No. 2, Season 1885-86 :—

From Madras to Negapatam *viá* St. Thomas' Mount, Chingleput, Villupuram, Cuddalore, Porto Novo, Chidambaram, Máyavaram, Kumbakonam and Tanjore, from Tanjore to Rámesvaram *viá* Arantángi, Devipatnam and Ramnad: and from Ramnad to Tuticorin.

Heights in the Madras Presidency, No. 3, Season 1886-87 :—

From Tuticorin to Tanjore *viá* Maniyáchi, Madura, Dindigul and Trichinopoly: from Trichinopoly to Erode *viá* Lálápet and Púgalúr, from Shoranur to Cochin *viá* Trichúr from Kárwár to Mormugáo, and from Agoada Fort to Agoada Fort Jetty.

Heights in the Madras Presidency, No. 4, Season 1887-88 :—

From Madras to Vizagapatam *viá* Nellore, Guntúr, Rajahmundry and Cocanada.

Heights in the Madras Presidency, No. 5, Season 1888-89 :—

From Bangalore to Mangalore *viá* Mágadi, Kunigal, Channaráypatna, Gráma, Hassan, Saklespur, Uppinangadi, Páni Mangalúr and Faringipet.

Heights in the Madras Presidency, No. 6, Seasons 1888-90 :—

From Bidar to Bézváda *viá* Sadáshivpet, Pattancharu, Secunderabad, Hyderabad, Súrayapet, Munagál and Nandigáma.

Heights in the Bombay Presidency, No. 5, Season 1889-90 :—

From Navánár to Tatta *viá* Mundra, Bhúj, Nakhtrána Mota, Mátánomadh, Lakhpat, Moghul Bhin and Sujáwal.

Heights in the Bombay Presidency, No. 6, Season 1890-91 :—

From Rájkot to Bhávnagar *viá* Sardhár, Átkot, Bábra, Dhola and Sanosra: and from Sanosra to Port Albert Victor *viá* Noghanvadar, Khuntávada and Dungar.

Heights in the Bombay Presidency, Hyderabad Assigned Districts and Central Provinces, No. 7, Seasons 1877-78, 1882-83 and 1890-91-92. Revised Edition :—

From Nándgaon to Nágpur *viá* Chálisgaon, Páchora, Bhusával, Malkapur, Shegaon, Akola, Murtazapur, Badnera, Amráoti and Wardha: and from Nágpur to Biláspur *viá* Kamptee, Tumsar, Dongargarh, Nándgaon, Drug and Raipur.

Heights in Burma, No. 1, Season 1892-93 :—

From Rangoon to Elephant Point *viá* Dala, Kôndan, Danôk and Pilakat Creek: from Rangoon to Mandalay along the Sittang and Mandalay Lines of the Burma State Railway: also points about Mergui.

Heights in the Central Provinces and Orissa, No. 8, Seasons 1891-92 and 1893-94. Revised Edition :—

From Biláspur to Sambalpur *viá* Chámpa, Sakti, Raigarh and Jhársuguda: and from Sambalpur to Kendrapára *viá* Bráhmani Turum, Binka, Sonpur, Kantilo, Charchi-ka-Bánki and Cuttack.

Heights in Karáchi and its Neighbourhood, Season 1893-94:—

From Manora to South End Karáchi Base, through Kimári and Karáchi.

Heights in Orissa and the Northern Circars, No. 9, Season 1894-95:—

From Cuttack to Vizagapatam *viâ* Khurda, Ganjam, Chatrapur and Berhampur, thence along the East Coast Railway *viâ* Ichchhápuram, Báruva, Mandasa Road Railway Station, Chípurupalle, Vizianagram and Waltair: and from Khurda to Puri *viâ* Pipli.

Heights in Calcutta, Season 1894-95:—

From Her Majesty's Mint to the Standard Bench-Mark at the Mathematical Instrument Office, with an extension to the Kidderpore Tidal Station.

Heights in the Madras Presidency, Central Provinces, Central India Agency and the United Provinces of Agra and Oudh, No. 10, Seasons 1891-92, 1894-95, 1896-97 and 1898-99:—

From Vizagapatam to Vizianagram, *viâ* Waltair, and Almauda.
From Vizianagram to Raipur, *viâ* Gajapatinagaram, Sálúru, Potanghi, Koráput, Jeypore, Naurangapur, Umarkot and Dhamtari.
From Raipur to Biláspur, along the main line of the Bengal-Nágpur Railway.
From Biláspur to Katni, *viâ* Sáhdol and Umaria.
From Katni to Allahabad, *viâ* Maihar, Rewah and Mangawán.
From Katni to Sironj, *viâ* Damoh, Saugor, Kurai, Bína and Kurwai.

Heights in Bengal and Assam, Seasons 1899-1902.

From Calcutta to Dámukdia, along the Eastern Bengal State Railway.
From Dámukdia to Siliguri, *viâ* Nator, Nilphamari and Jalpaiguri.
From Siliguri to Sonákhoda, *viâ* Rámganj G. T. Survey Station.
From Parbatipur to Dhubri, *viâ* Rangpur, along the Eastern Bengal State Railway.
From Porádaha to Faridpur, along the Eastern Bengal State Railway.
From Parbatipur to Manihári Ghat, *viâ* Dinajpur, Bársoi and Katihar.
From Bársoi to Kishanganj, along the Eastern Bengal State Railway.
From Katihar to Anchara Ghat, *viâ* Purnea and Araria.

Professional Papers of the Survey of India.

Professional Paper No. 1. *On the projection for a Map of India and Adjacent Countries on the Scale of 1: 1000000. Second Edition, Dehra Dún, 1903.*

" " *No. 2.* *Method of measuring Geodetic Bases by means of Metallic Wires by M. Jäderin. (Translated from Mémoires Présentés Par Divers Savants Á L'académie Des Sciences De L'institut De France). Dehra Dún, 1899.*

" " *No. 3.* *Method of measuring Geodetic Bases by means of Colby's Compensated Bars. Dehra Dún, 1900.*

" " *No. 4.* *Notes on the Calibration of Levels. Dehra Dún, 1900.*

" " *No. 5.* *The Attraction of the Himalaya Mountains upon the Plumb-Line in India*. Considerations of recent data. Dehra Dún, 1901.*

" " *No. 6.* *Account of a Determination of the Co-efficients of Expansion of the wires of the Jäderin Base-Line Apparatus. Dehra Dún, 1902.*

" " *No. 7.* *Miscellaneous. Calcutta, 1903:—*

(1) *On the values of Longitude employed in maps of the Survey of India.*
(2) *Levelling across the Ganges at Damukdia.*
(3) *Experiment to test the increase in the length of a Levelling Staff due to moisture and temperature.*
(4) *Description of a Sun-dial designed for use with tide gauges.*
(5) *Nickel-Steel alloys and their application to Geodesy (Translated from the French.)*
(6) *Theory of electric projectors (Translated from the French).*

* *Vide* Nature, Vol. 66, No. 1699 of May 22, 1902.

Professional Paper No. 8. *Experiments made to determine the Temperature Co-efficients of Watson's Magnetographs. Calcutta, 1905.*

" " *No. 9.* *An Account of the Scientific work of the Survey of India and a Comparison of its progress with that of Foreign Surveys. Prepared for the use of the Survey Committee, 1905.* Calcutta, 1905.*

Hand-books for the use of Surveyors.

Hand-book of General Instructions for the Survey of India Department. Second Edition. Calcutta, 1900.

Hand-book of Professional Instructions for the Trigonometrical Branch, Survey of India Department. Second Edition. Calcutta, 1902.

Hand-book of Professional Instructions for the Topographical Branch, Survey of India. Third Edition. Calcutta, 1905.

Auxiliary Tables to facilitate the calculations of the Survey of India. Fourth Edition. Revised and extended. Dehra Dún, 1906.

Special Publications on Scientific subjects.

Report on the Explorations in Great Tibet and Mongolia made by A–K in 1879-82. Dehra Dún, 1891.

Catalogue of 249 Stars for the epoch January 1, 1892, from observations by the Great Trigonometrical Survey of India. Dehra Dún, 1893.

Report on the Recent Determination of the Longitude of Madras. Calcutta, 1897.

Report on the Trigonometrical Results of the Earthquake in Assam. Calcutta, 1898.

The Total Solar Eclipse, January 22nd, 1898. Dehra Dún, 1898.

(1) *Report on the observations at Dumraon.*

(2) *Report on the observations at Pulgaon.*

(3) *Report on the observations at Sahdol.*

Report on the Identification and Nomenclature of the Himalayan Peaks as seen from Katmandu, Nepal.† Calcutta, 1904.

General Reports on the Operations of the Great Trigonometrical Survey of India from 1861 to 1877.
General Reports on the Operations of the Survey of India from 1878 to 1904.

Extracts from Narrative Reports of the Survey of India.

1900-01. Recent improvements in Photo-Zincography. G. T. Triangulation, Upper Burma. Latitude Operations, 1900-01. Experimental Base Measurement with Jäderin Apparatus. Magnetic Survey. Tidal and Levelling Report for 1900-01. Topography, Upper Burma. Calcutta, 1903.

1901-02. G. T. Triangulation, Upper Burma. Latitude Operations, 1901-02. Magnetic Survey Tidal and Levelling Report for 1901-02. Topography in Upper Burma. Topography in Sind. Topography in the Punjab. Calcutta, 1904.

* Vide Nature, Vol. 74, No. 1917 of July 26, 1906.
† Vide Nature Vol. 71. Nos. 1828 and 1830 of November 10th and 24th. 1904.

1902-03. Principal Triangulation, Upper Burma. Topography, Upper Burma. Topography, Shan States. Survey of the Sámbhar Lake. Latitude Operations. Tidal and Levelling Operations. Magnetic Survey. Introduction of the Contract System of payment in Traverse Surveys. Traversing with the Subtense Bar. Compilation and Reproduction of Thána maps. Calcutta, 1905.

1903-04. The Magnetic Survey of India. Pendulum Operations. Tidal and Levelling Operations. Astronomical Azimuths. Utilisation of old Traverse data for modern Surveys in the United Provinces of Agra and Oudh. Identification of Snow Peaks in Nepal. Topographical Surveys in Sind. Notes on Town and Municipal Surveys. Notes on Riverain Surveys in the Punjab. Calcutta, 1906.

Accounts of the progress of Indian Geodesy were submitted to the International Geodetic Conferences that met at

Stuttgart in 1898,

Paris in 1900,

Copenhagen in 1903,

Buda Pesth in 1906,

and were published in the reports of the Conferences.

Accounts of the progress of Geodesy and Geography in India were published in the Annual Reports of the Board of Scientific Advice from 1905 to date.

A paper on Himalayan Attraction was published in the Monthly Notices of the Royal Astronomical Society, January 1902.

Summaries of the progress of Geodesy in India were published in the following numbers of the Philosophical Transactions of the Royal Society of London:—

Series A, Vol. 186 (1895) pp. 754–816.

Series A, Vol. 205 (1905) pp. 289–318.

APPENDIX.

No. 7.

ON THE COMBINATION WEIGHTS EMPLOYED IN THIS VOLUME.

BY CAPTAIN H. McC. COWIE, R. E.

1. An examination of the abstracts and summaries of observations and results will show that the system of relative combination weights described in Section 7, Chapter II has not always been adhered to and that, in many cases, the reasons for departure from this system are not at once evident. Some explanation, then, seems called for with an account of the development of the system now adopted.

Adoption of equal weights.

2. Before the year 1899, in combining the individual values to obtain the final co-latitude, no system of relative weights was used. That is to say, every value, whether dependent on one or on several observations, or whether the pair were independent or entangled with others, was allotted equal weight. By this procedure, values which depended on several observations of the same pair of stars were relatively under-weighted, while those derived from single observations and from entangled pairs were over-weighted.

Adoption of arbitrary weights.

3. In 1899, for the first time, a system of relative weights was introduced. This was purely an arbitrary one, having no theoretical basis. To the result from each single observation of an independent pair of stars was allotted a weight of 0·5. Two observations raised the weight to 1·0; three to 1·5 and so on. Each component value of a double pair, deduced from a single set of observations, was given a weight of 0·5. Values dependent on two or on three observations of entangled pairs received weights of 0·75. Under this system, it is evident, the values given by single observations of independent pairs were relatively under-weighted, while results derived from repeated observations of independent pairs and all values from entangled pairs were over-weighted.

Adoption of a scientific system.

4. In 1901, the system described in Chapter II was first introduced, though for this and the following year, the numerical values of the relative weights differed slightly from those given on page (24), in consequence of the derivation of the values of the quantities η and e from the season's work. This investigation entailed somewhat laborious computations and as each successive season's results showed that the values of η and e did not differ materially from $\pm\ 0''\cdot 20$ and $\pm\ 0''\cdot 30$ respectively, it was considered that an annual examination of results was unnecessary and that the adoption of the above mentioned values for η and e was fully justified. The table of the relative weights given on page (24), computed with these data, has been in use from the season 1902-03.

Arbitrary weights accepted in this volume for the years 1898-1902.

5. Such, from time to time, have been the various methods of procedure followed in combining the individual values of the co-latitude. In the compilation of this volume, however, it has been thought advisable for the sake of uniformity, to reconsider all observations made prior to the season 1898-99 and to apply to the individual observations the most recent system of relative weights, and so to deduce final values comparable with the work of later years. But as the changes in the final values of co-latitude, consequent on the alteration of the combination weights, were not of a magnitude to justify the labour of recomputation, the results of the four seasons 1898-99 to 1901-02 have not been recomputed and in the abstracts of observations given in this book for the years 1898-1902, the system of weights employed is that originally adopted for the season's work.

Weights have been arbitrarily altered in order to balance positive and negative micrometer corrections.

6. In many of the abstracts, again, the weights applied will be seen to conform neither to the system of 1901 nor to that of 1903, and the reasons for the discrepancies not being at once evident, a note of explanation is necessary. In the concluding paras of Section 6, Chapter II attention is drawn to the importance of balancing the sums of positive and negative micrometer corrections, for the purpose of eliminating errors due to a faulty value of a revolution of the micrometer screw. It is generally possible to contrive an approximate balance of positive and negative differences at the time of drawing up the programme of work. The desirability of balancing, however, was not recognized till the year 1891 and the micrometer differences in observations taken prior to this date had to be subsequently balanced by the arbitrary alteration of weights. Even when a programme of stars has been so framed as to produce a perfect balance, the latter will frequently be disturbed by the accidental missing of stars or by the interference of clouds or by the rejection of certain individual values of co-latitude, on account of gross errors of observation. Measures have then to be taken to readjust the balance of corrections. This may be done in two ways:

(1) By rejecting arbitrarily one or more observations.

(2) By slightly altering the combination weights.

Both methods are the same in principle. To reject an observation is to give it a weight of 0·0. By the first method, a few results are given no weight at all; by the second, the weights of a greater number of results are altered by smaller amounts. In some instances the first method has been followed, in others the second, and it is to this arbitrary alteration of weights that the discrepancies referred to at the beginning of this paragraph are due.

Weights of entangled pairs.

7. The case of entangled pairs has now to be considered. There will be found in the abstracts of this volume several instances in which the weights employed are not theoretically correct, but of which the errors cannot be attributed to any of the causes discussed above. These instances will be seen to occur wherever a number of stars have been observed with the same instrumental setting and where several individual values of co-latitude have been derived from the same observations. These values are, in consequence, not independent. The commonest case is that in which observations to two stars of one aspect are combined with observations to one star of the other aspect and two values of co-latitude deduced from the three observations.

The case of a double pair has been considered on page (24), where the appropriate weights have been determined. But though a double pair is of commonest occurrence, the abstracts contain many instances of a more complicated kind. Such as, for example, when four stars are, perhaps, combined to give three values of co-latitude, or five stars to give four values. On some occasions four stars of one aspect have been combined with but one of the other; and there are cases of three stars of one aspect being combined with two of the other. All these various cases should have been treated individually in order to obtain the appropriate weights. This, however, has not been done, as it was not considered necessary to introduce refinements whose effect on the final co-latitude was negligible. The procedure has been to treat each component as if it were one of a double pair, and to weight the individual results accordingly.

Weights altered by observer.

8. In addition to the cases already dealt with, there are in the abstracts a few instances of a weight having been arbitrarily altered by the observer; the observation in his opinion not meriting full weight.

Determination of correct weights for entangled pairs.

9. In Section 7, Chapter II, the case of three stars being combined to form two entangled pairs has been investigated and the appropriate weights determined. As has been already stated, this, the double, is the most common form of entangled pairs. Of recent years observers have endeavoured to reduce and if possible to eliminate intricate entanglements; but the abstracts of earlier work show many combinations of great complexity. Following the procedure of Section 7, I have determined the relative combination weights for a few specimen cases. These are given below:

Case (a) in which a star transits so close to the zenith that it may be observed in both telescopic positions with the same instrumental setting and where $c = \Delta + \frac{Z_1 - Z_2}{2}$, where $Z_1 - Z_2$ is the difference of the zenith distances measured in the two positions of the instrument and c the co-latitude.

Instances of this will be found in

Station	112	pair	number	27
"	117	"	"	28,33
"	131	"	"	40
"	135	"	"	5

If the $p.e.$ of a single declination be $\pm 0''\cdot 3$ and the $p.e.$ of observation in a single determination of co-latitude be $\pm 0''\cdot 3$

$$(p.e.)^2 \text{ of } c = (0\cdot 3)^2 + (0\cdot 3)^2$$
$$= 0\cdot 18.$$

Where a pair of stars is observed one north, the other south of the zenith

$$c = \frac{\Delta_N + \Delta_S}{2} + \frac{Z_N - Z_S}{2}$$

$$\text{and } (p.\,e.)^2 \text{ of } c = (0\cdot2)^2 + (0\cdot3)^2 = 0\cdot13.$$

Hence if w be the weight appropriate to a value for the co-latitude deduced from observations to one zenith star, and W, the weight of a result by a pair of stars,

$$\frac{w}{W} = \frac{0\cdot13}{0\cdot18} = 0\cdot7$$

$$\text{If } W = 1\cdot0 \qquad w = 0\cdot7.$$

The mean result from two sets of observations to a zenith star should then be given a weight $w = 0\cdot7$. The result by one set of observations should receive a weight

$$w = 0\cdot7 \times 0\cdot7 = 0\cdot5.$$

Case (b) in which two north stars and two south stars are observed with the same instrumental setting; for example

Station	142	pairs	22	to	25
,,	145	,,	8	,,	11
,,	158	,,	8	,,	11

Utilizing the symbols p and q of Section 7, the combinations we may form are

$$\begin{aligned} c_1 &= p_1 + q_1 \\ c_2 &= p_1 + q_2 \\ c_3 &= p_2 + q_1 \\ c_4 &= p_2 + q_2 \end{aligned}$$

of which, as is at once evident, two are redundant. For the mean value of co-latitude from the four combinations above is

$$c = \tfrac{1}{2}\,[p_1 + q_1 + p_2 + q_2]$$

which is the mean result from the two combinations

$$\begin{aligned} c_1 &= p_1 + q_1 \\ c_4 &= p_2 + q_2 \end{aligned}$$

It is, thus, a mistake to introduce the other two combinations

$$p_1 + q_2$$
$$\text{and} \quad p_2 + q_1$$

In determining the weight of the mean result, we may consider the $p.\,e.$'s of $p_1.\ p_2.\ q_1.\ q_2$ each equal to e; then

$$(p.\,e.)^2 \text{ of } c = 4\left(\frac{e}{2}\right)^2 = e^2.$$

Again the $(p.\,e.)^2$ of the result by a single pair $= 2e^2$.

Therefore if W be the weight of the result from a single pair and w the weight to be given to c

$$\frac{w}{W} = \frac{2e^2}{e^2} = 2$$

from which, if $W = 1$ $\quad w = 2$

Hence, if all four stars be twice observed and the four possible combinations be formed from the observations, a weight of $0\cdot5$ should be allotted to each component. Had the observations been combined to form the two independent pairs

$$\begin{aligned} p_1 + q_1 \\ p_2 + q_2 \end{aligned}$$

a weight of 1·0 would have accrued to the result from each, under system of Chapter II, the aggregate weight of the mean co-latitude deduced from the observations being as before 2·0.

The two combinations $p_1 + q_2$ and $p_2 + q_1$ are thus superfluous, they influence neither the final mean result nor the aggregate weight of that result.

When several stars have been observed with the same instrumental setting, it is essential that the observations should be so combined as to give the most probable value to the mean result.

In the case of the four observations considered above, two courses are possible: either both the superfluous combinations should be rejected or both should be included. It would be incorrect to reject one only. For if, for example, we formed the three combinations

$$\begin{aligned} c_1 &= p_1 + q_1 \\ c_2 &= p_1 + q_2 \\ c_4 &= p_2 + q_2 \end{aligned}$$

the mean result would be

$$c' = \tfrac{1}{3}[2p_1 + q_1 + p_2 + 2q_2]$$

instead of

$$c = \tfrac{1}{2}[p_1 + q_1 + p_2 + q_2],$$

the most probable mean value resulting from the four observations.

The aggregate weight of c' can be shown to be 1·8, the introduction of the combination

$$c_2 = p_1 + q_2$$

actually diminishing the aggregate weight by 0·2; a clear proof that the data at our disposal has not been combined to give the most probable mean result.

The following table shows the combination weights determined for a few cases:—

TABLE I.

Number of Stars		No. of entangled pairs formed	Weight for each entangled pair		Examples
Of one Aspect	Of other Aspect		Observed once	Observed twice	
2	3	4	0·4	0·6	Station 155 pairs 11 and 14
4	1	4	0·3	0·4	„ 134 „ 18 and 21
5	1	5	0·2	0·3	... ...
4	2	5	0·3	0·4	... ...

10. *Table II* gives a summary of all cases, in which the weights allotted in this volume differ from those derived under the system described in Chapter II: it also shows the effect on the final co-latitude of the adoption of arbitrary and un-systematic weights.

The differences, M′ − M, must not however be regarded as errors. In all cases in which the substitution of systematic for arbitrary weights has disturbed the balance of micrometer differences, the final result has been rendered less reliable and the value of M′ less trustworthy than that of M.

TABLE II.

Reference Number of Station	Number of Values whose weights have been altered	Results as given in the Abstracts of this volume		Results that would have obtained if weights had been employed in accordance with system of Chapter II		Difference M′ − M	Reason why allotted weights differ from those of the system of Chapter II
		Seconds of Observed Co-latitude = M	Aggregate Weight = Σ P	Seconds of Observed Co-latitude = M′	Aggregate Weight = Σ P′		
116	2	18·55	19·9	18·56	19·3	+0·01	Arbitrarily altered by observer.
117	17	25·49	34·2	25·46	29·1	−0·03	All entangled pairs treated as double pairs.
118	1	7·80	27·8	7·79	27·5	−0·01	Arbitrarily altered by observer.
119	16	41·51	24·3	41·52	28·2	+0·01	To balance positive and negative micrometer differences.
120	2	21·44	22·0	21·43	21·4	−0·01	Arbitrarily altered by observer.
121	11	45·13	14·5	45·12	16·1	−0·01	To balance positive and negative micrometer differences.
123	1	11·81	34·1	11·81	34·5	0·00	Arbitrarily altered by observer.
124	4	57·45	21·6	57·45	20·8	0·00	All entangled pairs treated as double pairs.
125	19	2·90	47·5	2·89	48·3	−0·01	System of 1899 adopted.
128	8	21·96	11·8	21·87	15·4	−0·09	To balance positive and negative micrometer differences.
129	9	31·77	12·6	31·69	16·2	−0·08	To balance positive and negative micrometer differences.
130	13	36·69	41·5	36·69	40·2	0·00	System of 1899 adopted.
131	4	54·82	35·5	54·82	35·9	0·00	To balance positive and negative micrometer differences.
134	11	35·00	36·1	35·02	33·5	+0·02	All entangled pairs treated as double pairs.
135	7	52·56	37·2	52·55	35·8	−0·01	All entangled pairs treated as double pairs.
137	13	5·72	39·5	5·71	39·5	−0·01	System of 1899 adopted.
138	6	50·94	37·3	50·93	36·1	−0·01	All entangled pairs treated as double pairs.
140	3	6·52	22·3	6·53	21·7	+0·01	All entangled pairs treated as double pairs.
141	12	59·26	40·0	59·26	38·8	0·00	System of 1899 adopted.
142	4	25·97	41·9	25·97	41·5	0·00	All entangled pairs treated as double pairs.
143	2	28·06	34·1	28·06	34·5	0·00	System of 1901 adopted.
145	7	34·57	19·3	34·55	18·2	−0·02	All entangled pairs treated as double pairs.
146	3	14·63	42·6	14·64	42·9	+0·01	System of 1901 adopted.
147	6	20·85	33·6	20·86	33·0	+0·01	All entangled pairs treated as double pairs.
148	4	7·95	53·3	7·95	52·9	0·00	All entangled pairs treated as double pairs.
150	13	29·69	23·0	29·69	22·9	0·00	System of 1899 adopted.
151	10	60·31	50·9	60·30	50·4	−0·01	All entangled pairs treated as double pairs.
155	8	38·80	23·2	38·73	19·8	−0·07	To balance positive and negative micrometer differences.
156	3	22·65	15·9	22·66	15·6	+0·01	All entangled pairs treated as double pairs.

TABLE II.

Reference Number of Station	Number of Values whose weights have been altered	Results as given in the Abstracts of this volume		Results that would have obtained if weights had been employed in accordance with system of Chapter II		Difference M′ − M	Reason why allotted weights differ from those of the system of Chapter II
		Seconds of Observed Co-latitude = M	Aggregate Weight = ΣP	Seconds of Observed Co-latitude = M′	Aggregate Weight = ΣP′		
157	4	8·10	16·7	8·10	15·7	0·00	To balance positive and negative micrometer differences.
158	8	60·35	20·9	60·36	18·9	+0·01	All entangled pairs treated as double pairs.
159	6	17·07	47·9	17·07	47·3	0·00	All entangled pairs treated as double pairs.
163	3	49·34	54·6	49·34	54·3	0·00	All entangled pairs treated as double pairs.
164	1	54·01	28·2	54·01	28·6	0·00	Arbitrarily altered by observer.
165	11	17·31	31·0	17·33	29·2	+0·02	System of 1899 adopted.
166	9	48·55	25·0	48·55	24·1	0·00	System of 1901 adopted.
168	11	49·46	36·4	49·46	38·3	0·00	To balance positive and negative micrometer differences.
169	11	17·04	34·5	17·04	32·6	0·00	All entangled pairs treated as double pairs.
170	9	38·08	49·5	38·08	48·6	0·00	All entangled pairs treated as double pairs.
171	17	57·26	46·5	57·27	45·4	+0·01	System of 1899 adopted.
174	1	1·82	41·9	1·83	42·2	+0·01	Arbitrarily altered by observer.
175	3	37·43	50·1	37·43	49·8	0·00	All entangled pairs treated as double pairs.
176	12	16·22	39·0	16·22	36·4	0·00	All entangled pairs treated as double pairs.
178	8	52·87	46·4	52·87	45·6	0·00	All entangled pairs treated as double pairs.
179	7	7·85	14·1	7·86	15·5	+0·01	To balance positive and negative micrometer differences.
180	1	47·70	53·6	47·70	53·5	0·00	Arbitrarily altered by observer.
181	9	44·76	20·5	44·76	19·8	0·00	System of 1901 adopted.
182	24	20·15	45·8	20·12	40·2	−0·03	All entangled pairs treated as double pairs.
183	3	25·14	17·5	25·14	18·1	0·00	To balance positive and negative micrometer differences.
185	5	45·82	26·8	45·83	27·7	+0·01	System of 1901 adopted.
186	9	41·74	30·1	41·73	31·4	−0·01	To balance positive and negative micrometer differences.
188	5	17·18	36·9	17·18	37·4	0·00	System of 1901 adopted.
192	16	53·23	43·6	53·21	42·0	−0·02	All entangled pairs treated as double pairs.
193	6	11·93	46·4	11·93	45·8	0·00	All entangled pairs treated as double pairs.
194	20	3·83	32·2	3·86	26·6	+0·03	All entangled pairs treated as double pairs.
195	11	57·03	23·9	57·02	23·0	−0·01	To balance positive and negative micrometer differences.
196	8	2·91	19·7	2·89	18·7	−0·02	To balance positive and negative micrometer differences.
197	1	46·79	27·5	46·80	28·0	+0·01	Arbitrarily altered by observer.

TABLE II.

Reference Number of Station	Number of Values whose weights have been altered	Results as given in the Abstracts of this volume: Seconds of Observed Co-latitude = M	Results as given in the Abstracts of this volume: Aggregate Weight = ΣP	Results that would have obtained if weights had been employed in accordance with system of Chapter II: Seconds of Observed Co-latitude = M′	Results that would have obtained if weights had been employed in accordance with system of Chapter II: Aggregate Weight = ΣP′	Difference M′ − M	Reason why allotted weights differ from those of the system of Chapter II
201	5	12·15	23·7	12·13	21·2	−0″·02	To balance positive and negative micrometer differences.
202	4	27·34	32·6	27·35	31·8	+0·01	All entangled pairs treated as double pairs.
203	11	16·91	28·5	16·91	28·0	0·00	System of 1899 adopted.
204	4	42·72	44·8	42·72	45·6	0·00	System of 1899 adopted.
205	2	55·20	8·4	55·20	8·6	0·00	To balance positive and negative micrometer differences.
207	15	41·38	14·6	41·44	15·3	+0·06	To balance positive and negative micrometer differences.
211	11	9·64	24·0	9·62	22·0	−0·02	System of 1899 adopted.
214	4	55·24	40·9	55·24	40·5	0·00	All entangled pairs treated as double pairs.
215	4	33·89	53·4	33·89	52·5	0·00	All entangled pairs treated as double pairs.
216	10	23·74	34·0	23·74	33·0	0·00	System of 1899 adopted.
217	4	0·40	24·4	0·41	23·6	+0·01	All entangled pairs treated as double pairs.
218	1	47·59	32·6	47·58	32·3	−0·01	Arbitrarily altered by observer.
219	19	31·05	49·5	31·08	36·5	+0·03	System of 1899 adopted.
221	8	24·88	35·0	24·87	33·8	−0·01	System of 1899 adopted.
222	2	11·21	22·3	11·20	23·3	−0·01	To balance positive and negative micrometer differences.
223	1	26·63	8·6	26·64	8·7	+0·01	Arbitrarily altered by observer.
224	8	41·88	16·9	41·87	16·9	−0·01	System of 1901 adopted.
225	6	51·26	34·2	51·22	33·7	−0·04	All entangled pairs treated as double pairs.
226	29	4·49	30·5	4·52	40·6	+0·03	To balance positive and negative micrometer differences.
227	12	29·70	37·0	29·70	36·2	0·00	System of 1899 adopted.
229	5	44·38	27·5	44·44	24·7	+0·06	All entangled pairs treated as double pairs.
230	1	39·35	45·5	39·35	45·7	0·00	Arbitrarily altered by observer.
231	4	38·57	35·8	38·58	35·0	+0·01	All entangled pairs treated as double pairs.
232	15	47·57	33·8	47·60	29·5	+0·03	All entangled pairs treated as double pairs.
233	8	57·06	23·2	57·05	21·4	−0·01	All entangled pairs treated as double pairs.
234	4	30·88	29·6	30·88	29·2	0·00	All entangled pairs treated as double pairs.
235	2	48·28	8·9	48·27	9·1	−0·01	To balance positive and negative micrometer differences.
236	4	59·71	37·9	59·69	36·8	−0·02	All entangled pairs treated as double pairs.
238	1	3·33	48·6	3·33	48·3	0·00	All entangled pairs treated as double pairs.
239	12	39·55	42·4	39·54	40·4	−0·01	All entangled pairs treated as double pairs.

11. *Table III* gives details, relating to observations by the Talcott method with the Zenith Sector No. 1 and with the Zenith Telescope. This table shows the *p. e.* and the aggregate weight, ΣP, of the final values of the co-latitude. From which two quantities, the *p. e.* of a result, having unit weight, has been deduced. This latter is exhibited in the last column of the Table.

TABLE III.—Details relating to observations by the Talcott Method.

Reference Number	Observer	Instrument	Season	No. of Stars	No. of Observations	*p. e.*	Σ P	*p. e.* of result of unit weight
						″		″
140	S. G. B.	Z. S. No. 1. (used as Z. T.)	1892-93	39	62	± 0·076	22·3	± 0·359
167	„	„	1892-93	40	58	·051	22·5	·242
233	„	„	1892-93	39	65	·080	23·2	·386
217	„	„	1892-93	42	72	·057	24·4	·282
229	„	„	1892-93	47	77	·091	27·5	·477
145	„	„	1892-93	36	46	·053	19·3	·233
155	„	„	1892-93	33	74	·074	23·2	·357
201	„	„	1892-93	34	84	·070	23·7	·341
117	„	„	1893-94	65	77	·061	34·2	·357
134	„	„	1893-94	72	85	·055	36·1	·331
176	„	„	1893-94	74	93	·061	39·0	·381
232	„	„	1893-94	68	77	·045	33·8	·261
182	„	„	1893-94	86	108	·059	45·8	·399
158	„	„	1893-94	40	52	·086	20·9	·393
194	„	„	1893-94	62	75	·067	32·2	·380
124	„	„	1893-94	32	88	·077	21·6	·358
230	G. P. L. C.	Z. T.	1890-91	78	123	± 0·077	45·5	± 0·520
163	„	„	1890-91	86	170	·059	54·6	·436
180	„	„	1890-91	86	164	·051	53·6	·373
154	„	„	1890-91	117	121	·044	57·7	·334
200	„	„	1890-91	84	167	·053	53·1	·386
151	„	„	1890-91	81	172	·052	50·9	·371
209	„	„	1892-93	18	19	·104	8·5	·304
156	„	„	1892-93	33	36	·082	15·9	·327
147	„	„	1892-93	70	74	·061	33·6	·354
193	„	„	1892-93	93	99	·055	46·4	·375
159	„	„	1892-93	101	102	·045	47·9	·311
175	„	„	1892-93	103	110	·055	50·1	·389

TABLE III.—Details relating to observations by the Talcott Method.

Reference Number	Observer	Instrument	Season	No. of Stars	No. of Observations	p. e.	Σ P	p. e. of result of unit weight
						"		"
170	G. P. L. C.	Z. T.	1892-93	108	103	± 0·050	49·5	± 0·352
199	"	"	1892-93	115	118	·051	56·5	·384
112	"	"	1892-93	75	69	·072	35·4	·428
135	"	"	1893-94	78	84	·060	37·2	·366
206	"	"	1893-94	84	89	·068	39·1	·425
236	"	"	1893-94	78	85	·057	37·9	·351
225	"	"	1893-94	69	83	·071	34·2	·415
202	"	"	1893-94	72	73	·063	32·6	·360
239	"	"	1893-94	85	102	·053	42·4	·345
218	"	"	1893-94	69	78	·067	32·6	·383
149	"	Z. S. No. 1. (used as Z. T.)	1898-99	74	80	·124	35·3	·737
131	"	"	1898-99	74	75	·134	35·5	·799
226	"	"	1898-99	82	90	·080	30·5	·442
168	"	"	1898-99	79	87	·079	36·4	·476
231	"	"	1898-99	72	81	·080	35·8	·478
186	"	"	1898-99	65	77	·076	30·1	·417
234	"	"	1898-99	60	70	·077	29·6	·419
169	"	"	1898-99	67	84	·069	34·5	·405
119	"	"	1898-99	58	70	·075	24·3	·370
221	"	"	1899-1900	70	84	·060	35·0	·355
227	"	"	1899-1900	74	86	·044	37·0	·268
130	"	"	1899-1900	83	108	·050	41·5	·322
137	"	"	1899-1900	85	106	·060	39·5	·377
141	"	"	1899-1900	80	92	·049	40·0	·310
219	"	"	1899-1900	67	121	·050	49·5	·352
216	"	"	1899-1900	68	90	·050	34·0	·292
114	G. A. B.	Z. T.	1897-98	43	37	± 0·103	18·9	± 0·448
116	"	"	1897-98	44	40	·091	19·9	·406
113	"	"	1897-98	39	39	·065	18·4	·279
115	"	"	1897-98	43	47	·095	21·3	·439

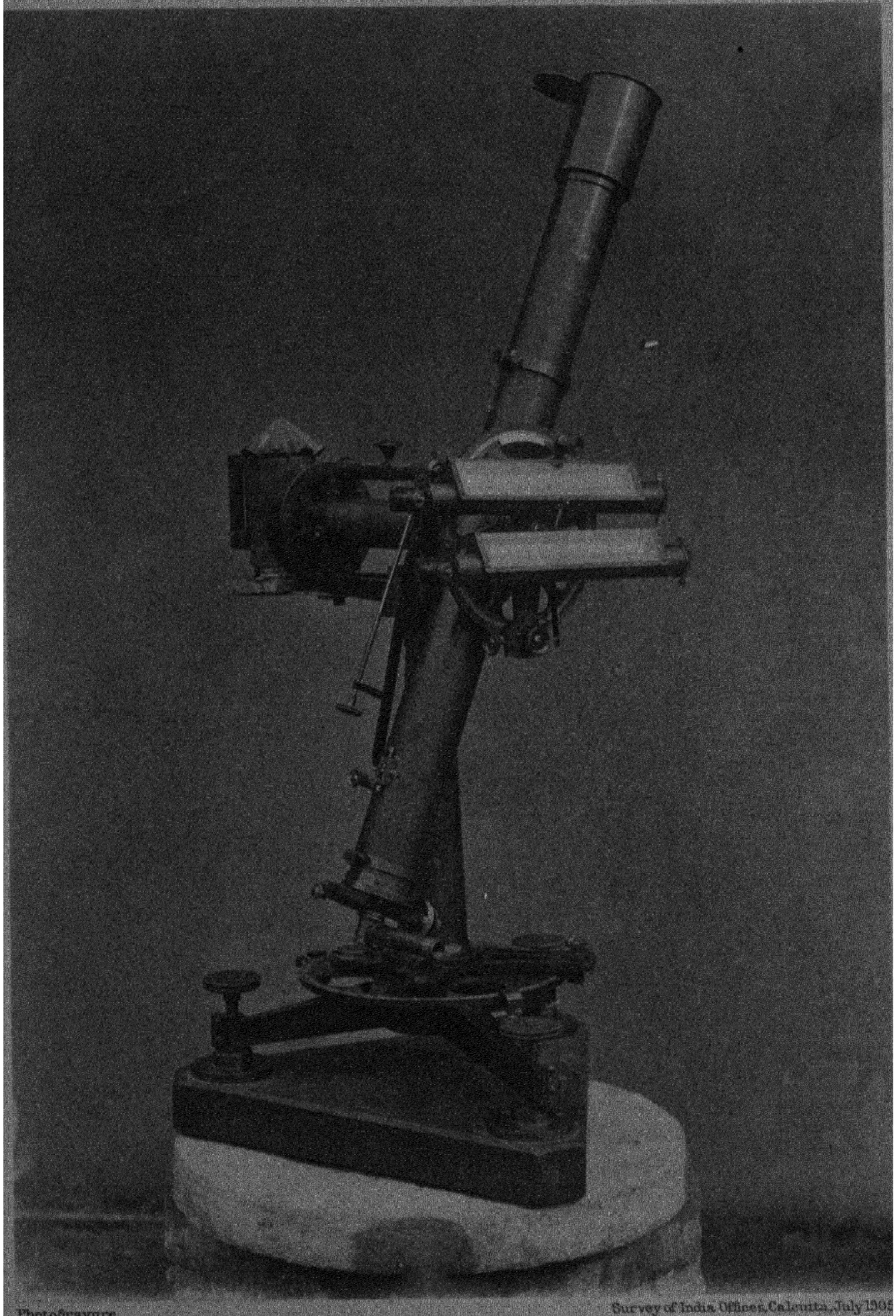
TABLE III.—Details relating to observations by the Talcott Method.

Reference Number	Observer	Instrument	Season	No. of Stars	No. of Observations	p. e.	Σ P	p. e. of result of unit weight
						"		"
117	G. P. L. C. & G. A. B.	Z. T.	1897-98	61	140	± 0·061	38·7	± 0·379
118	„	„	1897-98	53	66	·069	27·8	·364
238	E. A. T.	Z. T.	1898-99	100	100	± 0·065	48·6	± 0·453
214	„	„	1898-99	85	87	·076	40·9	·486
192	„	„	1898-99	87	102	·071	43·6	·469
178	„	„	1898-99	94	110	·063	46·4	·429
148	„	„	1898-99	108	124	·048	53·3	·350
204	„	„	1898-99	85	126	·047	44·8	·314
142	„	„	1898-99	85	95	·061	41·9	·395
153	„	„	1898-99	93	106	·056	45·8	·379
125	„	„	1899-1900	102	110	·052	47·5	·358
171	„	„	1899-1900	100	104	·053	46·5	·361
165	„	„	1899-1900	66	70	·078	31·0	·434
211	„	„	1899-1900	52	60	·076	24·0	·372
203	„	„	1899-1900	62	61	·063	28·5	·336
150	„	„	1899-1900	53	54	·071	23·0	·341
174	H. M. C.	Z. T.	1900-01	92	93	± 0·082	41·9	± 0·531
161	„	„	1900-01	116	111	·036	52·4	·261
237	„	„	1900-01	95	102	·035	44·7	·234
187	„	„	1900-01	69	39	·053	23·7	·258
215	„	„	1900-01	113	127	·032	53·4	·234
144	„	„	1900-01	105	115	·036	49·7	·254
177	„	„	1900-01	98	118	·032	48·3	·222
122	„	„	1900-01	101	108	·034	46·8	·233
172	„	„	1900-01	90	100	·028	43·7	·185
120	„	„	1900-01	45	50	·073	22·0	·342
213	„	„	1900-01	27	27	·065	12·4	·229
188	„	„	1901-02	80	91	·040	36·9	·243
146	„	„	1901-02	90	100	·051	42·6	·333
143	„	„	1901-02	75	74	·058	34·1	·339

TABLE III.—Details relating to observations by the Talcott Method.

Reference Number	Observer	Instrument	Season	No. of Stars	No. of Observations	p. e.	Σ P	p. e. of result of unit weight
						"		"
185	H. M. C.	Z. T.	1901-02	58	64	± 0·057	26·8	± 0·295
166	,,	,,	1901-02	41	83	·056	25·0	·280
224	,,	,,	1901-02	33	42	·080	16·9	·329
181	,,	,,	1901-02	35	57	·060	20·5	·272
223	,,	,,	1901-02	19	20	·092	8·6	·270
235	,,	,,	1901-02	21	17	·096	8·9	·286
205	,,	,,	1901-02	23	14	·073	8·4	·212
164	,,	,,	1902-03	46	94	·049	28·2	·260
191	,,	,,	1902-03	67	104	·039	38·5	·242
123	,,	,,	1902-03	60	109	·038	34·1	·222
126	,,	,,	1902-03	66	103	·026	35·9	·156
188	,,	,,	1902-03	62	127	·034	37·3	·208
152	,,	,,	1902-03	50	188	·040	36·0	·240
222	,,	,,	1902-03	33	102	·043	22·3	·203
197	,,	,,	1902-03	40	121	·049	27·5	·257
133	,,	,,	1902-03	31	51	·052	18·4	·223
179	,,	,,	1903-04	34	36	·073	14·1	·274
183	,,	,,	1903-04	39	43	·099	17·5	·414
129	,,	,,	1903-04	34	32	·077	12·6	·273
128	,,	,,	1903-04	34	36	·102	11·8	·351
157	,,	,,	1904-05	29	49	·079	16·7	·323
195	,,	,,	1904-05	49	52	·113	23·9	·553
207	,,	,,	1904-05	31	39	·101	14·6	·386
121	,,	,,	1904-05	34	39	·063	14·5	·240
196	,,	,,	1904-05	42	41	·059	19·7	·262

PLATE I



Photogravure.

Survey of India Offices, Calcutta, July 1905

THE ZENITH TELESCOPE OF THE GREAT TRIGONOMETRICAL SURVEY OF INDIA.

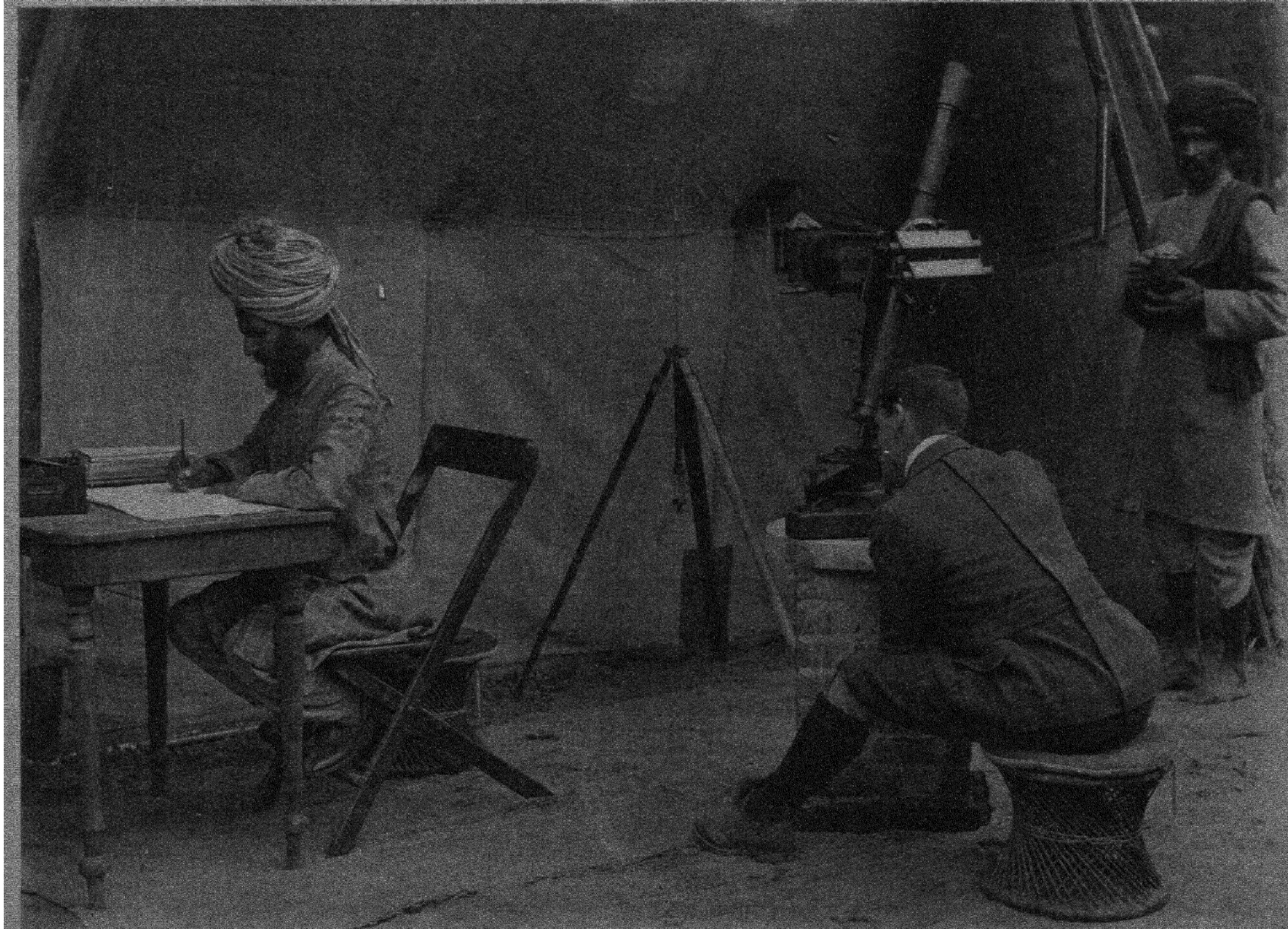
PLATE II.

Photogravure.

Survey of India Offices, Calcutta, July 1905.

LATITUDE OBSERVATIONS WITH THE ZENITH TELESCOPE.

PLATE III



Photogravure.

Survey of India Offices, Calcutta, July 1905.

LATITUDE OBSERVATIONS WITH THE ZENITH TELESCOPE

PLATE VI

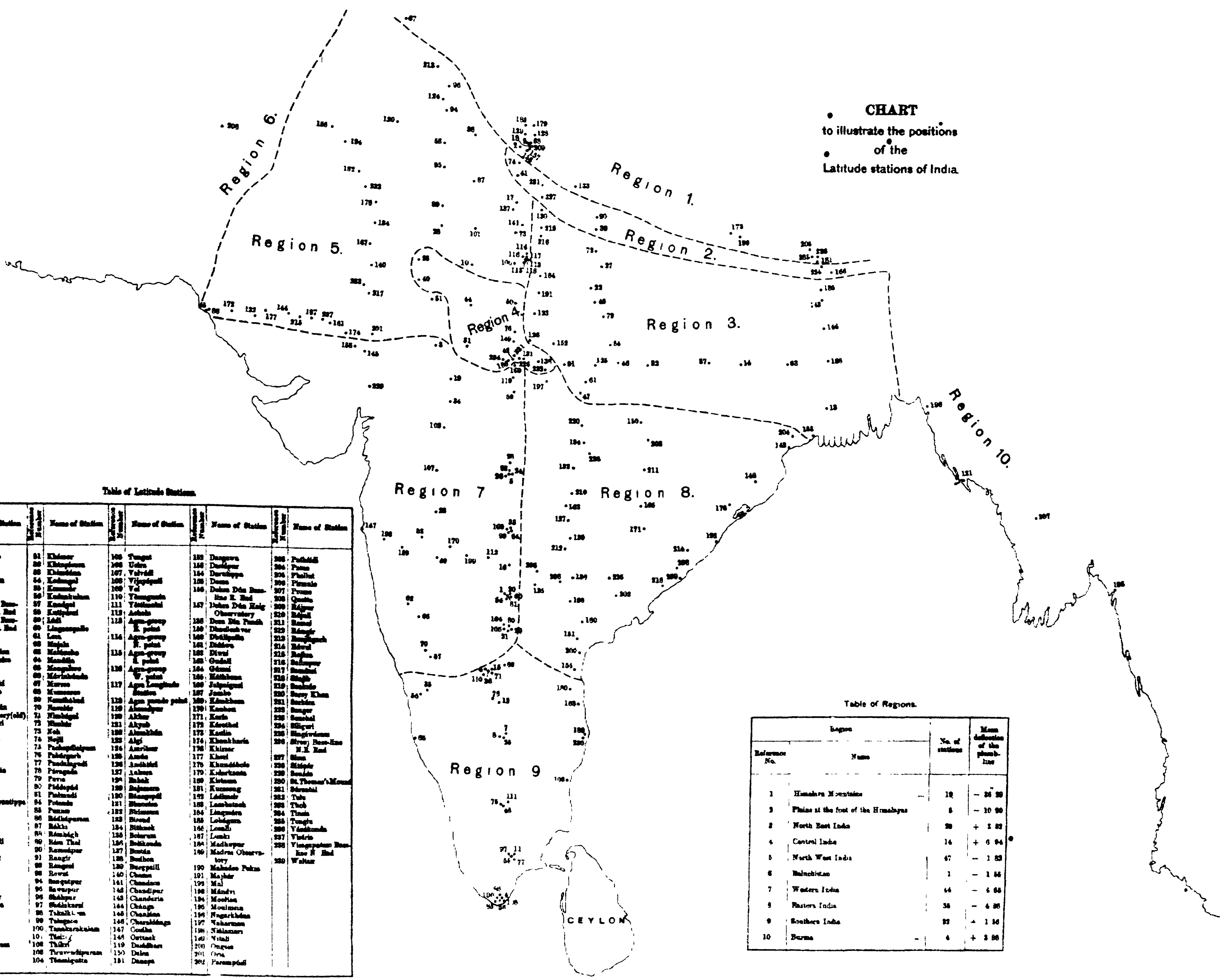


Table of Regions.

Region		No. of stations	Mean deflection of the plumb-line
Reference No.	Name		
1	Himalaya Mountains	12	− 25″ 20
2	Plains at the foot of the Himalayas	8	− 10 90
3	North East India	20	+ 2 83
4	Central India	14	+ 6 94
5	North West India	47	− 1 83
6	Baluchistan	1	− 1 55
7	Western India	44	− 4 66
8	Eastern India	38	− 4 36
9	Southern India	22	+ 1 16
10	Burma	4	+ 3 86

Table of Latitude Stations.

Reference Number	Name of Station
1	Ahmapalle
2	Ámnot
3	Assanlie
4	Asurikulam
5	Badgaon
6	Banddr
7	Bangalore Base-line N.E. End
8	Bangalore Base-line S.W. End
9	Banog
10	Bánskho
11	Block Station
12	[illegible]
13	Calcutta
14	Chandwár
15	Chikalgurid
16	Dámargida
17	Datairi
18	Dehra Dún Observatory (old)
19	Dee Dongri
20	Devandr
21	Devanagut
22	Devarada
23	Dhaignon
24	Dhivara
25	Doddagunta
26	Dotra
27	Etora
28	Garinda
29	Guttinadivyanttippa
31	Gunáro
32	Gurwáni
33	Halda
34	Harnám
35	Hosanavalli
36	Hosur
37	Hurilong
38	Isanpur
39	Jardra
40	Jetgarh
41	Kalchna
42	Kalianpur
43	Kándikhera
44	Kánkra
45	Karachi
46	Kartera
47	Karundi
48	Kátpalliayam
49	Kera
50	Kesri

Reference Number	Name of Station
51	Khámor
52	Khitaparam
53	Khánddna
54	Kodangal
55	Konandr
56	Kudankulam
57	Kandápi
58	Kattipári
59	Lídi
60	Lingampalle
61	Lora
62	Majala
63	Malkanha
64	Mandlia
65	Mangalore
66	Mávinhalada
67	Marwa
68	Mussoorie
69	Kamtháhad
70	Navaldr
71	Nimbágal
72	Nimkhár
73	Noh
74	Nojli
75	Pachapalliyam
76	Pahárgarh
77	Pandulagudi
78	Pávagada
79	Parra
80	Piddapád
81	Pindwadi
84	Potanda
85	Punnae
86	Rádhápuram
87	Rákha
88	Rámbágh
89	Rám Thal
90	Ramanápur
91	Rangir
92	Rángrai
93	Rewat
94	Sanquápur
95	Savurpur
96	Sháhpur
97	Sholakarai
98	Takalk..m
99	Talegaon
100	Taranakrakulam
101	Thaing
102	Thári
103	Tiruvadipuram
104	Thamigutta

Reference Number	Name of Station
105	Tungat
106	Udra
107	Valvádi
108	Vijayapuri
109	Vel
110	Yámangunta
111	Yástimadai
112	Achola
113	Agra-group E. point
114	Agra-group N. point
115	Agra-group S. point
116	Agra-group W. point
117	Agra Longitude Station
118	Agra pseudo point
119	Ahmadpur
120	Akbar
121	Alyub
122	Ahmadkhán
123	Algi
124	Amritsar
125	Amda
126	Andhiári
127	Ashura
128	Babak
129	Bajnaura
130	Bánaganpalli
131	[illegible]
132	[illegible]
133	Birond
134	Bithnok
135	Bolarum
136	Bodikonda
137	Botán
138	Budhon
139	Burgpalli
140	Chama
141	Chandanu
142	Chandipur
143	Chanderia
144	Chánga
145	Chanihan
146	Charaldánga
147	Cordha
148	Cuttack
149	Dadáhari
150	Dalea
151	Damepa

Reference Number	Name of Station
152	Dangaura
153	Daulatpur
154	Durakuppa
155	Dema
156	Dehra Dún Base-line E. End
157	Dehra Dún Haig Observatory
158	Dera Din Panah
159	Dhandhukwar
160	Dhulipalle
161	Didárea
162	Diwai
163	Gudali
164	Gámai
165	Háthikera
166	Jalpaiguri
167	Jumbo
169	Kánkhera
170	Kambon
171	Karla
172	Karothai
173	Kastia
174	Khankharia
176	Khirsar
177	Khori
178	Khunddbola
179	Kodarkanta
180	Kirtnam
181	Kunnsang
182	Ladimnir
183	Lambatach
184	Lingmára
185	Lohagaon
186	Lonáli
187	Lonkr
188	Madhupur
189	Madras Observatory
190	Mahadeo Pokra
191	Majhár
192	Mal
193	Mándvi
194	Moolan
195	Moulmein
196	Nagarkhána
197	Naharmau
198	Nálamara
199	Nitali
200	Ongoe
201	Oria
202	Parampádi

Reference Number	Name of Station
203	Padahádi
204	Patna
205	Phalut
206	Piranda
207	Prome
208	Quetta
209	Rájpur
210	Rájali
211	Ramad
212	Rángir
213	Rangiagarh
214	Rawal
215	Rajhra
216	Salimpur
217	Sandani
218	Sháh
219	Sankalo
220	Sarey Khan
221	Sarkira
222	Sangar
223	Sonahal
224	Siliguri
225	Singiwáram
226	Sirony Base-line N.E. End
227	Sima
228	Sitápur
229	Sonáda
230	St. Thomas's Mount
231	Sárantál
232	Tuba
233	Thob
234	Tinnia
235	Tongla
236	Vánakonda
237	Vitoria
238	Vizagapatam Base-line N. End
239	Waltair

PLATE VII

COLLIMATOR PILLAR USED IN THE LONGITUDE OBSERVATIONS, 1876.

LAMBTON'S STATION OF ORIGIN, 1802.

GRANITE PILLAR FOR THE ZENITH TELESCOPE, 1890.

BRICK PILLAR FOR THE ZENITH SECTOR, 1897.

Photogravure.

Survey of India Offices, Calcutta, December, 1905.

OBSERVATIONS FOR LATITUDE AT MADRAS IN 1897.