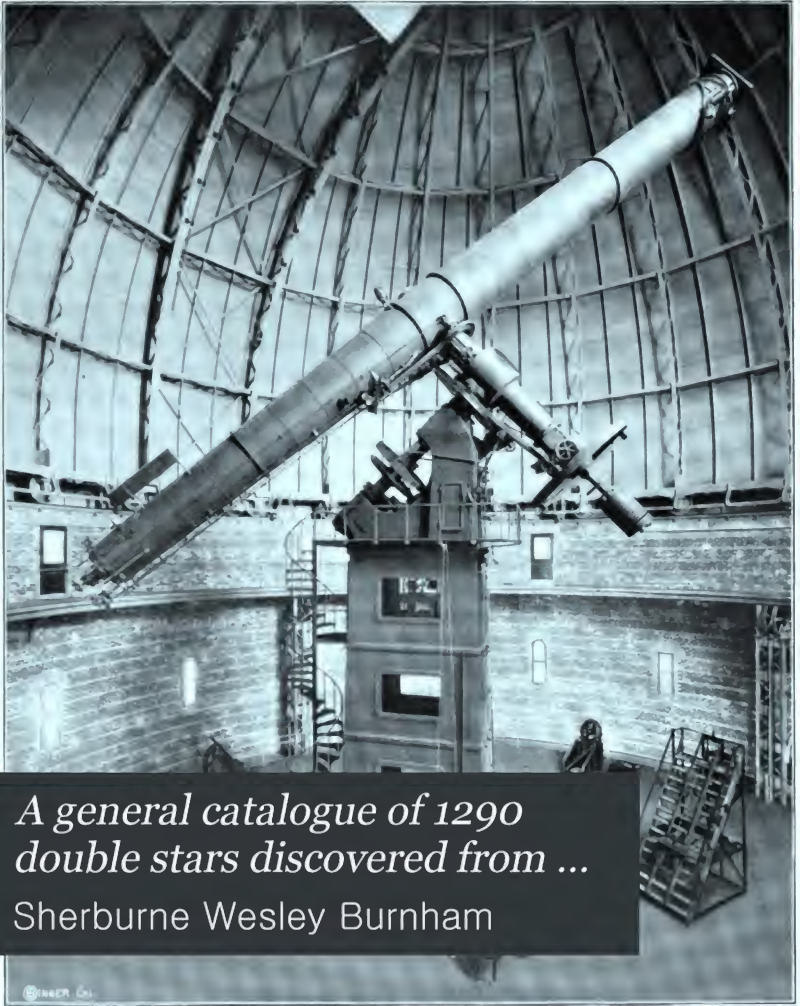
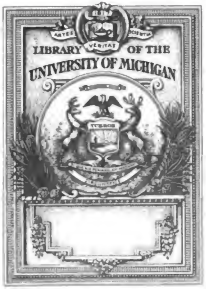
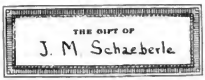
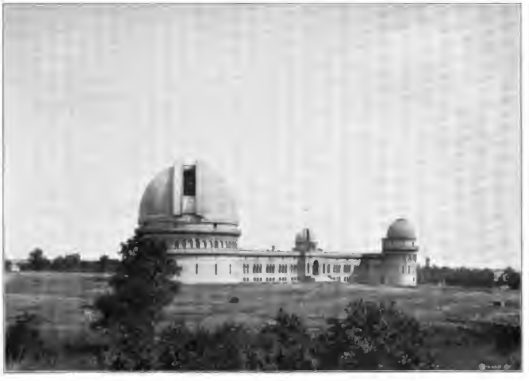


A general catalogue of 1290 double stars discovered from ...

Sherburne Wesley Burnham







THE YERKES OBSERVATORY OF THE UNIVERSITY OF CHICAGO

PUBLICATIONS

OF THE

YERKES OBSERVATORY

OF THE

UNIVERSITY OF CHICAGO

VOLUME I

CHICAGO
THE UNIVERSITY OF CHICAGO PRESS
1900

THE 40-INCH CLARK TELESCOPE OF THE YERKES OBSERVATORY
MOUNTED BY WARNER & SWASEY

A GENERAL CATALOGUE

OF

1290 DOUBLE STARS

DISCOVERED FROM 1871 TO 1899 BY S. W. BURNHAM. ARRANGED IN ORDER OF RIGHT ASCENSION WITH ALL THE MICROMETRICAL MEASURES OF EACH PAIR

BY

S. W. BURNHAM

CHICAGO

THE UNIVERSITY OF CHICAGO PRESS

1900

TO THE MEMORY OF

BARON DEMBOWSKI

THE DISTINGUISHED DOUBLE STAR OBSERVER, THE FIRST TO UNDERTAKE THE SYSTEMATIC MEASUREMENT OF THESE STARS, AND WHOSE KINDLY CRITICISM AND GENIAL ENTHUSIASM WERE TO THE WRITER ALWAYS AN INSPIRATION

THIS VOLUME

IS GRATEFULLY INSCRIBED

INTRODUCTION

A general catalogue of all the double stars discovered by me from time to time during the past twenty-five years has long been needed by those interested in this field of astronomical research, and, by reason of the special interest attached to many of these remote sidereal systems, it has become more and more important to bring the scattered material together in order to intelligently pursue the investigations which promise to so much increase our knowledge of the great universe beyond the solar system. These discoveries are scattered through nineteen different catalogues, published at various times and places, commencing with 1873; and the observation of these stars by a great number of astronomers in this country and in Europe can only be made use of by consulting hundreds of volumes of observatory and society publications, astronomical periodicals, etc. It is difficult, if not practically impossible, for the general observer or investigator to make a really complete collection of all the measures of a large number of these stars. Many of the observations are in obscure and unusual places, and in works not always readily accessible.

This general catalogue was arranged and prepared for publication in the latter part of my connection with the Lick Observatory, 1888-1892, and most of my work with the great 36-inch refractor of Mt. Hamilton during those four years was devoted to the careful remeasurement of the stars contained in the catalogues published prior to that time, and to the discovery and observation of another and more difficult class of doubles for which that splendid instrument is so well adapted. A new field was opened which was beyond the reach of most of the telescopes of the world. The pages of this catalogue will bear witness to the importance of the additions in the way of new measures and new systems made at the Lick Observatory during this time. For various reasons this catalogue was not published at that time. Since then it has been kept up to date by the addition of all the more recent measures, and the places recomputed by using later star catalogues, particularly those of the *Astronomischen Gesellschaft*, so far as published, the Cordoba catalogues of southern stars, and the other recent publications, in lieu of the places originally taken from Lalande, Argelander's Durchmusterung, Weisse, etc. In this way some minor errors have been eliminated in the places, and in the identity of some of the stars. No attempt has been made to make this work a substitute for original star catalogues with respect to the absolute places of these stars in the heavens. As these positions have no other use than for finding the objects with the telescope, it was not considered worth while to reduce them to any later epoch than that used in the several original double star catalogues, that epoch being uniformly 1880. In the star catalogue references, preference has been given, where the stars are below the naked-eye limit, to the old standard catalogues, although the places have been derived from more modern observations.

THE FIRST OBSERVATIONS

It may not be out of place here to give a brief history of the beginning of this astronomical work. When in London, about 1861, I purchased one of the cheap astronomical telescopes introduced about that time. It had a nominal aperture of three inches, but was without a finder, and had only the simple alt-azimuth mounting, with a common table tripod. It was supplied with a terrestial, as well as astronomical, eyepiece and while it was a good instrument for landscape use, it was of little value for astronomical purposes. Some years later I obtained a 3¼-inch telescope, with an English object-glass, mounted equatorially by Fitz on a portable stand. This was just good enough to be of some use, and poor enough, so far as its optical power was concerned, to make something better more desirable than ever. In 1869 I accidentally met Mr. Alvan G. Clark in Chicago, on his return from Iowa, where he had been to observe the total eclipse of that year, and made some

inquiries of him about a small equatorial. This interview resulted in my ordering from the celebrated firm of Alvan Clark & Sons an equatorial of six inches aperture. I told them what I wanted, and what I wanted it for. Every detail was left entirely to their judgment, stipulating only that its definition should be as perfect as they could make it, and that it should do on double stars all that it was possible for any instrument of that aperture to do. In due course of time this instrument was delivered, and was set up in an observatory prepared for it in the meantime. My attention for some reason or other, which I am unable to explain, had been almost exclusively directed to double stars previous to this while using the smaller telescope referred to. This preference was not in any sense a matter of judgment as to the most desirable or profitable department of astronomical work, or the result of any special deliberation upon the subject. It came about naturally, without any effort or direction upon my part.

At the beginning of the use of the 6-inch telescope my library, so far as the subject of double stars was concerned, was principally confined to the first edition of Webb's *Celestial Objects for Common Telescopes*, and I wish here to record my great indebtedness to this most admirable and really indispensable book. It was of great assistance to me at that time, and it has never ceased to be a valuable and convenient work for frequent reference. It contains about all that the beginner is likely to want in connection with any use of a small telescope. It has passed through several editions since that time, the last one containing many of these stars. The time came finally when other double-star catalogues were necessary. Double stars were frequently found which were not in Webb, and then it was necessary to ascertain what they were. The books at the Dearborn Observatory, then in charge of Professor T. H. Safford, were always accessible to me. This library had some of the principal star catalogues, but very little relating to double stars except Struve's *Mensurae Micrometricae*. The result was that from time to time I made manuscript copies at the Naval Observatory, the Dartmouth College Observatory, and other places, and from books borrowed from these institutions and various astronomers, of the essential results of most of the leading catalogues and observations relating to this subject. These copies included Struve's *Mensurae Micrometricae*, *Positiones Mediae*, and *Catalogus Novus;* the seven catalogues of Sir John Herschel; the catalogues of South, and Herschel and South, in the *Philosophical Transactions;* the *Poulkowa Catalogue* of O. Struve; the measures of Madler in the *Dorpat Observations;* material given in the *Memoirs* and *Monthly Notices of the Royal Astronomical Society*, *Astronomische Nachrichten*, and publications of like character; and many minor contributions, including nearly all the discoveries made after the Struves. While the labor involved in doing this work was very great, there was perhaps a corresponding advantage gained in acquiring a more thorough familiarity with the literature of this subject. Since that time these and many other works of like character have been obtained, and my library is practically complete, so far as double-star material is concerned.

The want of a single catalogue of all the double stars visible in the northern hemisphere was very manifest soon after the commencement of the observations with the 6-inch refractor. Many pairs were picked up on every good night which it was desirable to identify with as little loss of time as possible. If wanting in Struve, Herschel, and other of the old catalogues, they might still be known pairs, and it was unsafe to assume that they had not been before observed, without a careful examination of many minor lists, catalogues and observations of various kinds, scattered throughout a large number of volumes issued by observatories and societies, periodicals, handbooks and monographs printed in the last hundred years. I was therefore compelled in the interest of my own work to bring this material together and arrange all the pairs in order of Right Ascension in a general catalogue. In this way I made a manuscript catalogue of every known double star within 121° of the north pole, giving the details of measures, magnitudes, star catalogue references, etc. With this at hand, it was but a moment's work at the telescope to identify any known object, and to decide at

once whether or not an object thus found was really a new pair. This catalogue subsequently passed into a second manuscript edition, more complete and perfect in respect to some details. All the star places were reduced to a common epoch, and every measure of each pair was either given or cited. This served the purpose for a good many years, but the time came when the manuscript became too crowded by the interlineation of stars discovered by myself, and by other observers, and by the addition of a great number of references to measures and observations, and then I undertook the preparation of a third manuscript edition, which was arranged in the proper form for printing, with ample space for new stars and new observations, and giving a brief statement or discussion of the character of each pair of any general interest. This catalogue, substantially bound in twelve volumes, has all the time been kept posted to date by the addition of all new material as soon as printed, and many unpublished discoveries and observations. This general catalogue in its various forms has been of the greatest value and assistance to me from the beginning in all this work. In fact, it rendered possible all that has been accomplished in this field. Very few will fully appreciate the enormous amount of hard work which has been necessarily expended in the preparation of such a work. Whether it will ever assume other than the present manuscript form remains to be seen. It should be remarked in this connection that, with the exception of the four years, 1888-1892, all of this astronomical work, with the telescope and otherwise, has been done when eight or more hours of at least six days in the week were more or less occupied with other and very different affairs of life.

THE ORIGINAL LISTS OF NEW DOUBLE STARS

My discoveries of double stars may be said to have commenced in 1872, although the 6-inch Clark refractor had been in my possession for a year or two previously. A complete list of the nineteen catalogues, which are included in this work is as follows:

First Catalogue (β 1 to 81). *Monthly Notices of the Royal Astronomical Society*, XXXIII, 351 (March 1873). Discovered with the 6-inch refractor.

Second Catalogue (β 82 to 106). *Monthly Notices of the Royal Astronomical Society*, XXXIII, 437 (May 1873). Discovered with the 6-inch refractor.

Third Catalogue (β 107 to 182). *Monthly Notices of the Royal Astronomical Society*, XXXIV, 59 (December 1873). Discovered with the 6-inch refractor.

Fourth Catalogue (β 183 to 229). *Monthly Notices of the Royal Astronomical Society*, XXXV, 382 (June 1874). Discovered with the 6-inch refractor.

Fifth Catalogue (β 230 to 300). *Monthly Notices of the Royal Astronomical Society*, XXXV, 31 (November 1874). Nos. 230 to 252 were discovered with the 6-inch refractor; Nos. 253 to 281 with the 9.4-inch refractor of the Observatory of Dartmouth College, and Nos. 286 to 300 with the 26-inch refractor of the Naval Observatory at Washington.

Sixth Catalogue (β 301 to 390). *Astronomische Nachrichten*, No. 2062. Discovered with the 6-inch refractor.

Seventh Catalogue (β 391 to 436). *Astronomische Nachrichten*, No. 2103. Also reprinted in the *American Journal of Science*, September 1876. Discovered with the 6-inch refractor.

Eighth Catalogue (β 437 to 452). *American Journal of Science* (July 1877). Discovered with the 18½-inch refractor of the Dearborn Observatory.

Ninth Catalogue (β 453 to 482). *Monthly Notices of the Royal Astronomical Society*, XXXVIII, 78 (December 1877). Discovered with the 6-inch refractor.

Tenth Catalogue (β 483 to 733). *Memoirs of the Royal Astronomical Society*, Vol. XLIV. Discovered with the 18½-inch refractor of the Dearborn Observatory. (This volume contains also measures of 500 other double stars with the same instrument.)

ELEVENTH CATALOGUE (β 734 to 775). *Report to the Trustees of the James Lick Trust of Observations made on Mt. Hamilton with reference to the Location of the Lick Observatory, 1880.* Observations with the 6-inch refractor on Mt. Hamilton in 1879. There are measures of a few of the old pairs with the same instrument. (This report is reprinted in *Publications of the Lick Observatory*, Vol. I.)

TWELFTH CATALOGUE (β 776 to 863). *Publications of the Washburn Observatory*, Vol. I. Observations with the 15½-inch equatorial of the Washburn Observatory, Madison, Wis., in 1881. (This volume contains also several hundred measures of other double stars.)

THIRTEENTH CATALOGUE (β 864 to 1025). *Memoirs of the Royal Astronomical Society*, Vol. XLVII. Nos. 864 to 997 discovered with the 18½-inch refractor of the Dearborn Observatory; Nos. 998 to 1013 with the 12-inch of the Lick Observatory in October 1881; and Nos. 1014 to 1025 with the 18½-inch at Chicago. (This volume contains a large number of measures of Struve and other pairs.)

FOURTEENTH CATALOGUE (β 1026 to 1038). *Astronomische Nachrichten*, No. 2875. Observation with the 12 and 36-inch refractors of the Lick Observatory. The numbers were inadvertently omitted, but are given in the introduction to Catalogue XV. (*Astronomische Nachrichten* 2875 also contains measures of other stars.)

FIFTEENTH CATALOGUE (β 1039 to 1092). *Astronomische Nachrichten*, Nos. 2929, 2930. Observations with the 36-inch refractor. (Also measures of other double stars.)

SIXTEENTH CATALOGUE (β 1093 to 1154). *Astronomische Nachrichten*, Nos. 2956, 2957. Observations with the 36-inch refractor. (Also measures of other double stars.)

SEVENTEENTH CATALOGUE (β 1155 to 1224). *Astronomische Nachrichten*, Nos. 3047, 3048. Observations with the 36-inch refractor, and measures of other stars.

EIGHTEENTH CATALOGUE (β 1225 to 1266). *Astronomische Nachrichten*, Nos. 3113, 3114. Observations with the 36-inch refractor, and measures of other stars.

NINETEENTH CATALOGUE (β 1267 to 1274). *Astronomische Nachrichten*, Nos. 3141, 3142. Observations with the 36-inch refractor. (Catalogues XIV to XIX are given in *Publications of the Lick Observatory*, Vol. II.)

———————— (β 1275 to 1290). Published for the first time in this volume.

THE TELESCOPES USED

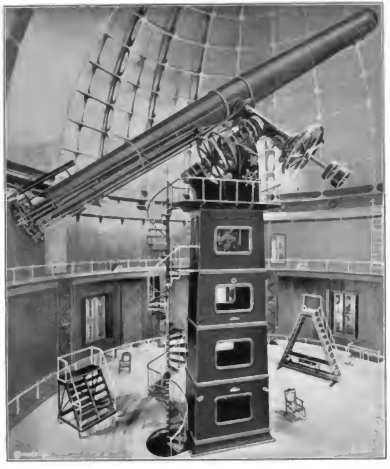
It is worthy of note in this connection that all of these new stars, without exception, were discovered with telescopes made by Alvan Clark & Sons. In one sense the success of this work is due to these eminent opticians, for nothing is more certain than that these discoveries could not have been made with any other class of telescopes. These instruments in order of aperture are as follows:

The 6 inch refractor. It is hardly necessary to say, in view of the discoveries made with it and given in this catalogue, that its performance on the most difficult objects was simply perfect. Many of the stars discovered with it are by no means easy to measure with the largest telescopes now in use. Some of the most rapid and interesting binaries in this catalogue were discovered with this instrument. It now belongs to the Washburn Observatory of the University of Wisconsin.

The 9.4 inch refractor of the Dartmouth College Observatory. During the summer of 1874 I spent a vacation within a few miles of this place. Before leaving for China on the Transit of Venus expedition, Professor Young very kindly placed his telescope at my disposal, and I spent some ten nights at that Observatory, with the results given in the *Fifth Catalogue*.

The 12 inch refractor of the Lick Observatory. The discoveries made with this telescope when I was on Mt. Hamilton for the second time, in 1881, are found in the *Thirteenth Catalogue*. The observations from 1888 to 1892 are contained in the Mt. Hamilton catalogues. Some of the most difficult pairs were discovered with this instrument, for instance, σ *Orionis*, ζ *Andromedae*, etc.

The 15.5-inch refractor of the Washburn Observatory at Madison, Wisconsin. The results of some four or five months' work with that telescope in 1881 will be found in the *Twelfth Catalogue* (*Publications of the Washburn Observatory*, Vol. I.) This is an excellent instrument, and very convenient to use in all its appointments.



THE 36-INCH CLARK TELESCOPE OF THE LICK OBSERVATORY
MOUNTED BY WARNER & SWASEY

The 16-inch refractor of the Warner Observatory at Rochester, N. Y. I had the pleasure of spending an evening with Dr. Lewis Swift, and picked up two or three new pairs which are given in my later catalogues. This fine instrument is now at the Lowe Observatory, in southern California.

The 18.5-inch refractor of the Dearborn Observatory at Chicago. This, at the time it was made, was the largest refractor in the world; and, although one of the early works of Clark & Sons, the definition of the object-glass is as perfect as any of their later productions. This is established by the discoveries and measures in my *Tenth* and *Thirteenth Catalogues*. The Dearborn Observatory, at that time, was attached to the old University of Chicago, and was located about three and a half miles from the business center of the city.

The 26-inch refractor of the Naval Observatory at Washington. I had the privilege of using this instrument one night in 1874, and found the new stars given in my *Fifth Catalogue*.

The 36-inch refractor of the Lick Observatory. With reference to the superb definition and light-power of the great telescope, it is sufficient to refer to the discoveries, and the measures of difficult objects contained in my last five catalogues. These will demonstrate the immense superiority of this instrument over all others elsewhere. There is probably no place in the world, where an observatory has been established, which can compare favorably with Mt. Hamilton.

The 40-inch refractor of the Yerkes Observatory. In the last two years I have given the time spent at the Yerkes Observatory to the re-measurement of these stars, where recent measures were wanting, and where change was shown by the prior observations. Much of the time the most difficult of these pairs could not be observed under the conditions present. All the measures given in the following pages, as made by me in 1897, 1898, and 1899, were made with this instrument. Altogether I have made about 950 measures of these pairs. Of course the number of measures which can be made in a given time with so large an instrument is much less than it would be with the other equatorials used in this work. More time is necessarily used in setting on stars in different parts of the sky than would be required with a moderately large aperture. When the 40-inch refractor is moved by hand, as it must be in getting every object into the field, it is necessary to move about twenty tons.

In the course of these observations, sixteen new pairs, Nos. 1275 to 1290, have been added to this catalogue, eight of which were noted with the large refractor. The others were stars discovered many years ago, some at Mt. Hamilton, and others at the old Dearborn Observatory, but were forgotten to be included in the catalogues of that time. In looking over my old observing books, I have made a note of some of these omissions, and as far as possible recovered and measured them for this work.

DISTRIBUTION OF DISCOVERIES

An examination of this catalogue to ascertain the distribution of the discoveries among the several telescopes used in this work shows the following:

6-inch—Private Observatory	451
18½-inch—Dearborn Observatory	413
36-inch—Lick Observatory	198
15½-inch—Washburn Observatory	87
12-inch—Lick Observatory	56
9.4-inch—Dartmouth College Observatory	24
26-inch—Naval Observatory	14
40-inch—Yerkes Observatory	8
16-inch—Warner Observatory	2

MICROMETRICAL MEASURES

The first measures of these stars were made by the late Baron Dembowski. I was fortunate in being placed in communication with this eminent astronomer soon after the commencement of my work with the 6-inch refractor, and from that time on until his death, in 1881, I was in constant correspondence with him, and all of my discoveries were transmitted to him in advance of their

publication. These new stars were measured by him in the most painstaking and thorough manner, and his observations give the fundamental data for comparison with subsequent measures of very many of the most important of these new systems. As an observer with the micrometer he had no superior, and few, if any, equals. His work is of the highest degree of accuracy. He made no mistakes, and wasted no time in idle speculations. He has left a record of honest, thorough and consistent work which will be an honor to his memory for all time. Baron Dembowski was to me an example so inspiring, a critic so genial and frank, a friend so warm-hearted and disinterested that simple justice as well as friendship impels me to inscribe this volume to his memory. The Royal Astronomical Society recognized the value of his services by the award of its gold medal in 1878. The results of his life-work have been published in two large volumes prepared and issued after his death under the direction of the two distinguished astronomers, Otto Struve and Schiaparelli. These observations are indispensable to every observer engaged in this department of work.

My own work with the micrometer commenced with the use of the 18½-inch equatorial of the Dearborn Observatory, situated then in the city of Chicago. It was continued for a few months at the Washburn Observatory, at Madison, Wis., in 1881, and was then suspended until the commencement of my duties at the Lick Observatory in the latter part of 1888. During the four years spent at that place my time was almost exclusively given to the measurement and discovery of double stars. If the discovery of new pairs, regardless of their micrometrical measurement, had been the paramount object, this general catalogue would have been increased by the addition of at least many hundred new pairs; but I deemed it of the first importance to accompany each discovery with a careful set of measures. This seemed the more necessary because most of the pairs found with the large refractor were too difficult for ordinary instruments; and therefore it was very desirable that good positions should be obtained with which future observations, whenever made, could be compared. A considerable portion of the time was given to the re-measurement of the stars previously discovered, and new pairs added no faster than they could be thoroughly observed with the micrometer.

Below is given a list of the principal observers whose measures of these stars are given in this work.

Aitken, R. G.	Engelmann, R.	Schiaparelli, G. V.
Barnard, E. E.	Glasenapp, S.	Scott, J. L.
Boothroyd, S. L.	Hall, Asaph	See, T. J. J.
Bowyer, W.	Hough, G. W.	Sellors, R. P.
Brown, S. J.	Howe, H. A.	Stone, Ormond
Bryant, W. W.	Hussey, W. J.	Struve, H.
Cogshall, W. A.	Lamb, Alice	Struve, O.
Collins, W. H.	Leavenworth, F. P.	Tarrant, K. J.
Comstock, G. C.	Lewis, Thomas	Wilson, H. C.
Dembowski	Maw, W. H.	Updegraff, Milton
Doolittle, E.	Muller, Frank	Upton, Winslow
Dyson, F. W.	Pollock, J. A.	
Egbert, H. V.	Pritchett, H. S.	

NUMBER OF DOUBLE STARS

In giving the number of nights included in the mean result given in the catalogue, I have stated it as the number of complete measures; that is, when distance and position-angle are both measured. In many instances the angle has been measured on a greater number of nights than that given here.

THE 18½-INCH CLARK TELESCOPE OF THE OLD UNIVERSITY OF CHICAGO (DEARBORN OBSERVATORY)

The total number of double stars now known has been greatly overstated by some writers. It has been said that the number is ten thousand and upwards. This is correct if the number is to be arrived at by adding all the stars contained in the various early double star catalogues; but it must be remembered that these lists, and particularly those of the Herschels, include a large proportion of very faint and very wide stars which cannot be called double in the proper sense of the word. The distance between them is much too great to make it in the least probable that the stars have any physical connection. With such a standard the number of pairs could be increased to hundreds of thousands by sweeping with a very moderate aperture. The number recorded in a single night would be limited only by the time occupied in reading the circles, and fixing the star places. The great majority of binary stars are moderately close pairs, where the mean distance does not exceed 2″; and all the short period binaries are very much closer. In the appendix to my *Thirteenth Catalogue* I gave a tabular statement showing the whole number of double stars of Class I (distance 0″ to 1″) and Class II (distance 1″ to 2″) in all the original double star catalogues published at that time. This statement, with my later results added in 1891, is as follows:

	Class I	Class II	Total	Ratio
Burnham. Catalogue of 1260 stars	385	305	690	550 : 1000
O. Struve. Catalogue of 547 stars	154	63	217	400 : 1000
Struve. Catalogue of 2640 stars	91	314	405	150 : 1000
Herschel I. Catalogue of 812 stars	12	24	36	45 : 1000
Herschel II. Catalogue of 3429 stars	2	20	22	7 : 1000

It will be seen from this exhibit that prior to 1870 all the leading double star catalogues combined, including altogether not less than 7400 so-called double stars, contained less than 700 pairs with distances not exceeding 2″. It will be noticed also that 60 per cent. of all known pairs with distances of 1″ and less had been discovered in the preceding twenty years.

It is apparent from this investigation that upon a very liberal estimate there were not more than 4000 or 5000 stars within 120° of the north pole which could be properly called double; and that many of this number were of little interest as physical systems, or likely to become so hereafter. In some instances the recording and measuring of a distinct companion has been of value in determining the proper motion of the primary; and in other instances it has been shown that the proper motion is common to both stars, and that therefore they have some connection with each other.

In recent years many new double stars have been discovered by a number of American observers. Of these special mention should be made of the several catalogues of new pairs recorded by Hough with the 18½-inch of the Dearborn Observatory, which is now connected with the Northwestern University at Evanston, Ill., and of the discoveries by See at the Lowell Observatory. These catalogues contain many close and interesting objects.

THE FIELD FOR DISCOVERY

For many years prior to 1870 it seems to have been practically accepted that the field for the discovery of new pairs had been substantially worked out by the Herschels and the Struves, and that so little had been overlooked by these eminent pioneers in this work that there was little chance for later observers to make many important additions. The great work of the first Struve, *Mensurae Micrometricae*, published in 1827, contained all known double stars within 105° of the north pole. The stars discovered by Herschel I, and other early observers, which were within the wide limits of distance adopted by Struve, are embraced in his great catalogue. His examination of the heavens

in search of new pairs was as complete and thorough as could have been expected under the conditions existing at that time. This was supplemented by the labors of his equally distinguished son, Otto Struve, who continued the work with the more powerful telescope at Poulkowa, and added some four hundred new pairs, published in 1850 as the *Poulkowa Catalogue*. For many years after this there was very little done in this field of astronomy, aside from the measurement of the pairs previously discovered; and that seems to have been taken by observers generally as about the only thing remaining to be done.

In 1842 the late Professor O. M. Mitchel visited Europe for the purpose of inspecting foreign observatories, and purchasing a teleseope for the proposed Cincinnati Observatory. In the interest of this object he visited most of the leading European astronomers, and, among others, Sir James South. This was during, or about, the time of a long litigation which grew out of a contract between this astronomer and a firm of instrument makers who undertook to mount equatorially a large object glass belonging to South. Mitchel, in describing his interview, says:[1]

One apartment was examined after another, until finally we reached a large room surmounted by a dome of great size and of an expensive construction, while fragments of the framework for mounting a great equatorial were scattered around.

"Here, sir," exclaimed Sir James, "you behold the wreck of all my hopes. Here I have expended thousands, and flattered myself that I was soon to possess the finest instrument in Europe; but it is all over, and there's an end."

I remarked that the object-glass was still in his possession, and might yet be mounted so as to realize his hopes and expectations.

"No," said Sir James, "Struve has reaped the golden harvest among the double stars, and there is little now for me to hope or expect."

It would be difficult to appreciate the feelings which at that moment were sweeping through the mind of the astronomer. Long cherished visions of fame and high distinction, nay, perhaps of grand discoveries in the heavens, which for years had played round his hopes of the future, had fled forever. Another had reaped the golden harvest, and like Clairaut, who wept that there was not for him, as for Newton, the problem of the universe to solve, Sir James South could almost weep to think that another's eye had been permitted to sweep over the far distant realms of space which he had long hoped might remain his own peculiar province.

Such views seem very strange at this time, when, if one is absolutely certain of anything in this direction, it is that there is much more to do, even now, after the lapse of half a century, in every department of double star work, than there ever was before. The late Rev. T. W. Webb, author of *Celestial Objects for Common Telescopes*, one of the most eminent English amateur astronomers, in a letter written to me in 1873, after the publication of my first three catalogues, said: "It will hardly be possible for you to go on for any great length of time as you have begun, because the number of such objects is not interminable, and every fresh discovery is one less to be made; still, what you have already done is so much more than any man now living has accomplished, that your high position as an observer is fully secured." Since that time more than one thousand new double stars have been added to my own catalogues, and the prospect of future discoveries is as promising and encouraging as when the first star was found with the six-inch telescope. The gold medal of the Royal Astronomical Society was awarded in 1894 for these discoveries.

NEW STARS TO OLD PAIRS

As would be expected in discoveries of this kind, many of the old pairs recorded by the Herschels, the Struves, and other astronomers, have been found to be triple or quadruple, by the addition of much closer and more difficult components. This catalogue contains 133 stars of this

[1] *Ormsby MacKnight Mitchel: Astronomer and General.* A biographical narrative. By his son, F. A. Mitchel, 1887.

THE 6-INCH CLARK REFRACTOR, NOW AT THE WASHBURN OBSERVATORY, UNIVERSITY OF WISCONSIN

class, or more than one tenth of the whole number is made up of previously known doubles, where one of the components has been again divided, or a much nearer star added to the system. Most of these were difficult objects when discovered, and all of them much more difficult than the old stars. In this way some pairs, much too wide to be of any interest as double stars, have been shown by the discovery of the new star to be important binary systems, and among the most rapid known.

The following is a classified list of the pairs given in the several catalogues of the Herschels, the Struves, and South, which I have found to be more closely double:

W. STRUVE

Σ	PAGE
17	3
100	18
117	20
157	24
171	25
258	30
524	34
366	37
439	41
468	43
645	58
668	59
687	61
692	62
707	63
721	64
734	66
753	67
762	68
809	72
888	77
1026	85
1057	87
1097	89
1179	96
1780	128
1835	133
2005	147

W. STRUVE

Σ	PAGE
2130	155
2268	171
2287	173
2342	180
2476	188
2538	192
2539	193
2549	194
2557	195
2704	212
2793	229
2816	233
2824	235
2959	254
3018	261
3047	267

HERSCHEL II.

H	PAGE
367	65
607	204
998	271
1455	199
1489	203
1499	206
1554	214
1828	252

HERSCHEL II

H	PAGE
1981	7
2161	33
2298	75
2638	123
2661	127
2710	133
2867	190
3133	249
3216	266
3261	53
3275	63
3644	47
3761	64
3780	69
3875	81
4774	142
4803	144
4935	160
5009	170
5028	172
5035	173
5072	184
5532	256

HERSCHEL I.

H	PAGE
V. 92	25

HERSCHEL I

H	PAGE
VI. 66	49
VI. 35	57
V. 25	61
V. 21	70
V. 93	73
VI. 70	90
III. 27	91
VI. 42	91
IV. 26	97
VI. 78	97
IV. 120	102
V. 124	130
III. 7	146
V. 6	148
III. 113	202
V. 95	244
VI. 21	250

SOUTH

S	PAGE
409	29
423	35
437	42
537	82
571	100
627	114
663	137

SOUTH

S	Page
738	203
752	210
781	225

SOUTH AND HERSCHEL

Sh	Page
110	107
120	114
179	134
255	169
263	176
264	176
376	141

O STRUVE

OΣ	Page
24	17
169	86
173	90
242	117
336	167
367	189
425	220
447	232

W. STRUVE (Appendix)
Wide Pairs

Σ	Page
14 App. I	65
21 App. I	120
24 App. I	124

W. STRUVE (Appendix)
Wide Pairs

Σ	Page
38 App. I	181
39 App. I	183
58 App. I	247
12 App. II	257

O. STRUVE (Appendix)
Wide Pairs

OΣ	Page
App. 12	17
App. 38	41
App. 77	79
App. 177	189
App. 209	215
App. 215	225
App. 220	232
App. 234	245

NEW NAKED-EYE DOUBLE STARS

In nearly one fourth of the whole number of stars found to be double, the primary is bright enough to be visible to the unaided eye. These stars, numbering altogether 291, are pretty well distributed among the different constellations visible in this latitude. Many of them are among the most prominent of the bright and well-known stars. To facilitate easy reference to these stars, when only the constellation name is given, I have arranged them under the heads of the constellations in which they are found.

β	Star	Page
	Andromeda	
1095	28 Andromedae	5
491	δ Andromedae	9
999	ω Andromedae	20
1147	2 Andromedae	255
717	8 Andromedae	259
388	W^1 XXII. 590	262
995	Groombridge 4139	265

β	Star	Page
	Aquarius	
1034	7 Aquarii	219
73	β Aquarii	230
1212	24 Aquarii	232
172	51 Aquarii	244
178	Aquarii 252	252
1220	ψ^1 Aquarii	257
279	ω^2 Aquarii	264

β	Star	Page
	Aquila	
287	ζ Aquilae	187
653	μ Aquilae	193
672	71 Aquilae	214
	Argo	
755	Argus 34	81
757	Argus 101	86
578	Lalande 14545	89
1061	κ Argus	91
1063	ξ Argus	92
101	9 Argus	92
1064	19 Argus	97
208	Lalande 17103	101
	Aries	
522	μ Arietis	32
306	Arietis 307	32
878	66 Arietis	39
	Auriga	
554	ε Aurigae	57
1046	9 Aurigae	57
888	σ Aurigae	62
1240	26 Aurigae	66
192	τ Aurigae	70
893	B.A.C. 1935	74
901	65 Aurigae	87
	Bootes	
1111	B.A.C. 4766	133
616	γ Bootis	135
1086	47 Bootis	140
	Caelum	
750	γ Caeli	58
	Camelopardalis	
1043	3 Camelopardali	51
1187	5 Camelopardali	55

β	Star	Page
	Cancer	
1065	β Cancri	98
	Canes Venatici	
925	Groombridge 1938	121
930	B.A.C 4389	123
608	17 Canes Ven.	124
	Canis Major	
753	λ Canis Majoris	80
328	Canis Majoris 139	85
329	Canis Majoris 146	85
	Canis Minor	
21	η Canis Minoris	89
	Capricornus	
294	3 Capricorni	204
295	α^1 Capricorni	204
60	π Capricorni	208
61	ρ Capricorni	208
668	B.A.C. 7080	210
	Cassiopeia	
1094	Lalande 655	5
231	ο Cassiopeiae	10
492	B.A.C. 201	10
497	B.A.C. 239	13
1098	υ^2 Cassiopeiae	13
1028	γ Cassiopeiae	14
1099	B.A.C. 255	14
396	B.A.C. 282	15
1101	ψ Cassiopeiae	19
1103	44 Cassiopeiae	23
513	48 Cassiopeiae	27
785	49 Cassiopeiae	28
278	B.A.C. 8138	260

NEW BINARY STARS

All of the most interesting of the known physical pairs have small apparent distances, and are difficult objects when compared with those in slow motion. As these catalogues, commencing with the first, contained an unusual proportion of close pairs, it was evident that sooner or later they would contribute a large number of physical systems. This expectation has been realized, and to an extent which could hardly have been anticipated within the time covered by the observations. The extreme range of the measures is but little more than twenty-five years, and the greater portion of the micrometrical work commenced at a later date. There is little doubt that this catalogue will furnish far more binaries than are found in all the voluminous early lists. There is nothing remarkable in this when the character of the stars with respect to distance is taken into account. As already stated the old catalogues contain a large proportion of very wide couples, where the distance between the components is much too great to make any physical connection between them at all probable. But it must be remembered that at least some of the instruments used by these observers could not compare favorably with modern refractors, and particularly with telescopes made by the Clarks; and even when those observers had had more powerful instruments in point of light-gathering power, as in the case of the Herschels, there can be no doubt that they were far inferior in definition, and in every practical respect for observations of this kind, to the 6-inch refractor with which so much of my work has been done. A glance at the list of old pairs to which new and more difficult components have been added will be sufficient on this point. I have shown in the appendix to my *Thirteenth Catalogue* that my several lists which had been published at that time include more double stars of Class I (where the distance does not exceed 1″) than all of the various catalogues of both Herschels and both Struves, notwithstanding the fact that the works of these eminent astronomers contain altogether not less than 7400 double stars.

It is only among the very closest pairs that rapid binaries are found, and it is certain that when the very close pairs, and particularly those discovered with the 36-inch, are fully observed, many wonderful systems of short periods will be brought to light. It is unfortunate that there are not more telescopes in the world powerful enough to take part in the work of reobserving these difficult pairs. But few short-period binaries are yet known. In all the old catalogues above referred to, there are but six whose orbits have been computed where the periodic time is less than fifty years. This catalogue contains not only the binary of the shortest known period, but it has several with periods of less than thirty years; and this number will be largely augmented when many of the stars known to be rapidly changing have been more fully measured.

The list of binary and probably binary stars which is given in this general catalogue must be regarded as only provisional. For many of the stars, and particularly the later discoveries, the evidence is insufficient when the relative motion is not rapid. Most of the pairs in the binary list are placed there because of the change, more or less rapid, shown by the micrometrical measures. In a few instances this may be the result of proper motion, but in the great majority of cases it is true orbital motion. A few examples are also included where the primary has a well determined proper motion, which the measures show is common to both stars. This fact sufficiently establishes a physical relation between the components, although the relative motion may be very small.

In the following table I have classified the stars in the order of their numbers. In these cases the evidence seems to warrant the conclusion that they are probably physical systems. For the numbers marked with a * orbits have been computed.

β	Page	β	Page	β	Page	β	Page
4	19	237	126	608	124	862	271
5	23	239	139	612*	127	870	24
7	27	271	226	620	144	874	28
16	74	279	264	625	150	877	33
17	74	281	271	627	154	878	39
28	120	286	174	631	166	883*	53
31	138	287	187	633	168	886	61
32	142	290	244	637	172	894	76
35	144	291	245	639	176	895	77
36	145	302	14	641	177	897	82
39	147	320	64	648	185	901	87
63	209	348	139	658	197	911	108
64	215	367	218	668	210	924	121
75	238	382	252	670	211	929	123
79	258	395*	9	675	215	932	126
80	259	416*	160	683	229	935	128
83	32	456	115	696	240	940	134
101*	92	491	9	701	245	947	146
105	105	513*	27	710	250	953	153
106	137	524*	34	711	251	962	166
113	126	525	35	717	259	971	183
117	135	531	38	718	260	989*	234
120	148	533	40	720	262	992	258
130	168	535	41	730	267	996	266
132	173	536	42	733*	268	999	20
142	191	543	44	741	35	1000	22
148	198	547	46	753	80	1004	45
151*	211	550	49	760	175	1007	69
152	216	552	54	766	228	1008	76
163	226	555	59	769	241	1009	85
172	244	560	71	785	28	1013	266
182	258	581	95	794	116	1022	84
232	12	587	102	800	125	1028	14
205	99	590	106	816	152	1029	18
208	101	599	113	823	155	1031	49
235	17	603	116	858	264	1032	68

β	PAGE	β	PAGE	β	PAGE	β	PAGE
1034	219	1087	148	1117	154	1179	39
1035	228	1088	155	1118	158	1212	232
1046	57	1089	165	1125	170	1220	257
1047	58	1090	165	1131	195	1240	66
1055	73	1092	249	1146	251	1241	74
1058	75	1095	5	1147	255	1246	132
1067	99	1099	14	1163	20	1251	167
1071	106	1101	19	1164	21	1260	207
1077	112	1103	23	1174	36	1266	261
1082	122	1111	133	1176	37	1281	110
1085	139						

QUADRUPLE STARS

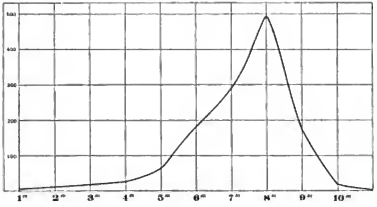
This catalogue furnishes a number of examples of double-double stars, of the ε *Lyrae* type, but with the pairs separated by a much smaller distance. Strictly speaking ε *Lyrae* should not be called a quadruple star, as the distance between the pairs renders it almost, if not quite, certain that they can have no physical relation, unless it is assumed from a small common proper motion. It is probable that many of the examples selected from this catalogue, although the distances are very much less, are too widely separated to give any presumption in favor of their belonging to one system. Of course, two double stars would be on no better footing, so far as this question is concerned, than two single stars within the same distance.

The distance between ϵ^1 and ϵ^2 *Lyrae* is about 207″. In the following list none of the stars have more than half that distance, and in most instances the component pairs are much closer. They are arranged in the order of the separating distance.

β	AB	CD	A AND C	PAGE	β	AB	CD	A AND C	PAGE
	″	″	″			″	″	″	
973	1.7	3.7	11.1	186	120	0.7	1.8	41.1	148
368	0.6	5.1	12.2	222	886	17.6	0.8	48.5	61
1210	2.5	4.3	14.0	220	366	1.2	1.4	50.7	27
639	0.1	8.1	17.3	176	285	1.6	2.0	60.1	175
935	1.6	2.0	27.1	128	876	1.2	6.2	70.7	30
836	0.8	1.3	27.4	223	806	0.7	1.2	72.0	136
1101	2.9	2.9	27.4	19	321	0.8	1.4	89.3	68
141	0.8	4.9	28.7	190	898	3.0	1.8	97.2	83
1049	0.6	1.6	29.2	65	1202	0.6	3.9	103.8	169

DISTRIBUTION IN MAGNITUDES

The following diagram shows the distribution of these pairs in magnitudes. The magnitude on the lower part of the diagram is of course that of the primary to the nearest whole number. As would be expected the maximum is reached at the eighth magnitude. A map showing the distribution in the heavens of the first one thousand double stars is given in my *Thirteenth Catalogue*.



REJECTED DOUBLE STARS

The numbers mentioned below are not given in this *General Catalogue*, as they are identical with pairs found in other and prior works.

β 29 = H 1218	β 562 = OΣ 122
58 = Σ 2629 rej.	594 = OΣ 216
99 = Σ 1007 rej.	644 = H 864
110 = H 2036	667 = Σ 2656
187 = Dembowski	737 = O. Stone
362 = OΣ 406	1038 = OΣ 510
444 = Omitted number	1057 = OΣ 129

UNPUBLISHED MEASURES

I am under deep obligations to many well-known double-star observers in this country and in Europe for unpublished measures of these stars. This catalogue contains several thousand observations which have never been printed elsewhere. The following astronomers have kindly furnished me with most valuable material for this work:

Aitken, Lick Observatory.
Barnard, Yerkes Observatory.
Brown, Naval Observatory.
Christie, Greenwich Observatory.
Cogshall and Boothroyd, Lowell Observatory.
Doolittle, Flower Observatory.
Hussey, Lick Observatory.
See, Naval Observatory.
Schiaparelli, Royal Observatory, Milan.
Struve, H., Universitäts Sternwarte, Königsberg.
Wilson, Goodsell Observatory, Northfield, Minn.

When it was definitely arranged to publish this catalogue, it was evident that its value would be greatly increased by giving, as far as practicable at this time, a complete history of each pair, so that the change, or absence of relative motion, could be fairly inferred in all pairs from the measures given. There were many pairs, and particularly among those discovered at the Lick Observatory from 1888 to 1892, which had not been re-observed, and therefore nothing was known concerning them as to the question of motion. In other instances there were no very recent measures, and the earlier observations were not sufficiently numerous, or extended in point of time, to show the character of the relation between the components. In order to supply these needed observations, I prepared and sent to Aitken, of the Lick Observatory, from time to time, special lists of these objects, which included the closest and most difficult stars to measure in the entire catalogue, and requested him to undertake their measurement with the 36-inch. These lists also included some pairs which had apparently become single from rapid motion, and others of a more or less doubtful character. This request received a hearty response, and he entered upon the work with enthusiasm and zeal, and has contributed results which, without his assistance, would be wanting here. I wish to record here my high appreciation of the great value and accuracy of these measures. Other measures have been made by the same observer while this catalogue was passing through the press, but received too late for insertion in their proper places, and these, with measures by other observers, will be given in a supplement at the end of this work. His last published series of measures in *A.N.* 3585, giving the observations of 1898, was received in printed form after a considerable portion of this work was in type. The measures are all given in this catalogue, but only those after R.A. $17^h\ 10^m$ are referred to by the above *A.N.* number.

Lists of other stars were sent to Brown, of the Naval Observatory; to Doolittle, of the Flower Observatory; to the observers of the Lowell Observatory, and to Wilson, of the Goodsell Observatory, and their valuable results are given in this catalogue. Doolittle has measured a large number of pairs with the 18½-inch. These will soon be published in Vol. I. of the *Publications of the Flower Observatory*, and they are therefore cited in the references in this way. I am also indebted to the Astronomer Royal of Great Britain for a large number of measures of close and difficult pairs, made principally by Lewis, Bowyer, Bryant and Dyson, with the 28-inch of the Royal Observatory at Greenwich.

The unpublished measures of Schiaparelli with the 18-inch refractor of the Royal Observatory embrace a large number of objects, altogether more than 1200 measures, and cover a period of not less than ten years. It is unnecessary to say that the measures of this distinguished observer are of the highest value.

The unpublished measures by See were made during his connection with the Lowell Observatory with the 24-inch, and, like the subsequent observations of Cogshall and Boothroyd at the same place, are principally of southern pairs. The observations by H. Struve were made with the 30-inch Clark refractor, at Poulkowa, about 1885, while he was connected with that Observatory; and those by Hussey with the 36-inch at the Lick Observatory.

My own unpublished observations with the 40-inch have already been referred to. The work with this instrument also includes measures by Barnard of special objects of interest, of which some will be found in the supplement.

PROPER MOTIONS

As far as practicable I have given the proper motions of all the stars in this catalogue where the value has been deduced from meridan observations. A knowledge of this movement has an important bearing in determining the question of physical relation. Where the components are moving together in space, there can be but little doubt of their forming binary systems, although

the relative change may be insignificant in the comparatively short time covered by the observations. In this examination I have given the first place to the investigations of Auwers as found in his *Catalogue of the Bradley Stars, Fundamental Catalogue*, and contributions on this subject in the *Astronomische Nachrichten*, and other publications. The new catalogues of the *Astronomischen Gesellschaft* have furnished the proper motions of a good many of the lower magnitudes. Other material has been obtained from the Greenwich, Radcliffe, Cape, Cincinnati, and other catalogues, and also from the recent works of Kustner, Bossert, and others. Porter, of the Cincinnati Observatory, has furnished information concerning many stars which appeared from the micrometrical measures to have some rectilinear movement, and which had not been recognized heretofore in the meridian observations.

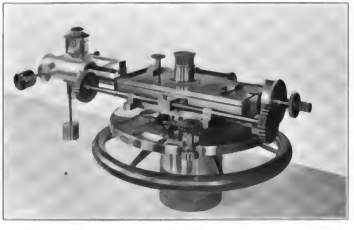
I am specially indebted to Professor George E. Hale, Director of the Yerkes Observatory, for his hearty assistance and coöperation in the prosecution of the work at this Observatory, and in its preparation and publication.

This volume in printed form owes its existence to the interest and liberality of that generous patron of astronomical science, Miss Catherine W. Bruce, of New York City. Her large gifts in aid of original research, in providing instruments and means for the prosecution of work, and the publication of observations and investigations, have been widely distributed, not only in this country, but abroad. The results already achieved in widely different fields are of the highest importance, and with the results yet to follow in the near and in the far future, will form a monument to the memory of this benefactor of Astronomy, which will endure for all time.

S. W. Burnham.

Chicago, December 6, 1899.

EYE END OF THE 40-INCH TELESCOPE OF THE YERKES OBSERVATORY



MICROMETER OF THE 40-INCH TELESCOPE
MADE BY WARNER & SWASEY

ABBREVIATIONS.

Most of the abbreviations of observers and publications used in the measures will be readily understood from the references given at the end of each double in the catalogue. The following only need a further explanation:

A. N. — *Astronomische Nachrichten.* In the references, the Arabic figures in parenthesis, without other designation, following the name of the observer, *e. g.*, β (3114), indicate, in all cases, the number of the *A. N.* in which the observation is made.

β^1 — *Double Star Observations made in 1877-8 at Chicago, with the 18½-inch refractor of the Dearborn Observatory, comprising: I. A catalogue of 251 new double stars with measures; II. Micrometrical measures of 500 double stars. Memoirs of the Royal Astronomical Society*, Vol. XLIV. (This volume contains my *Tenth Catalogue.*)

β^2 — *Report to the Trustees of the James Lick Trust, of observations made on Mt. Hamilton, with reference to the location of the Lick Observatory, 1879.* (This contains the *Eleventh Catalogue* and measures of other stars. It is reprinted in *Publications of the Lick University*, Vol. I.)

β^3 — *Double Star Observations made in 1879–80 with the 18½-inch refractor of the Dearborn Observatory. I. Catalogue of 151 new double stars with measures. II. Micrometrical measures of 770 double stars. Memoirs R. A. S.*, Vol. XLVII. (*Thirteenth Catalogue.*)

β^4 — *Publications of the Washburn Observatory*, Vol I. (*Twelfth Catalogue*, and measures of other stars.)

Cin^1, Cin^4, etc. — *Publications of the Cincinnati Observatory*, Nos. 3 to 6. (Measures of double stars by Stone, Howe, Upton, and Egbert, from 1875 to 1880. No. 10 of this series contains measures by Wilson.)

J — Dembowski.

J (I) — *Misure Micrometriche di Stelle Doppie e Multiple fatte negli anni 1852–1878 dal Barone Ercole Dembowski.* Roma 1883. (Vol. I contains the measures of β stars; Vol. II the Struve stars.)

Glasenapp (I, II, III, IV, V) — The Roman numerals refer to the five series of micrometrical measures made by the Director of the Observatory of the Imperial University of St. Petersburg, and published from 1892 to 1899.

H^1 — Sir William Herschel.

H^2 — Sir John F. W. Herschel.

Hall (I) — *Observations of double stars made at the U. S. Naval Observatory by Asaph Hall.* Appendix to the Washington Observations for 1877. (Measures with the 26-inch 1875–1879.)

Hall (II) — *Observations of double stars made at the U. S. Naval Observatory 1880–1891 by Asaph Hall.* Appendix to Washington Observatory for 1888.

LM — *Publications of the McCormick Observatory* of the *University of Virginia*, Vol. I, Part 4. (Measures of double stars with the 26-inch refractor in 1885–6 by F. P. Leavenworth and Frank Muller.)

Lv[1] *Micrometrical Measurements of Double Stars made at the Haverford College Observatory* by F. P. Leavenworth. (Measures in 1888 with the 10-inch Clark refractor. A few of the measures by student assistants.)

Sp (II) *Osservazioni Sulle Stelle Doppie 1875–1885 da G. V. Schiaparelli.* Milano, 1888. (A prior series of measures of the Struve stars was published in 1882.)

Sp (III) Unpublished measures by Schiaparelli, made at Milan, 1889–1898.

Wilson (Cin.[m]) *Publications of the Cincinnati Observatory* No. 10. (Double star measures 1882–1886, principally by H. C. Wilson. The unpublished measures by the same observer were made with the 16-inch of the Goodsell Observatory, Northfield, Minn.)

A General Catalogue of the Double Stars discovered by S. W. Burnham from 1871 to 1899, arranged in order of Right Ascension. By S. W. BURNHAM.

β 1155. D.M. (3°) 4932

R.A. $0^h\ 0^m\ 26^s$
Decl. $+\ 3°\ 30'$

1890.82	90°.4	0".44	8.7... 9.3	3n	β
1898.64	91.1	0.42	8.7... 9.0	2n	A

Discovered with the 36-inch. Apparently without change.

[β (XVII)...β (3047)...β (*Pub. L. O.* II.)...Aitken ( )...]

β 1014. Lalande 47287

R.A. $0^h\ 1^m\ 24^s$
Decl. $+\ 31°\ 0'$

1882	340°±	2".±	7 ...12		β
1891.70	335.9	1.50	7.0...12.5	3n	β
1897.94	304.1	1.15	...	3n	L
1898.65	337.4	1.55	7.0...13.0	2n	β

Discovered with the 18½-inch. Probably no relative change. According to PORTER this star has no appreciable proper motion.

[β (XIII)...β3 (app.)...β (3113)...β (*Pub. L. O.* II.)... Lewis (*Mon. Not.* LIX, 400)...]

β 483. Lalande 17348

R.A. $0^h\ 2^m\ 50^s$
Decl. $+\ 40°\ 11'$

1878.66	44°.7	2".37	7.5...11.8	1n	β
1885.83	44.0	3.09	...	2n	HΣ
1891.70	44.1	2.95	7.2...11.7	3n	β
1898.59	42.7	3.05	7.5...10.7	2n	β

Discovered with the 18½-inch; one of a wide pair. Probably unchanged.

[β (X)...β2...β (3113)...β (*Pub. L. O.* II.)...HΣ ( )...]

β 391. κ' *Sculptoris*

R.A. $0^h\ 3^m\ 14^s$
Decl. $-\ 28°\ 39'$

1876.79	97°.2	0".78	6.0... 6.2	1n	Cin
1877.74	97.1	0.87	6.2... 6.3	3n	Cin
1888.88	92.5	0.94	6.1... 6.1	6n	Lv
1892.88	88.0	0.75	6.1... 6.1	2n	Gl
1893.91	91.0	0.74	6 ... 6	2n	Sel
1894.94	92.0	0.94	...	3n	Sel
1895.83	91.0	0.93	...	3n	A
1895.85	91.0	0.98	...	3n	Scott
1897.07	93.5	1.24	6.4... 6.4	3n	See
1897.95	271.2	1.11	6½... 6½	4n	Scott
1898.69	270.1	1.09	7.0... 7.2	2n	Bd

Discovered with the 6-inch. The measures do not show any certain change.

[β (VII)...β (2103)...Cin¹...Cin⁴...L.ᵉ...Glasenapp (II) Sellors (3420,3303)...Scott (*Brit. Ast. Asso.* VI. 368) (*Mon. Not.* LIX, 427)...Aitken (3395)...See (3405)... Boothroyd ( )...]

β 484. D.M. (51°) 9

R.A. $0^h\ 3^m\ 29^s$
Decl. $+\ 51°\ 22'$

1878.66	156°.3	1".95	7.7...11.9	2n	β
1885.74	154.7	1.90	...	2n	HΣ
1890.90	154.6	1.91	7.7...11.7	3n	β
1891.70	156.1	1.86	7.6...11.5	3n	β

Discovered with the 18½-inch.

[β (X)...β2...β (3048,3113)...β (*Pub. L. O.* II.)... HΣ ( )...]

β 253. D.M. (57°) 15

R.A. $0^h\ 4^m\ 8^s$
Decl. $+57°\ 51'$

1875.95	49.9	0.42	8.3...	8.5	5*n*	*d*
1889.28	50.8	0.65	8.3...	8.3	3*n*	β
1891.52	47.2	0.60	8.3...	8.4	2*n*	β

Discovered with the 9.4-inch at the Dartmouth College Observatory. This is the *n* star of a wide pair, 38′ *n* of *β Cassiopeiae*.

[β (v)...β (*Mon. Not.* xxxv, 31)...β (2956,3113)...β (*Pub. L. O.* II)...*d* (1)...]

β 485. D.M. (57°) 22

R.A. $0^h\ 4^m\ 29^s$
Decl. $+58°\ 6'$

1878.17	148.5	0.41	8.7...	9.0	2*n*	β
1889.55	307.4	0.44	8.5...	8.6	3*n*	β
1890.93	120.2	0.4±	...		1*n*	Sp
1891.52	307.6	0.43	8.5...	8.5	2*n*	β
1892.96	305.9	0.28±	...		5*n*	Sp

The duplicity of this star was suspected at the time of finding the preceding pair, and subsequently verified with the 18½-inch. It is one of a small triangle of stars between *β* 253 and *β Cassiopeiae*.

[β (x)...β″...β (2956,3113)...β (*Pub. L. O.* II)...Sp. (III)...]

β 254. O. Arg. N. 74

R.A. $0^h\ 5^m\ 14^s$
Decl. $+59°\ 6'$

A and B

1875.71	237.7	7.41	7.5...11.5		4*n*	*d*
1884.76	240.0	7.42	7.9...10.9		6*n*	En
1893.51	235.6	7.40	7.7...10.8		3*n*	W
1898.74	237.6	7.17	8.0...10.7		2*n*	β

A and C

1893.51	240.3	38.16	...12.2		2*n*	W
1898.74	241.4	38.35	...11.1		2*n*	β

Discovered with the 9.4-inch at the Dartmouth College Observatory. Apparently fixed.

[β (v)...β (*Mon. Not.* xxxv, 31)...*d* (1)...Engelmann (2742)...Wilson ( )...]

β 255. Lalande 54

R.A. $0^h\ 5^m\ 38^s$
Decl. $+27°\ 45'$

1875.76	99.0	0.38	7.5...	7.8	4*n*	*d*
1880.57	106.7	0.49	7.5...	8.5	1*n*	β
1882.62	93.5	0.63	7.5...	9.0	1*n*	OΣ
1887.25	101.2	0.56	...		4*n*	Sp
1888.55	105.9	0.52	...		5*n*	HΣ
1888.98	98.4	0.48	...		4*n*	Sp
1890.87	97.9	0.59	7.5...	8.4	3*n*	β
1896.83	107.5	0.44	...		1*n*	Lew
1897.81	91.7	0.53	...		3*n*	How
1897.88	99.3	0.45	...		3*n*	Lew

Discovered with the 9.4-inch at the Dartmouth College Observatory. There is no evidence of change. This star has no appreciable proper motion.

[β (v)...β (*Mon. Not.* xxxv, 31)...β″...β (3048)...β (*Pub. L. O.* II)...*d* (1)...OΣ (*Poulkowa Obsns.* x)...Sp (III)... Lewis and Bowyer (*Mon. Not.* LIX, 400)...HΣ ( )...]

β 1026. Lalande 58

R.A. $0^h\ 5^m\ 50^s$
Decl. $+52°\ 57'$

1888.76	329.6	0.48	8.1...	8.9	4*n*	β

Discovered with the 12-inch. This star is 6.5 in D.M., and 7m in L.

[β (XIV)...β (2875)...β (*Pub. L. O.* II)...]

β 864. D.M. (34°) 12

R.A. $0^h\ 6^m\ 40^s$
Decl. $+34°\ 40'$

1880.77	138.6	1.60	8.9...12.3		4*n*	β
1891.70	136.4	2.03	8.4...11.5		3*n*	β

Discovered with the 18½-inch.

[β (XIII)...β″...β (3113)...β (*Pub. L. O.* II)...]

β 998. Lalande 130

R.A. $0^h\ 7^m\ 30^s$
Decl. $+5°\ 55'$

1881.86	114.9	1.04	8.7...	8.7	3*n*	β
1891.68	114.5	1.23	8.3...	8.5	3*n*	β
1898.70	115.3	1.39	8.8...	9.0	3*n*	Cg

Discovered with the 12-inch. No change unless in distance.

[β (XIII)...β″...β (3113)...β (*Pub. L. O.* II)...Cogshall ( )...]

β 486. *Ceti* 33

R.A. $0^h\ 8^m\ 19^s$
Decl. $-8°\ 27'$

1877.87	4.3	...	5.5...10.0	1*n*	Cin
1878.54	5.2	2.81	6.0...12.0	4*n*	β
1879.76	6.3	3.05	5.8...10.5	2*n*	Cin
1886.86	3.4	3.31	6.0...11.5	2*n*	L M
1888.91	5.3	3.09	5.0...11.0	1*n*	β
1898.68	8.8	3.13	5.7...11.5	2*n*	Bd
1898.78	2.9	3.03	6.0...12.0	1*n*	Cg

Discovered with the 18½-inch. Apparently fixed. This star (= L 158) is 6 m in ARGELANDER and HEIS.

[β (x)...β^1...β^2...β^4...β (2956)...β (*Pub. L. O.* II)... Cin^3...Cin^4...L.M...Boothroyd and Cogshall ( )...]

β 1027. D.M. (20°) 15

R.A. $0^h\ 8^m\ 44^s$
Decl. $+20°\ 53'$

1888.92	186.8	1.54	7.2...10.3	3*n*	β
1891.85	187.4	1.55	7.7...11.5	3*n*	β
1895.90	180.5	1.38	...	1*n*	L
1897.89	180.9	1.62	...	3*n*	A

Discovered with the 36-inch. This star is W°O. 200.

[β (XIV)...β (2875,3113)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsns.*, 1895)...Aitken (*A. J.* 429)...]

β 487. W°O. 241

R.A. $0^h\ 10^m\ 18^s$
Decl. $+28°\ 38'$

B and C

1878.25	265.4	2.04	...12.5	2*n*	β
1891.64	266.5	2.39	...11.5	2*n*	β
1898.72	266.2	2.54	...11.5	2*n*	β

A and B (= Σ 17)

1828	29.4	20.1±	8 ... 9-10	1*n*	H
1830.05	29.3	26.33	8.0... 9.2	2*n*	Σ
1847.43	29.2	26.85	...	2*n*	Ma
1866.17	29.6	26.76	7.8... 9.2	3*n*	J
1878.77	28.9	27.06	...	1*n*	β
1891.64	29.4	26.98	8.1...	2*n*	β
1892.96	29.5	27.17	8.0... 9.2	2*n*	Gla
1898.72	29.5	26.88	8.2... 8.5	2*n*	β

The companion to B was discovered with the 18½-inch. There appears to be no change in the components of Σ 17. The foregoing are all the measures of AB.

[β (x)...β^1...β (3113)...β (*Pub. L. O.* II)...β (*Astron. & Astro-Physics* XIII, 16)...Madler (*Western Systems* II)... Herschel (*Mem. R. A. S.* IV)...δ (II)...Glasenapp (II)...]

β 392. B.A.C. 46

R.A. $0^h\ 10^m\ 31^s$
Decl. $+60°\ 52'$

1879.70	68.6	19.38	6.0...12.0	2*n*	β
1888.71	68.2	19.80	6.5...12.3	3*n*	β
1898.71	69.1	19.70	6.1...13	2*n*	β

Discovered with the 6-inch. Probably fixed.

[β (VII)...β^1...β (2103,2875)...β (*Pub. L. O.* II)...]

β 776. D.M. (49°) 40

R.A. $0^h\ 10^m\ 53^s$
Decl. $+49°\ 55'$

1881.59	202.5	0.90	8.8... 9.0	3*n*	β
1888.88	202.0	1.11	8.8... 9.2	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory. So far no evidence of change.

[β (XII)...β^1...Comstock (*Pub. Washburn Obsy.* VI)...]

β 393. Lalande 291

R.A. $0^h\ 12^m\ 12^s$
Decl. $-21°\ 48'$

1877.87	6.2	0.6±	7.0... 8.0	1*n*	Cin
1879.75	11.4	0.77	6.0... 8.0	1*n*	Cin
1886.81	12.6	....	7 ... 8	1*n*	L M
1890.89	16.0	0.71	7.5... 8.1	3*n*	β
1893.91	12.9	0.59	7 ... 9	2*n*	Sel
1897.71	18±	0.3±	...	1*n*	See
1898.68	12.7	0.69	7.5... 9.0	1*n*	Cg
1898.69	10.8	0.80	7.0... 7.5	1*n*	β

Discovered with the 6-inch. Probably unchanged.

[β (VII)...β (2103,3048)...β (*Pub. L. O.* II)...Cin^4...Cin^8... Sellors (3240)...See (3495)...Cogshall ( )...]

β 256. S.D. (14°) 48

R.A. $0^h\ 13^m\ 53^s$ }
Decl. $-14°\ 30'$ } 1

1876.40	249.1	2.31	10.0 . . . 10.5	3*n*	J
1878.79	249.9	2.43	8.3 . . . 8.8	2*n*	Cin
1886.79	248.4	2.70	8.8 . . . 9.1	2*n*	LM
1893.81	250.9	2.70	9.0 . . . 9.2	2*n*	W
1898.72	251.7	2.51	9.0 . . . 9.2	1*n*	Bd

Discovered with the 9.4-inch at the Dartmouth College Observatory. Evidently without change. The magnitude in S.D. is 8.

[β (v). . . β (*Mon. Not.* xxxv, 31). . . J (1). . . Cin¹. . . Cin⁸. . . LM. . . Wilson ( ) . . . Boothroyd ( ) . . .]

β 1015. Lalande 368

R.A. $6^h\ 14^m\ 27^s$ }
Decl. $+11°\ 39'$ } 1

1888.56	114.8	0.59	8.0 . . . 8.0	1*n*	Lv
1891.64	120.6	0.52	8.4 . . . 8.6	2*n*	β
1897.86	116.4	0.40	. . .	1*n*	Bow
1897.93	112.6	0.46	. . .	1*n*	L
1897.96	125.4	0.51	. . .	2*n*	Br
1898.86	124.0	0.48	. . .	3*n*	Bow
1898.89	118.1	0.51	. . .	1*n*	L

Discovered with the 18½-inch. Probably unchanged.

[β (XIII). . . β¹ (app.). . . β (3113). . . β (*Pub. L. O.* II). . . Lewis and Bowyer (*Mon. Not.* LIX, 400). . . Brown ( ) . . .]

β 1093. Lalande 375

R.A. $6^h\ 14^m\ 44^s$ }
Decl. $+10°\ 19'$ } 1

1889.65	54.3	0.39	7.3 . . . 8.2	3*n*	β
1890.98	49.1	0.25 ±	. . .	3*n*	Sp
1895.88	46.3	0.2 ±	. . .	1*n*	Sp
1895.90	42.0	. . . .	. . .	1*n*	L
1896.93	39.8	0.31	. . .	1*n*	L
1897.96	49.2	0.50	. . .	1*n*	L
1898.71	55.5	0.66	7.5 . . . 8.2	3*n*	Bd
1898.84	61.4	0.44	7.5 . . . 8.5	1*n*	β
1898.88	60.9	0.39	. . .	1*n*	L

Discovered with the 36-inch. The *f* one of three bright stars.

[β (XVI). . . β (2956). . . β (*Pub. L. O.* II). . . Sp. (III). . . Lewis (*Mon. Not.* LVI, 359; LIX, 400) (*Greenwich Obsns.* 1895) . . . Boothroyd ( ) . . .]

β 777. D.M. (−1°) 32

R.A. $0^h\ 14^m\ 56^s$ }
Decl. $-0°\ 55'$ } 1

1881.73	166.7	4.09	8.5 . . . 9.5	3*n*	β
1886.86	166.6	3.91	. . .	2*n*	UL
1888.32	166.2	3.98	8.7 . . . 9.8	3*n*	Com
1891.83	166.0	4.08	8 . . . 10	3*n*	Col
1898.69	167.0	3.89	8.2 . . . 8.8	3*n*	Bd

Discovered with the 15½-inch of the Washburn Observatory. Apparently fixed.

[β (XII). . . β⁸. . . Updegraff and Lamb (*Pub. Washburn Obsy.* VI). . . Comstock (*Pub. Washburn Obsy.* VI). . . Collins (*Pub. Haverford Coll. Obsy.* 1891). . . Boothroyd ( ) . . .]

β 488. Lalande 465

R.A. $6^h\ 17^m\ 52^s$ }
Decl. $-4°\ 8'$ } 1

1878.40	347.9	3.32	7.5 . . . 10.5	4*n*	β
1886.74	347.2	3.40	7.6 . . . 10.9	7*n*	LM
1893.81	347.3	2.90	7.2 . . . 11.0	2*n*	W
1898.71	346.7	3.07	7.4 . . . 10.6	4*n*	Cg

Discovered with the 18½-inch. Probably unchanged.

[β (X). . . β⁸. . . LM. . . Glasenapp (II). . . Wilson ( ) . . . Cogshall ( ) . . .]

β 489 D.M. (43°) 80

R.A. $6^h\ 19^m\ 40^s$ }
Decl. $+43°\ 31'$ } 1

1878.43	182.5	3.32	8.0 . . . 12.0	3*n*	β
1891.64	180.4	3.35	8.3 . . . 11.5	2*n*	β

Discovered with the 18½-inch. No indication of motion.

[β (X). . . β⁸. . . β (3113). . . β (*Pub. L. O.* II). . .]

β 778. D.M. (51°) 72

R.A. $6^h\ 19^m\ 43^s$ }
Decl. $+51°\ 10'$ } 1

1881.61	47.9	1.05	9.5 . . . 9.5	3*n*	β
1888.37	45.0	1.24	9.2 . . . 9.3	4*n*	Com

Discovered with the 15½-inch of the Washburn Observatory. Motion doubtful.

[β (XII). . . β⁸. . . Comstock (*Pub. Washburn Obsy.* VI). . .]

β 1156. D.M. (63°) 48

R.A. $0^h\ 19^m\ 58^s$
Decl. $+63°\ 46'$

1890.74	31.9	0.52	9.2 ... 9.3	3*n*	β

Discovered with the 36-inch in examining the place of TYCHO BRAHE'S star.

[β (XVII)...β (3047)...β (*Sid. Mess.* IX, 449)... β (*Pub. L. O.* II)...]

β 1225. W² O. 496

R.A. $0^h\ 20^m\ 55^s$
Decl. $+20°\ 26'$

1891.85	189.3	1.15	8.1 ... 11.8	3*n*	β
1898.90	187.5	1.36	...	2*n*	Bar

Discovered with the 36-inch. The magnitude in D.M. is 7.3.

[β (XVIII)... β (3113)...β (*Pub. L. O.* II)...Barnard ( )...]

β 779. Lalande 592

R.A. $0^h\ 21^m\ 37^s$
Decl. $+22°\ 55'$

1881.67	263.0	0.85	8.5 ... 9.0	3*n*	β
1887.86	260.4	0.87	8.4 ... 9.2	3*n*	Com
1897.75	253.6	1.18	8+... 9	3*n*	D

Discovered with the 15½-inch of the Washburn Observatory. Some change is probable.

[β (XII)...β"... Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* I)...]

β 1157. D.M. (63°) 52

R.A. $0^h\ 22^m\ 30^s$
Decl. $+63°\ 35'$

1890.74	90.2	1.66	8.4 ... 11.3	3*n*	β
1897.76	81.2	1.54	8+... 11	3*n*	D

Discovered with the 12-inch; near β 1156. The magnitude is 8.0 in D.M.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

β 1094. Lalande 655

R.A. $0^h\ 23^m\ 29^s$
Decl. $+59°\ 19'$

1889.53	244.6	0.70	5.7... 9.5	3*n*	β
1897.96	246.3	0.79	...	3*n*	A

Discovered with the 36-inch. This is a naked-eye star in *Cassiopea*.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken [*A. J.* 429)...]

β 1095. 28 *Andromedae*

R.A. $0^h\ 23^m\ 47^s$
Decl. $+29°\ 5'$

1889.51	0.1	2.42	5.5...13.3	3*n*	β
1898.73	4.5	2.34	6.0...13.5	3*n*	β

Discovered with the 36-inch. The principal star has an annual proper motion of 0".061 in the direction of 159°.8, according to AUWERS. The effect of this movement would decrease the position angle of B 3°.8, and increase the distance 0".53 in the interval covered by the foregoing measures. The change shown by the measures is in the reverse direction, indicating common proper motion.

[β (XVI)...β (2956)...β (*Pub L. O.* II)...]

β 394. Lalande 678

R.A. $0^h\ 24^m\ 16^s$
Decl. $+46°\ 52'$

1876.77	278.0	0.83	8.2 ... 8.4	3*n*	J
1885.74	278.5	0.97	...	4*n*	HΣ
1888.68	281.5	1.08	8.0 ... 8.2	3*n*	T
1893.54	280.1	1.06	8.0 ... 8.3		W

Discovered with the 6-inch. Probably unchanged.

[β (VII)...β (2103)...J (1)...Tarrant (2991)...Wilson ( ) ...HΣ ( )...]

β 107. D.M. (62°) 93

R.A. $0^h\ 24^m\ 31^s$
Decl. $+62°\ 41'$

1873.68	360.0±	2.±	9.0...10.0		β
1891.52	358.8	4.44	8.0... 9.6	2*n*	β
1898.72	354.0	5.67	9.1... 9.4	3*n*	β

Discovered with the 6-inch. About 25' *n* of κ *Cassiopeiae*.

It would be assumed in the first instance that any change in a pair of very small stars, separated by so great a distance, would be due to the proper motion of one or the other. In this instance the two sets of measures give an apparent annual movement of the companion of $0''.18$ in the direction of $337°.3$. Carrying this back to 1873, the smaller component at that time would be $1''.87$ from the primary in the position-angle of $37°.7$. This agrees well enough with the estimated places so far as distance is concerned, but the agreement with the estimate of the angle is not very satisfactory. It is more difficult to judge of the direction of one star from another in high northern declinations, unless special care is taken, and this may explain the large error, if this is an error. In addition to this, allowable errors in the measure would change the direction of motion and give a much smaller position-angle for 1873. The probabilities are that the movement is rectilinear, and due to the proper motion of one of the stars, but of course there is nothing to indicate which one is drifting, beyond perhaps a slight persumption in favor of the brighter. The difference in magnitude, however, is too small to make this of much importance.

At the time of finding this pair, I assumed that it was D.M. $(62°)$ 93 from its situation with reference to two stars of similar magnitude, in the same field and nearly south of the double, which appeared to be Nos. 94 and 95 of that catalogue.

Since making the last measure, showing change in the components, I have more carefully examined ARGELANDER, and find that the stars in the D.M. do not correspond at all to the present positions of the stars in this vicinity. In order to compare the two accurately, I have connected the four principal stars in the field with A of the double by micrometrical measures. The results are as follows:

AC	1898.73	$336°.2$	$46''.95$	...8.2	2
AD	1898.73	146.6	50.27	...8.3	2
AE	1898.76	171.2	113.78	..8.5	1
AF	1898.76	113.9	150.44	...8.7	1

There are many small stars in the field, but all too faint for the D.M. These five stars are laid down to scale on Fig. 1 from the above measures. The four stars given in ARGELANDER (Nos. 93 to 96) are platted on the same scale, and shown in Fig. 2.

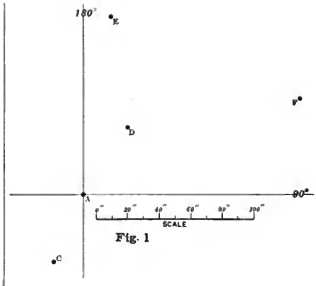


Fig. 1

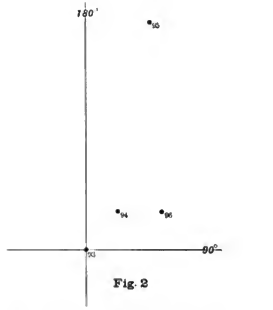


Fig. 2

It will be seen that it is impossible to identify the stars in one diagram with those of the other, except that *E* and No. 95 are probably the same. All of the stars in Fig. 1 are entitled from their magnitude to a place in the D.M. It is evident that there has been a great change in the relation of these stars since the meridian observations of ARGELANDER, or that there are very considerable

errors in the D.M. places of two or more of them. I have found it necessary, in the past twenty-five years, to compare the D.M. catalogues with the sky in the identification of small stars many hundreds of times, and I do not recall at this time any instance of serious error or omission. I have, therefore, a high degree of confidence in the substantial accuracy of this great work. Unfortunately, the new catalogues of the *Astronomischen Gesellschaft* are very defective with respect to the D.M. stars in the lower magnitudes. Of the first hundred stars given in the D.M. zone of 62°, less than one-third are found in the new catalogue covering this region, and all the stars in question are missing. So far as I know there are no meridian observations of them other than those in ARGELANDER, and hence there is no data for determining their previous relations to each other, and their proper motions. For this reason I have connected them together by the measures given above, so that hereafter the moving star or stars can be easily identified. It is certain that one of the components of the pair is moving, and there can be but little doubt of this being rectilinear motion; but that does not appear to be sufficient to entirely explain the difference between the two diagrams.

[*β* (111)...*β* (*Mem. Not.* XXXIV, 59)...*β* (3113)...*β* (*Pub. L. O.* II; *Pop. Astronomy* VII, 1)...]

β 1158. Lalande 718

R.A. $0^h\ 24^m\ 55^s$
Decl. $-\ 10°\ 45'$

B and C

1890.91	138.°1	0.″26	8.6... 8.6	3*n*	*β*
1898.76	146.7	0.13	8.3... 8.3	1*n*	*β*

A and BC (=H 1981)

1890.91	86.°6	79.″31	6.9...	3*n*	*β*
1898.74	86.5	78.86	7.0...	2*n*	*β*

The wide pair constitutes the double star, H 1981. The duplicity of the companion was detected with the 36-inch. H gave the angle 84.°8, and the estimated distance 60″, with magnitudes 8 and 9. The magnitude of the smaller star in S.D. is 8.6. The magnitudes assigned to A cover a wide range: LALANDE and SCHJELLERUP, 8; CORDOBA, 7½; SCHÖNFELD, 7.2; HEIS, 6–7.

[*β* (XVII)...*β* (3047)...*β* (*Pub. L. O.* II)...H (*Mem. R. A. S.* VI)...]

β 1226. D.M. (57°) 97

R.A. $0^h\ 24^m\ 58^s$
Decl. $+\ 57°\ 29'$

1891.58	190.°	0.″40	8.5...10.5	3*n*	*β*

Discovered with the 36-inch.

[*β* (XVIII)...*β* (3113)...*β* (*Pub. L. O.* II)...]

β 1227. D.M. (57°) 98

R.A. $0^h\ 25^m\ 41^s$
Decl. $+\ 57°\ 41'$

A and B

1891.59	206.°1	2.″82	7.3...11.6	3*n*	*β*
1897.04	202.9	2.67	7.3...11.5	3*n*	A

A and C

1897.05	87.°2	22.″27	...11½	2*n*	A

A and D

1897.05	116.°6	32.″69	...12	2*n*	A

Discovered with the 36-inch. The distant stars added by AITKEN.

[*β* (XVIII)...*β* (3113)...*β* (*Pub. L. O.* II)...Aitken (3465)...]

β 780. D.M. (36°) 79

R.A. $0^h\ 26^m\ 0^s$
Decl. $+\ 37°\ 5'$

1881.93	144.°2	2.″32	8.5... 9.8	3*n*	*β*
1886.87	144.1	2.37	...	1*n*	UL
1888.52	143.6	2.46	8.4...10.2	5*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[*β* (XIII)...*β*...*β*...Updegraff and Lamb (*Pub. Washburn Obsy.* V)...Comstock (*Pub. Washburn Obsy.* VI)...]

β 108. O. Arg. N. 492

R.A. $0^h\ 25^m\ 43^s$
Decl. $+62°\ 15'$

1875.83	358°.1	4″.20	7.6...10.7	6*n*	*J*
1876.76	358.3	4.17	8.0... 9.5	1*n*	OΣ
1885.69	357.8	4.40	...	2*n*	HΣ
1888.68	359.0	4.28	...	3*n*	T
1898.69	358.1	4.30	7.0...10.5	1*n*	*β*

Discovered with the 6-inch. No evidence of change. The 40-inch shows four faint stars. The single settings are :

337°.8	:	20″.87 15 m
213.6	:	24.06 13 m
150.8	:	27.25 14 m
218.9	:	41.75 10 m

[*β* (111)...*β* (*Mem. Not.* XXXIV, 59)...*J* (1)...OΣ (*Poulkowa Obsns.* x)...Tarrant (2991)...HΣ ( )...]

β 490. 13 *Ceti*

R.A. $0^h\ 29^m\ 4^s$
Decl. $-4°\ 15'$

1877.78	65°.3	38″.12	6 ...12-13	1*n*	*β*
1887.81	60.8	35.63	...13	1*n*	Ho
1891.61	58.9	33.72	5.5...14.2	3*n*	*β*
1898.56	57.8	31.28	...13.2	2*n*	*β*

The faint companion was noted with the 18¾-inch. The principal star has a proper motion of 0″.397 in the direction of 93°.0 (Auwers). This movement fully accounts for the change in the position of the companion as shown by the measures. The minimum distance of 18″ will be reached about 1962. My first distance in 1877 was erroneously printed 37″.12.

In 1887 Ho thought that the principal star was a very close pair, 93°.4 : 0″.3 ± (1887.81) 1*n*. In 1890 and 1891 I could not see any elongation with the 36-inch, and it does not appear to have been measured or seen since the time first referred to. It should be watched, but the probabilities are that it is not really double.

[*β* (x)...*β*...*β* (3048,3113)...*β* (*Pub. L. O.* II)...Hough (2977)...]

β 1096. O. Arg. N. 534

R.A. $0^h\ 29^m\ 46^s$
Decl. $+57°\ 51'$

A and B

1889.61	267°.7	0″.22	9.5... 9.5	3*n*	*β*

B and C

1889.60	61°.8	33″.38	... 8.9	3*n*	*β*
1898.77	61.7	33.93	... 8.3	2*n*	*β*

Discovered with the 36-inch. The close pair is a difficult object.

[*β* (XVI)...*β* (2956)...*β* (*Pub. L. O.* II)...]

β 1097. Radcliffe 159

R.A. $0^h\ 30^m\ 30^s$
Decl. $+57°\ 21'$

1889.60	251°.6	0″.76	8.4 ... 8.4	4*n*	*β*
1891.56	251.7	0.48	8.1 ... 8.2	3*n*	*β*
1897.03	241.1	0.48	8+... 8+	1*n*	A
1898.00	252.4	0.60	...	2*n*	Hu

Discovered with the 36-inch. The magnitude in the *Radcliffe Catalogue* is 7.4, and in D.M. 7.0. So far there is no evidence of change.

[*β* (XVI)...*β* (2956,3113)...*β* (*Pub. L. O.* II)...Aitken (3105)...Hussey ( )...]

β 230. W° 0.764

R.A. $0^h\ 30^m\ 59^s$
Decl. $+26°\ 39'$

1891.70	324°.1	3″.91	8.4... 9.0	3*n*	*β*
1898.69	323.7	3.55	8.5... 9.0	1*n*	*β*

Discovered with the 6-inch. Unchanged.

[*β* (V)...*β* (*Mem. Ast.* XXXV, 31)...*β* (3113)...*β* (*Pub. L. O.* II)...]

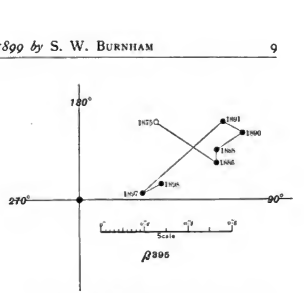
β 395. *Ceti* 82. B.A.C. 160

R.A. $0^h\ 31^m\ 12^s$
Decl. $-25°\ 26'$

1875.84	135°.±	0".5 ±	6.0...	6.0	1*n*	*β*
1886.85	104.7	0.65	6.1...	6.3	2*n*	I.M
1888.01	109.4	....	7 ...	7	1*n*	Pol
1888.89	109.6	0.67	6.0...	6.4	3*n*	L.v
1889.99	111.4	0.88	6.0...	6.0	2*n*	Hl
1890.82	112.6	0.74	6.0...	6.1	3*n*	*β*
1891.83	115.2	0.69	...		1*n*	L.v
1891.85	118.2	0.75	6.9...	7.2	3*n*	*β*
1897.65	278.2	0.22	...		2*n*	See
1897.67	272.8	0.25	...		1*n*	Cg
1897.82	85.9	0.39	...		1*n*	*β*
1897.92	273.7	0.27	...		3*n*	A
1897.92	275.1	0.31	...		3*n*	Hu
1898.59	280.4	0.38	6.2...	6.3	3*n*	A
1898.69	97.5	0.68	7.5...	7.5	1*n*	*β*

This interesting system was discovered with the 6-inch, and if was evident from the first that it was a physical pair from the large proper motion of the components, since if this movement belonged to one of the stars only, a few years preceding its discovery it would have been a wide and easy pair, and hence catalogued as a double star.

SEE, using the measures to 1897.67, has computed the orbit, and found a period of 16.3 years (*A.N.* 3455). This assumes a change in position-angle of about 180° between 1891 and 1897. From the slow motion in angle and distance between the date of discovery and the last measures in 1891, it seems very probable that in all the observations the companion star should be put in the same quadrant. It will be seen from the magnitude estimates when the distance was the greatest that the components are very nearly equal, and a correction of 180° may be considered as allowable in any of the measures. It is not material whether we consider the second or the fourth quadrant as the correct one for the smaller star. There is no question of the binary character of this pair, but if the change has been in a gradual approach of the two components, as seems most likely, the period will not be a short one. The measures of the next few years will show whether or not there has been any rapid angular motion. The principal measures are shown on the accompanying diagram.



Some of the values for the proper motion are:

Stumpe -	-	1".402 in	91°.3
Kustner -	-	1.379 in	90.6
Porter -	-	1.524 in	90.2
Bossert -	-	1.409 in	91.2

[*β* (VII)...*β* (2103,3048,3113)...*β* (*Pub. L. O.* 11)... Pollock (*Pub. Sydney Obsy.*, 1891) (*Mem. R. A. S.* L)...L.v¹...L.v (*Std. Mets.* VIII, 77) (*Proc. Haverford Coll. Obsy.*, 1891)... Hall (II)...See (*A. J.* 412)...See (3455,3495)...Aitken (*A. J.* 424, 429)...Hussey (*A. J.* 427)...]

β 1159. D.M. (39°) 148

R.A. $0^h\ 32^m\ 28^s$
Decl. $+40°\ 1'$

1890.68	41°.7	0".23	9.7...	9.9	3*n*	*β*

This very minute and difficult pair, discovered with the 36-inch, is involved in the extreme preceding end of the great nebula in *Andromeda*. The magnitude in D.M. is 8.9.

[*β* (XVII)... *β* (3047)...*β* (*Pub. L. O.* 11)...]

β 491. δ *Andromedae*

R.A. $0^h\ 32^m\ 54^s$
Decl. $+30°\ 12'$

1878.40	209°.3	2".86	3	...12.5	3*n*	*β*
1888.71	209.7	27.60		...12.5	3*n*	*β*
1890.56	209.4	28.18		...12.2	3*n*	*β*
1898.55	209.2	27.90		...13	3*n*	*β*

Discovered with the 26-inch of the Naval Observatory. The proper motion of this star, according

to Auwers, is 0".151 in the direction of 120°.7. It is evident from the measures that this movement is common to both stars. Assuming the measured distance of 1878 as correct, the distance of the companion, if fixed in space, should have been 30".9 at the date of my last measures in 1898. It is certain, therefore, that these stars form a physical system, although apparently relatively fixed for the last twenty years.

[β (x)...β...β...β (2875,3048)...β (*Pub. L. O.* 11)...]

β 257. Lalande 1019

R.A. $0^h\ 33^m\ 37^s$
Decl. $+\ 46°\ 36'$

1876.04	236°.6	0".48	7.9... 9.0	4*n*	J
1891.68	237.1	0.65	8.1... 8.8	3*n*	β
1898.00	244.3	0.66	...	2*n*	Hu

Discovered with the 9.4-inch of the Dartmouth College Observatory. Change in angle is probable.

[β (v)...β (*Mem. Nat.* xxxv, 31)...J (1)... β (3113)...β (*Pub. L. O.* 11)...Hussey ( )...]

β 109. *Ceti* 91

R.A. $0^h\ 34^m\ 27^s$
Decl. $-\ 17°\ 10'$

B and C

1875.99	159°.4	12".±	9.0... 9.0	1*n*	Cin
1876.73	164.0	11.02	10.7...11.2	3*n*	J
1893.82	160.3	11.61	10.0...11.0	1*n*	W
1898.69	160.1	11.78	9.5... 9.6	1*n*	β
1898.79	160.5	11.24	10.2 ..10.9	5*n*	Cg

A and C

1876.94	355°.7	91".11	7.0...	1*n*	J
1893.82	356.6	91.53	7.0...	1*n*	W
1898.69	356.4	91.90	7.0...	1*n*	β
1898.67	355.9	92.21	6.7...	1*n*	Cg

A and B

1898.79	354°.8	103".05	6.8...	4*n*	Cg

Unimportant wide double companion; noted with the 6-inch. Lalande 1064.

[β (111)...β (*Mem. Nat.* xxxiv, 59)...J (1)...Cin^3...Wilson ( )...Cogshall ( )...]

β 231. o *Cassiopeiae*

R.A. $0^h\ 38^m\ 2^s$
Decl. $+\ 47°\ 38'$

1876.31	303°.9	32".81	5.5...12	1*n*	J
1878.47	303.7	32.16	...	1*n*	β
1888.71	303.5	32.63	...11.6	3*n*	β
1898.00	303.1	32.66	...	2*n*	Hu

Discovered with the 6-inch. Auwers gives as the proper motion of the principal star 0".018 in the direction of 145°.9. The movement is too small to say with certainty whether the two are moving together.

[β (v)...β (*Mem. Nat.* xxxv, 31)...β...β (2875)...β (*Pub. L. O.* 11)...J (1)...Hussey ( )...]

β 492. B.A.C. 201

R.A. $0^h\ 38^m\ 27^s$
Decl. $+\ 54°\ 34'$

1878.73	152°.6	1".90	6 ...12	2*n*	β
1885.69	150.70	2.23	...	2*n*	HΣ
1889.55	152.7	2.11	5.7...11.3	3*n*	β
1898.65	151.5	2.12	6.0...12.0	2*n*	β

Discovered with the 26-inch at the Naval Observatory. Rogers gives the proper motion of this star as 0".066 in the direction of 317°.3. The measures show relative fixity, and they are, therefore, moving together. A naked-eye star in *Cassiopeæ*.

[β (x)...β...β (2956)...β (*Pub. L. O.* 11)...HΣ I ( )...]

β 865. D.M. (42°) 161

R.A. $0^h\ 38^m\ 52^s$
Decl. $+\ 42°\ 45'$

1880.78	197°.4	1".21	8.5... 9.0	4*n*	β
1891.83	197.1	1.30	8.3... 8.8	3*n*	β
1898.00	195.5	1.30	...	2*n*	Hu
1898.95	192.0	1.48	...	1*n*	How

Discovered with the 18½-inch. Without change, β 866 is closely following.

[β (xiii)...β...β (3113)...β (*Pub. L. O.* 11)...Hussey ( ) ...Bowyer (*Mem. Nat.* 11x, 200)...]

β 493. D.M. (50°) 137

R.A. $0^h\ 39^m\ 4^s$ }
Decl. $+50°\ 27'$ }

1878.67	51°.4	0″.85	9.0...	9.0	2*n*	β
1891.85	51.4	0.77	9.0...	9.1	2*n*	β
1891.92	55.6	0.5±	...		1*n*	Sp
1898.76	54.7	0.69	9.0...	9.2	1*n*	β

Discovered with the 18½-inch. The β of a small triangle of 9m stars. There seems to be no sensible change. There is a 3″.8 pair of stars 89″ distant in the direction of 216°.8.

[β (x)...β'...β (3113)...β (*Pub. L. O.* II)...Sp (III)...]

β 866. D.M. (42°) 166

R.A. $0^h\ 39^m\ 43^s$ }
Decl. $+42°\ 45'$ }

1880.78	68°.2	1″.26	9.2...	9.2	4*n*	β
1891.83	69.6	1.39	9.0...	9.1	3*n*	β

Discovered with the 18½-inch. Without change. β 865 is in the field β.

[β (XIII)...β'...β (3113)...β (*Pub. L. O.* II)...]

β 494. Lalande 1266

R.A. $0^h\ 40^m\ 53^s$ }
Decl. $-1°\ 54'$ }

1878.20	168°.5	1″.38	8.1...	8.1	2*n*	β
1886.80	171.2	1.36	8.0...	8.0	3*n*	I.M
1888.76	170.5	1.27	8.3...	8.4	4*n*	Lv
1888.87	171.4	1.39	8.0...	8.0	4*n*	T
1892.86	171.8	1.37	8.2 ..	8.2	1*n*	Gl
1896.91	173.1	1.20	...		1*n*	Col
1898.65	172.0	1.33	8.2...	8.3	3*n*	Bd
1898.93	180.5	1.62	...		1*n*	Sol

Discovered with the 18½-inch. Apparently fixed.

[β (x)...β'...Lv'...I.M...Tarrant (2991)...Glasenapp (II) ...Boothroyd ( )...Coleman (*Mem. R. A. S.* LIII)... Sola (3363)...]

β 495. Lalande 1308

R.A. $0^h\ 42^m\ 25^s$ }
Decl. $+18°\ 2'$ }

1878.70	230°.9	0″.58	7.5...	7.5	1*n*	β
1883.80	223.8	0.5	...		2*n*	Per'y
1885.14	225.8	0.60	7.3...	7.6	5*n*	En
1885.87	224.1	0.60	...		2*n*	HΣ
1887.98	225.0	0.54	6 ...	7	2*n*	Hl
1889.92	225.5	0.63	...		5*n*	Sp
1891.66	224.9	0.65	7.5...	7.7	3*n*	β
1896.80	222.2	0.57	...		1*n*	Bow
1896.95	221.3	0.81	...		1*n*	L
1897.83	218.8	0.68	...		1*n*	Bow
1897.87	219.7	0.62	...		2*n*	L
1898.76	222.5	0.77	8.0...	8.2	1*n*	β
1898.82	220.3	0.85	...		3*n*	Bow

Discovered with the 18½-inch. The motion, if any, is very slow. The measures by HALL are erroneously credited to OΣ 20.

[β (x)...β'...β (3113)...β (*Pub. L. O.* II)...J. M. Perry (*Eng. Mechanic* XXXVIII, 192; XXXIX, 11)...Engelmann (2786)...HΣ ( )...Hall (II)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...]

β 301. Lalande 1350

R.A. $0^h\ 43^m\ 21^s$ }
Decl. $-22°\ 3'$ }

A and B

1891.79	318°.8	0″.90	8.3...	14	3*n*	β

A and C

1875.92	299°.8	5″±	9.0...	10.0	3*n*	Cin
1891.78	300.7	11.23	8.3...	9.4	3*n*	β
1893.92	298.6	10.57	9 ...	10	1*n*	Sel
1898.92	300.0	11.03	8.3...	8.8	1*n*	β

C was discovered with the 6-inch, and in measuring that with the 36-inch the close star was detected. It is difficult with the large instrument.

[β (VI)...β (2062,3113)...β (*Pub. L. O.* II)...Cln'...Sellors (1240)...]

β 1160. B.A.C. 230

R.A. $0^h\ 43^m\ 24^s$
Decl. $-14°\ 13'$

1890.69	113.1	1.19	5.8...12.0	3*n*	β

Discovered with the 36-inch. This is a naked-eye star in *Cetus*. The magnitude in Gould is 5.9. [β (XVII)...β (3047)...β (*Pub. L. O.* II)...]

β 232. O. Arg. N. 794

R.A. $0^h\ 43^m\ 38^s$
Decl. $+49°\ 59'$

A and B

1876.23	288.4	0.48	8.0... 8.5	6*n*	J
1883.82	291.0	0.4	...	1*n*	Per'y
1891.66	320.1	0.41	8.0... 8.1	3*n*	β
1892.84	319.7	0.62	...	1*n*	Bar
1892.99	321.2	0.4 ±	...	1*n*	Sp
1896.09	325.1	0.3 ±	...	3*n*	Sp
1897.77	326.1	0.38	...	2*n*	D
1898.65	340.7	0.31	8.0... 8.0	2*n*	β

AB and C

1875.99	292.8	28.70	...10.2	3*n*	Δ
1891.66	293.8	28.49	... 9.1	3*n*	β
1897.77	294.3	28.42	...	2*n*	D
1898.65	293.6	28.01	... 9.0	2*n*	β

Discovered with the 6-inch. It is certain that the close pair is in moderately rapid motion. At the time of the discovery of this pair, in October, 1874, the angle of AB was estimated 290°, "nearly in the direction of C," thus confirming the position found by J in 1876.

[β (V)...β (*Mem. Not.* XXXV, 31)...], J. M. Perry (*Eng. Mechanic* XXXIX, 11)...Sp (III)...β (3113)...β (*Pub. L. O.* II)...d (1)...Barnard (*A. J.* 447)...Doolittle (*Pub. Flower Obsy.* I)...]

β 781. Lalande 1337

R.A. $0^h\ 44^m\ 26^s$
Decl. $+68°\ 20'$

1881.51	31.2	1.04	8.1... 8.6	3*n*	β
1886.86	28.2	1.18	...	2*n*	UL
1888.44	26.5	1.04	8.3... 9.2	3*n*	Com
1891.59	30.0	0.88	8.1... 8.4	3*n*	β

Discovered with the 15½-inch at the Washburn Observatory. So far there has been no change.

[β (XII)...β"...β (3113)...β (*Pub. L. O.* II)...Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI)...]

β 496. Lalande 1416

R.A. $0^h\ 45^m\ 18^s$
Decl. $+12°\ 8'$

1878.74	2.4	5.12	7 ...13	2*n*	β
1885.97	2.3	5.04	...	1*n*	HΣ
1891.64	4.2	5.31	7.5...12.5	2*n*	β

Discovered with the 18½-inch. No sensible change.

[β (X)...β"...β (3113)...β (*Pub. L. O.* II)...HΣ ( )...]

β 1. O. Arg. N. 819

R.A. $0^h\ 45^m\ 50^s$
Decl. $+55°\ 58'$

A and B

1875.34	81.0	1.42	8.1...10.1	4*n*	J
1876.76	79.8	1.45	8 ...10	1*n*	OΣ
1885.73	82.1	1.62	...	2*n*	HΣ
1888.66	82.0	1.38	8.0...10.0	5*n*	T
1889.55	82.6	1.45	8.2... 9.8	3*n*	β
1892.96	83.8	1.48	8.1...10.1	2*n*	J
1898.66	79.2	1.63	8.4...10.0	2*n*	β

A and C

1875.34	133.3	3.70	... 8.8	4*n*	J
1876.46	130.1	3.85	... 9.0	1*n*	OΣ
1885.73	132.3	3.83	...	2*n*	HΣ
1888.66	137.2	4.08	... 9.0	5*n*	T
1889.55	134.2	3.82	... 8.7	3*n*	β
1892.89	132.8	3.60	... 8.6	2*n*	J
1898.58	137.6	3.67	... 9.7	2*n*	β

A and D

1875.34	192.9	8.82	... 9.5	4*n*	J
1876.46	192.7	8.87	... 9.0	1*n*	OΣ
1885.73	192.7	8.93	...	2*n*	HΣ
1888.67	193.5	8.76	... 9.5	4*n*	T
1889.55	193.7	8.97	... 8.7	3*n*	β
1892.89	193.2	8.83	... 9.2	2*n*	J
1898.58	194.4	8.73	...	2*n*	β

A and E

1888.67	334.1	16.53	...12.0	4*n*	T
1889.55	333.1	15.84	...12.5	3*n*	β
1898.58	332.9	15.86	...	2*n*	β

Discovered with the 6-inch. It is a pretty group, in the *np* edge of a large diffused nebula, discovered by BARNARD in 1881 (Dreyer 281). The components of this multiple seem to be fixed.

[β (1)...β (*Mem. Not.* XXXIII, 351)...β (*Pub. L. O.* II)...δ (2081)...δ (1)...OΣ (*Pemiketwa Obsns.* x)...HΣ ( ) ...Tarrant (2991)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Barnard (2588)]

β 497. B.A.C. 239

R.A. $0^h\ 45^m\ 55^s$
Decl. $+60°\ 28'$

B and C

1877.59	150.9	0.9	9.0...11.5	1*n*	β
1891.52	149.8	0.76	9.0...11.5	2*n*	β
1898.73	151.6	0.84	8.7...10.5	1*n*	β

A and B

1878.66	171.6	121.20	6.0...	1*n*	β
1888.08	171.4	123.17	...	2*n*	Eng
1891.51	171.2	123.89	6.0... 8.7	3*n*	β
1895.01	171.7	124.82	...	2*n*	Eng
1898.72	171.6	125.06	5.7... 8.2	2*n*	β

This distant double companion was detected with the 18½-inch. The bright star has an annual proper motion of 0".175 in the direction of 331°.2 (PORTER), and this corresponds to the the change of the distant star with reference to A. The small star B is D.M. (60°) 125.

[β (x)...β^{2}...β (3113)...β (*Pub. L. O.* II)...β (*A. & A.-P.* XIII, 16)...Engelhardt (*Obsns. Ast.* II, III)...]

β 498. Lalande 1459

R.A. $0^h\ 46^m\ 33^s$
Decl. $+9°\ 5'$

1878.26	150.2	2.53	8.0...12.0	2*n*	β
1885.97	158.5	2.57	...	1*n*	HΣ
1891.96	154.6	2.70	8.0...12.6	2*n*	β

Discovered with the 18½-inch. No change is shown by the measures.

[β (x)...β^{2}...β (3113)...β (*Pub. L. O.* II)...HΣ ( )...]

β 734. *Ceti* 132

R.A. $0^h\ 46^m\ 47^s$
Decl. $-24°\ 40'$

1879.68	348.9	10.74	6.0...11.0	3*n*	β
1879.69	345.6	10.75	5.5... 9.5	1*n*	Cin
1882.74	344.9	11.19	5.7... 9.5	3*n*	W
1888.84	346.9	10.83	7 ...10	2*n*	β
1897.63	345.7	11.24	...	1*n*	See
1898.71	347.1	10.68	6.0...11.5	1*n*	β

Discovered with the 6-inch at Mt. Hamilton. There has been no change in the position of the small star. The principal star is 5½ m in GOULD (= Lalande 1477 = Lacaille 238).

[β (xi)...β^{2}...β (2929)...β (*Pub. L. O.* I, II)...Cin^{6}...Wilson (Cin^{10})...See (3495)...]

β 1098. *ν Cassiopeiae*

R.A. $0^h\ 47^m\ 53^s$
Decl. $+58°\ 19'$

1889.60	75.2	12.79	6 ...13.5	3*n*	β
1896.80	74.4	12.87	6 ...14	1*n*	A
1898.60	74.0	13.18	...14	2*n*	β

Discovered with the 36-inch. The principal star has a proper motion of 0".106 in the direction of 221°.2 (AUWERS). With the position of 1889, and this proper motion, the distance of the small star, if fixed in space, should be 13".6 in the position-angle of 73° at the date of the last measure in 1898.

[β (xvi)...β (2956)...β (*Pub. L. O.* II)...Aitken (34651...]

β 500. Lalande 1539

R.A. $0^h\ 48^m\ 53^s$
Decl. $+30°\ 1'$

1878.36	289.0	1.04	8.1... 8.1	2*n*	β
1889.94	290.3	0.56	...	6*n*	Sp
1893.34	112.2	0.78	8.2... 8.3	2*n*	W
1896.72	289.8	0.62	8 ... 8	2*n*	Lv

Discovered with the 18½-inch. Change is doubtful.

[β (x)...β^{2}...Sp (III)...Lv (*A. J.* 407)...Wilson ( )...]

β 233. O. Arg. S. 505

R.A. $0^h\ 49^m\ 9^s$
Decl. $-18°\ 6'$

1876.77	268°.6	1".42	8.6 . . . 9.4	4*n*	J
1877.80	87.3	1.30	8.0 . . . 9.2	2*n*	Cin
1891.77	92.0	1.36	. . . 9	2*n*	Col
1891.96	90.5	1.14	8.0 . . . 9.0	1*n*	β
1895.91	96.3	. . .	. . .	3*n*	Dob
1897.75	90.0	1.46	. . .	1*n*	See

Discovered with the 6-inch. Evidently without change.

[β (v). . . β (*Mon. Not.* xxxv, 31). . . β (3114). . . β (*Pub. L. O.* II). . . Δ (1). . . Cin[4]. . . Collins (*Proc. Haverford Coll. Obsy.* 1891). . . Dobreck (3378). . . See (3495). . .]

β 1028. γ *Cassiopeiae*

R.A. $0^h\ 49^m\ 28^s$
Decl. $+66°\ 4'$

A and B

1888.69	255°.9	2".18	. . . 11.0	6*n*	β
1889.53	255.4	2.15	. . . 11.6	4*n*	β
1894.78	353.7	2.22	. . .	3*n*	Bar
1896.86	248.6	1.97	. . .	3*n*	A
1897.83	255.2	2.10	. . .	2*n*	Hu
1898.57	256.5	2.02	. . . 11.5	2*n*	β

A and C (=β 499)

1879.68	348°.2	52".15	. . . 13.0	4*n*	β
1888.68	348.6	52.44	. . . 13.5	2*n*	β
1896.89	348.4	52.71	. . .	2*n*	A
1898.59	347.7	52.69	. . .	3*n*	β

The distant star was detected with the 18½-inch, and in measuring it with the 36-inch the close star was discovered. It should have been seen with the smaller telescope, as it was measurable with the 12-inch at L. O.

Auwers gives for the proper motion of the large star 0".027 in the direction of 134°.3. If the companion does not share in this motion, the angle at the date of the last measures in 1898 should be 261°.5 and the distance 2".33. As the measures appear to show no relative change, it is very probable that B is moving with the principal star, and that they constitute a physical system. The distance of C is increasing as it should from the movement of A. The computed place of C from the measures of 1879 and the proper motion of A is, 347°.9 : 52".65 for 1898.5, which is practically identical with the measures of that date.

[β (x, xiv). . . β'. . . β'. . . β (2875,2956). . . β (*Pub. L. O.* II). . . Hussey (*A. J.* 427). . . Aitken (3465). . . Barnard (*A. J.* 447). . .]

β 1099. B.A.C. 255

R.A. $0^h\ 49^m\ 34^s$
Decl. $+59°\ 43'$

1889.57	270°.2	0".15	6.1 . . . 6.8	3*n*	β
1891.64	282.2	0.12	6.2 . . . 6.2	3*n*	β
1894.72	289.5	0.09	. . .	3*n*	Bar
1898.57	307.3	0.26	. . .	2*n*	β
1899.46	312.6	0.20	6.0 . . . 6.5	1*n*	A

This close and difficult pair was discovered with the 36-inch. It is a naked-eye star, $21'$ *s* of γ *Cassiopeiae*. Rapid angular motion is clearly shown by the measures, and it may belong to the class of short period binaries. It is important that careful measures with large apertures should be made each year.

[β (xvi). . . β (2056,3114). . . β (*Pub. L. O.* II). . . Barnard (*A. J.* 447). . . Aitken ( ). . .]

β 302. P.O. 245

R.A. $0^h\ 51^m\ 53^s$
Decl. $+20°\ 45'$

1876.27	92°.5	0".75	6.7 . . . 8.1	4*n*	J
1876.76	84.1	0.90	7.5 . . . 8.5	1*n*	OΣ
1883.53	94.3	0.82	6.8 . . . 7.9	5*n*	En
1883.85	97.5	0.7	. . .	1*n*	Per'y
1887.53	97.0	0.61	. . .	6*n*	Sp
1888.32	99.9	0.89	. . .	7*n*	HΣ
1889.02	97.1	0.66	. . .	8*n*	Sp
1898.01	101.0	0.58	. . .	2*n*	Br

Discovered with the 6-inch. A naked-eye star in *Pisces*. The angle appears to be increasing.

[β (vi). . . β (2062). . . J (1). . . Englemann (2742). . . OΣ (*Pulkowa Obsns.* x). . . J. M. Perry (*Eng. Mechanic* xxxix, 11). . . Sp (111). . . Brown ( ). . . HΣ ( ). . .]

β 867. Lalande 1719

R.A. 0h 53m 56s
Decl. + 11° 17'

1880.21	174.8	0.96	8.1 ... 8.6	3n	β
1889.00	172.2	0.98	8.0 ... 9.0	1n	Lv
1889.93	174.6	1.00	...	3n	Sp

Discovered with the 18½-inch.

[β (xIII) ... β[1] ... Lv[1] ... Sp (III) ...]

β 234. O. Arg. S. 563

R.A. 0h 54m 36s
Decl. − 17° 43'

A and B

1875.84	330.8	4.65	8.2 ... 8.5	3n	♃
1876.16	333.5	4.37	8.2 ... 8.3	4–1n	Cin
1877.78	330.5	4.76	8.2 ... 8.2	3–2n	Cin
1884.92	332.5	4.72	8.5 ... 8.5	1n	W
1887.97	332.2	4.70	8.5 ... 8.5	2n	Lv
1892.89	332.6	4.41	8.4 ... 8.6	2n	Gl
1893.82	332.0	4.60	8.0 ... 8.2	1n	W
1898.70	331.8	4.58	8.2 ... 8.3	3n	Cg
1898.88	331.4	4.54	8.0 ... 8.2	1n	β

A and C

1876.30	132.4	60.28	... 8.6	2n	♃
1892.89	132.1	60.66	... 8.7	2n	Gl
1893.82	131.9	59.90	... 8.0	1n	W
1898.70	132.0	62.34	... 8.6	3n	Cg
1898.89	131.6	60.41	... 8.0	2n	β

Discovered with the 6-inch. C is O.Arg.S. 565. Apparently fixed.

[β (v) ... β (*Mon. Not.* xxxv, 31) ... ♃ (I) ... Cin[3] ... Cin[4] ... Lv[2] ... Wilson (Cin[m]) ... Glasenapp (II) ... Wilson ( ) ... Cogshall ( ) ...]

β 1161. Lalande 1766

R.A. 0h 55m 53s
Decl. + 51° 9'

1890.71	324.2	0.48	6.9 ... 7.7	3n	β
1897.90	331.0	0.5 ±	...	2n	A
1898.74	330.5	0.57	7.5 ... 8.5	2n	β

Discovered with the 36-inch. Some change is probable.

[β (xvII) ... β (3047) ... β (*Pub. L. O.* II) ... Aitken (*A. J.* 429) ...

β 396. B.A.C. 282

R.A. 0h 56m 14s
Decl. + 60° 26'

1877.10	66.4	1.24	6.1 ... 9.2	4n	♃
1879.40	65.8	1.21	6.2 ... 10.0	4n	β
1881.63	67.5	1.15	6.7 ... 10.8	3n	β
1885.69	66.0	1.21	...	2n	HΣ
1888.72	66.8	1.25	6.3 ... 9.3	4n	β
1889.53	66.4	1.28	6.0 ... 10.0	3n	β

Discovered with the 6-inch. A naked-eye star near γ *Cassiopeiae*. The components have a striking difference in color; ♃ gives, *white : light blue*. Thus far there is no change in angle or distance.

[β (vII) ... β[1] ... β[3] ... β[4] ... β (2103, 2875, 2956) ... β (*Pub. L. O.* II) ... ♃ (I) ... HΣ ( ) ...]

β 735. Lacaille 296

R.A. 0h 58m 53s
Decl. − 34° 10'

1877.79	219.1	8.45	6.5 ... 10.0	1n	Cin
1879.68	218.3	8.64	7.0 ... 11.5	2n	β
1891.83	220.3	8.68	6.0 ... 10.5	3n	β
1896.76	219.4	8.37	...	2n	See
1896.87	220.0	8.43	...	1n	Hu

Discovered with the 6-inch at Mt. Hamilton. There is no evidence of change. This star had been previously seen by the Cincinnati observers. The magnitude of A is 6.5 in Gould.

[β (xI) ... β[6] ... β (3114) ... β (*Pub. L. O.* I, II) ... Cin[4] ... Hussey (*A. J.* 397) ... See (3495) ...]

β 1228. D.M. (12°) 133

R.A. 0h 59m 30s
Decl. + 12° 41'

1891.59	268.0	0.82	8.3 ... 8.9	3n	β
1895.88	268.1	0.51	...	1n	L
1896.81	265.1	0.60	...	1n	A
1897.86	266.8	0.69	...	1n	L
1897.98	265.2	0.86	...	1n	Bow
1898.87	275.7	0.89	...	3n	Bow
1898.94	268.5	0.80	8.5 ... 9.5	1n	A

Discovered with the 18½-inch in 1884, but not given in the catalogues of that time. The

measures are all too recent to show change, unless the motion is rapid.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Lewis and Bowyer (*Mon. Not.* LVI, 359; LIX, 400) (*Greenwich Obsvt.* 1895)...Aitken (3465).....Aitken [ )...]

β 501. Lalande 1958

R.A. $1^h\ 6^m\ 40^s$
Decl. $-5°\ 17'$

1878.49	29°.9	2″.55	8.0...11.7	2*n*	β
1891.94	31.3	2.73	8.1...11.5	3*n*	β
1898.64	28.4	2.80	7.2...11.8	3*n*	Cg

Discovered with the 18½-inch. No sensible change.

[β (X)...β'...β (3114)...β (*Pub. L. O.* II)...Coggshall( )...

β 397. Lalande 1943

R.A. $1^h\ 6^m\ 54^s$
Decl. $+46°\ 12'$

A and B

1876.64	142°.1	8″.75	7.6... 9.8	2*n*	J
1891.70	141.9	8.70	7.3... 9.6	3*n*	β
1893.56	142.9	8.54	7.3... 9.8	3*n*	W
1898.63	142.6	8.86	7.2...10.2	2*n*	β

A and C

1891.70	63°.8	16″.63	...13	3*n*	β
1898.63	65.4	16.63	...12.5	2*n*	β

The nearest companion was found with the 6-inch, and the other added with the 36-inch. These stars appear to be relatively fixed. The double star H 2015 has the same R.A., but 1° *n* of this pair. There is no such pair in H's place, and there is certainly an error of 1° in his declination, making it identical with this pair. The description in H is: 146°.2 ; 10″.± : 8.9...12.

[β (VII)...β (3114)...β [*Pub. L. O.* II)...J (1)...Wilson ( )...]

β 502. W° O. 1077

R.A. $1^h\ 2^m\ 13^s$
Decl. $+15°\ 9'$

1878.29	306°.6	3″.49	8.1...11.5	2*n*	β
1892.00	305.6	3.24	8.2...11.2	2*n*	β

Discovered with the 18½-inch. Unchanged.

[β (X)...β'...(3114)...β (*Pub. L. O.* II)...]

β 868. O. Arg. N. 1156

R.A. $1^h\ 2^m\ 54^s$
Decl. $+51°\ 24'$

1880.68	233°.8	9″.37	8.0... 9.8	4*n*	β
1891.70	233.7	9.25	7.9... 9.3	2*n*	β
1898.79	233.4	9.15	8.0...10.3	1*n*	β

Discovered with the 18½-inch. Unchanged.

[β (XIII)...β'...β (3113)...β (*Pub. L. O.* II)...]

β 303. *Piscium* 201

R.A. $1^h\ 3^m\ 10^s$
Decl. $+23°\ 9'$

1876.35	283°.7	0″.59	7.1... 7.3	6*n*	J
1876.76	281.0	0.69	7.5... 7.5	1*n*	OΣ
1877.08	104.6	0.56	7 ... 9	2*n*	Hl
1883.21	286.3	0.71	7.2... 7.8	5*n*	En
1883.59	283.0	0.8	...	1*n*	Per'y
1885.97	282.0	...	...	1*n*	HΣ
1887.51	285.0	0.55	...	6*n*	Sp
1887.92	103.0	0.61	7 ... 9	4*n*	Hl
1889.00	285.4	0.57	...	8*n*	Sp
1891.96	284.8	0.71	7.2... 7.2	2*n*	β
1892.85	284.5	0.93	7.0... 7.1	2*n*	Jnes
1895.91	285.7	0.62	7.2... 7.2	3*n*	Lew
1896.86	284.3	0.70	...	1*n*	Dy
1897.00	287.0	0.59	...	1*n*	Sp
1897.88	280.1	0.64	...	3*n*	Bow
1897.89	286.2	0.49	...	2*n*	Lew
1898.89	281.3	0.50	...	1*n*	L
1898.92	280.9	0.64	...	3*n*	Bow

Discovered with the 6-inch. Naked-eye star, Hrs 6.7 m. The measures show no change in either angle or distance. Lalande 2046.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...J (1)...Hall (1, II)...Engelmann (2678)...Perry (*Eng. Mechanic* XXXIX, 11)...OΣ (*Foulkowa Obsvt.* X)...HΣ ( )...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsvt.* 1895)...Sp (III)...Lewis, etc. (*Mon. Not.* LIX, 400)...]

β 235. Lalande 2042

R.A. 1h 3m 29s
Decl. + 50° 22′

A and *a*

1875.65	74.0	0.48	7.0...	7.4	6*n*	J
1878.65	76.9	0.84	7.8...	7.8	1*n*	β
1883.75	78.5	0.59	7.2...	7.6	6*n*	En
1888.56	83.7	0.63	...		5*n*	Sp
1889.53	86.1	0.79	7.2...	7.3	3*n*	β
1891.68	86.0	0.71	7.3...	7.4	3*n*	β
1892.88	84.0	0.87	7.1...	7.4	3*n*	J
1898.72	91.1	0.83	...		3*n*	Hu
1897.84	87.6	0.86	...		3*n*	A

B and *b*

1878.65	76.6	8.50	10.2...	12.0	1*n*	β
1898.54	78.7	8.64	...		2*n*	β

C and *c* (= Oζ 24)

1845.73	46.9	7.1±	...		2*n*	Ma
1847.91	45.0	7.80	...	11.2	2*n*	Oζ
1868.05	48.9	7.99	10.2...	11.5	3*n*	J
1878.65	47.2	8.13	9.0...	11.0	1*n*	β
1892.99	47.9	6.34	9.3...	10.4	1*n*	J
1898.54	47.6	8.03	...		2*n*	β

A and B

1868.75	287.9	43.79	7.0...	10.5	2*n*	J
1884.08	286.9	43.20	7.6...	9.8	5*n*	Fr'z
1898.54	286.1	43.43	...		2*n*	β

A and C (= Oζ (app.) 12)

1847.91	66.3	60.65	7.0...	8.9	2*n*	Oζ
1868.05	66.9	60.86	7.0...		3*n*	J
1883.48	66.7	60.06	7.3...	9.4	6*n*	Fr'z
1886.06	67.1	60.45	7.0...	8.8	3*n*	Eng
1898.54	67.2	60.01	...		2*n*	β

The close pair, and the minute companion to B, were discovered with the 6-inch. There appears to be a slow advance in the angle of Aa, with little or no change in the distant stars.

[β (v)...β (*Mon. Not.* xxxv, 31)...β...β (2956,3114)...β (*Pub. L. O.* II)...δ (I, pp. 133, 315)...δ (2086)...Oζ (*Poulkowa Obsns.* IX)... Madler (*Dorpat Obsns.* XIII)... Engelmann (2678)... Franz (2640)...Engelhardt (2785) (*Obsns. Ast.* II)... Jones (*Proc. Haverford Coll. Obsy.* 1892) ...Aitken (*A. J.* 429)...Sp (III)...Hussey ( )...]

β 2. W[a] I. 16

R.A. 1h 3m 46s
Decl. + 29° 14′

1875.71	155.7	2.07	9.3...	10.5	3*n*	J
1891.97	155.9	2.25	8.7...	9.0	1*n*	β

Discovered with the 6-inch.

[β (I)...β (*Mon. Not.* xxxiii, 351)...β (3114)...β (*Pub. L. O.* II)...δ (I)...]

β 1162. D.M. (35°) 215

R.A. 1h 3m 52s
Decl. + 35° 18′

1890.68	140.3	0.34	9.2...	9.4	3*n*	β

A difficult pair; discovered with the 36-inch. It is about 25″ *nf* β *Andromedae*.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...]

β 398. O. Arg. N. 1200

R.A. 1h 4m 52s
Decl. + 47° 10′

1877.02	50.5	1.85	9.0...	9.1	3*n*	J
1883.70	56.6	1.90	8.5...	8.8	6*n*	En
1891.51	50.3	1.84	8.9...	9.0	2*n*	β
1893.06	52.5	1.73	9.2...	9.2	1*n*	J

Discovered with the 6-inch. Without change.

[β (VII)...β (2103,3114)...β (*Pub. L. O.* II)...δ (I)...Engelmann (2678)...Jones (*A. J.* 312)...]

β 236. D.M. (46°) 285

R.A. 1h 5m 6s
Decl. + 46° 21′

1875.81	114.3	5.19	8.3...	8.8	4*n*	J
1882.10	114.0	5.91	...		1*n*	Pt
1885.12	114.8	5.65	8.5...	8.9	7*n*	En
1893.01	113.7	5.36	8.6...	8.8	3*n*	W

Discovered with the 6-inch. Apparently fixed.

[β (V)...β (*Mon. Not.* xxxv, 31)...δ (I)...Engelmann (2742) ...Pritchett (*Pub. Morrison Obsy.* I)...Wilson ( )...

β 258. Lalande 2110

R.A. 1h 5m 33s
Decl. + 61° 4′

1875.20	260.°4	0.″79	6.2 ... 9.0	4π	⊿
1881.63	264.4	0.89	7.2 ... 10.2	3π	β
1885.69	262.1	0.89	...	2π	HΣ
1888.97	262.3	0.78	...	3π	Sp
1889.57	268.2	0.99	6.3 ... 9.7	3π	β
1897.84	256.7	1.01	...	3π	A

Discovered with the 6-inch. Change is uncertain. AITKEN speaks of a 12m star, 204° : 41″.

[β (V) ... β (*Mon. Not.* XXXV, 31) .. β¹ .. β (2957) ... β (*Pub L. O.* 11) ... ⊿ (2086) ... ⊿ (1) ... HΣ ( ) ... Sp (111) ... Aitken (*A. J.* 429) ...]

β 1100. Lalande 2155

R.A. 1h 7m 9s
Decl. + 60° 18′

1889.54	43.°6	0.″48	7.4 ... 7.4	3π	β
1897.94	33.7	0.75	...	3π	A
1898.73	35.7	0.49	7.5 ... 7.7	1π	β

Discovered with the 36-inch. The measures indicate some motion.

[β (XVI) ... β (2956) ... β (*Pub. L. O.* 11) ... Aitken (*A. J.* 429) ...]

β 1029. ζ *Piscium*

R.A. 1h 7m 27s
Decl. + 6° 56′

B and C

1888.71	248.°7	0.″03	... 11	5π	β
1888.99	248.0	0.7±	...	3π	Sp
1890.92	248.8	0.85	... 13.5	3π	β
1895.90	240.1	...	...	1π	Dy
1896.74	241.5	0.97	...	3π	A
1898.73	241.7	0.88	...	1π	β

A and B (= Σ 100)

1832.83	63.°7	23.″46	4.2 ... 5.3	5π	Σ
1866.04	63.8	23.77	4.2 ... 5.8	3π	⊿
1888.71	63.5	23.72	...	5π	β
1890.92	63.5	23.70	...	2π	β
1898.76	63.5	23.67	...	4π	β

The close pair was discovered with the 36-inch. AUWERS gives the proper motion of A as 0.″123 in the direction of 114.°6, and this is obviously the movement of B, as these stars have remained relatively fixed since the first measures were made. The measures of C cover a sufficient time to show that the small star belongs to the system. The position of this star for 1898.7 with reference to B, if fixed, should be 268.°3 : 1.″99 from the proper motion of the large star. It is evident from the measures that no such change has taken place, and that there is probably slow orbital motion. These three stars undoubtedly constitute a vast physical system. It would appear from the measures of the last seventy years that the proper motion of B is identical with that assigned to A from the meridian observations. From the position of B given by Σ in 1832, assuming that star to be fixed in space, its relation to A in its position in 1898.8 would be 44.°7 : 19.″40.

[β (XIV) ... β (2875, 3038) ... β (*Pub. L. O.* 11) ... Sp (111) ... Dyson (*Mon. Not.* LVI, 359) (*Greenwich Obsns.* 1895) ... Aitken (3395) ...]

The measures of the wide pair (= Σ 100 = H IV.8 = Sh 16) are very numerous, and cover, first and last, more than a century. The early distances, however, are inaccurate and inconsistent, and the reliable results commence with the measures of Σ. A few only of the measures are given above, but sufficient to show the relative fixity of these stars. All the measures will be found in the following :

Mailler (*Dorpat Obsns.* IX, X, XIII, XV) (*Fixstern Syst.* 1) ... Herschel (*Mem. R. A. S.* XXXVIII) ... Dawes (*Mem. R. A. S.* VIII, XIX) (*Add. Obsns. at Bishop's Obsy.*) ... Mailler (324) ... Kaiser (409) ... Peters (1042) ... Auwers (1303) ... Bessel (*Beob. zu Doppelsternen*) ... Kaiser (*Annalen der Sternwarte* III, Leiden, 1872) ... Fletcher (*Mem. R. A. S.* XXII) ... Wichman (*Ergänzung-Heft, Astron. Nach.* 1849) ... Secchi (*Catalogo di 1121 Stelle Doppie*) ... Lather (*Königsberg Obsns.* I, II, III) ... *Obsns. at Barclay's Obsy.* 1) ... Engelmann (*Mess. zum Neunzig Doppelsternen*, 1865) ... Glasbill (*Mem. R. A. S.* XLII) ... Wilson and Seabroke (*Mem. R. A. S.* XLII, XLVIII) ... *Annals Harvard Obsy.* XIII ... OΣ (*Poulkowa Obsns.* IX) ... Dunér (*Mesures Microm.* Lund., 1876) ... Perrotin (*Annals Obsy. de Nice* II) ... Engelhardt (*Obsns. Astron.* II) ... Giacomelli (*Accad. dei Lincei*, 1890, VI) ... Jedrzejewicz (3224) ... Sp (11) ... ⊿ (1118) ... ⊿ (1, 11) ... Franz (2590) ... Glasenapp (11, 111) ... Cohn (3240) ... Hagen (3258) ... Chofardet (3450) ... Coleman (*Mem. R. A. S.* LIII) ... Solá (3563) ...]

β 3. D.M. (55°) 277

R.A. $1^h\ 9^m\ 39^s$
Decl. $+55°\ 52'$

1875.48	28.0	4.37	7.8 . . . 10.2	4*n*	⊿
1888.68	29.4	4.18	7.7 . . . 10.3	2*n*	T
1893.01	28.5	4.58	7.7 . . . 10.3	3*n*	W

Discovered with the 6-inch. Without motion.

[β (1) . . . β (*Mem. Not.* XXXIII, 351) . . . ⊿ (1) . . . Tarrant (2991) Wilson ( ) . . .]

β 503. Lalande 2307

R.A. $1^h\ 10^m\ 54^s$
Decl. $+9°\ 58'$

1878.38	136.7	5.44	8.0 . . . 12.0	3*n*	β
1885.93	136.8	5.83	. . .	1*n*	HΣ
1898.65	134.6	5.77	8.0 . . . 11.5	2*n*	β

Discovered with the 18½-inch. Apparently fixed.

[β (8) . . . β² . . . HΣ ( ) . . .]

β 504. Lalande 2318

R.A. $1^h\ 11^m\ 9^s$
Decl. $+1°\ 12'$

1878.35	277.3	1.40	7.7 . . . 11.7	3*n*	β
1897.93	279.3	1.87	. . .	3*n*	Br

Discovered with the 18½-inch.

[β (8) . . . β² . . . β¹ . . . Brown ( ) . . .]

β 782. Lalande 2357

R.A. $1^h\ 13^m\ 29^s$
Decl. $+55°\ 35'$

1881.57	79.2	2.95	8.0 . . . 9.6	3*n*	β
1885.70	77.5	2.96	. . .	2*n*	HΣ
1886.86	76.2	2.82	. . .	2*n*	UL
1888.41	76.7	3.16	8.0 . . . 9.4	3*n*	Com
1893.20	80.9	2.96	8.1 . . . 9.6	4*n*	W

Discovered with the 15½-inch at the Washburn Observatory. Apparently without change.

[β (XII) . . . β² . . . Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI) . . . Wilson ( ) . . . HΣ ( ) . . .]

β 1229. Cord. G.C. 1214

R.A. $1^h\ 13^m\ 46^s$
Decl. $-35°\ 7'$

1891.84	292.4	1.04	8.1 . . . 8.4	3*n*	β
1893.91	292.9	1.02	8.5 . . . 8.5	2*n*	Sel
1896.82	291.3	0.96	. . .	2*n*	See
1896.84	291.6	1.12	. . .	1*n*	Cg
1897.96	292.6	1.14	. . .	3*n*	A

Discovered with the 12-inch. So far there has been no change.

[β (XVIII) . . . β (3113) . . . β (*Pub. L. O.* II) . . . Sellors (3240) . . . See and Cogshall (3295) . . . Aitken (*A. J.* 420) . . .]

β 4. *Piscium* 255

R.A. $1^h\ 14^m\ 59^s$
Decl. $+10°\ 55'$

1872.81	100.±	0.5±	8 . . . 8.5		β
1876.76		Single	7	1*n*	OΣ
1877.17	81.0	0.37	7.0 . . . 7.5	1*n*	β
1879.66	119.1	0.5±	7.0 . . . 7.0	1*n*	Cin
1880.84	75.9	0.58	7.5 . . . 8.5	3*n*	β
1886.73	73.6	0.48	6.6 . . . 8.3	3*n*	LM
1888.84	59.0	0.43	7.1 . . . 7.1	3*n*	Lv
1889.93	69.1	0.4±	. . .	5*n*	Sp
1890.88	69.2	0.40	7.8 . . . 8.8	4*n*	β
1898.73	67.4	0.36	7.0 . . . 7.5	2*n*	β

AB and C

1898.76	248.9	22.28	. . . 13.5	1*n*	β

Discovered with the 6-inch. Slow retrograde motion is probable, with no sensible change in distance. In 1875 ⊿ could only see a^2 doubtful elongation in 68°. This star is LALANDE 2435. The faint star first noted with the 36-inch.

[β (1) . . . β (*Mem. Not.* XXXIII, 351) . . . β² . . . β¹ . . . β (3048) . . . β (*Pub. L. O.* II) . . . Cin⁶ . . . OΣ (*Pawlowsk Obsvn.* X) . . . UM . . . Lv² . . . Lv (*Sid. Mess.* VIII, 77) . . .]

β 1101. ψ *Cassiopeiae*

R.A. $1^h\ 17^m\ 27^s$
Decl. $+67°\ 30'$

A and B

1889.52	41.2	3.19	4.5 . . . 13.5	4*n*	β
1891.52	44.9	2.93	. . . 12.5	4*n*	β
1898.68	41.8	2.93	. . . 13.0	3*n*	β

A and C (= Σ 117 = H^{I} V. 83)

	°	″			
1783.62	100.2	33.42	...	1*m*	H^{I}
1831.04	101.8	32.22	4.4... 8.9	5*m*	Σ
1866.38	105.1	29.56	5.1...	4*m*	⊿
1881.66	106.8	28.67	...	4*m*	β
1889.52	107.4	28.01	...	4*m*	β
1898.68	108.8	27.44	...	3*m*	β

C and D (= Σ 117)

	°	″			
1831.04	253.3	3.01	8.9... 9.5	4*m*	Σ
1867.28	254.8	2.79	9.7...10.6	4*m*	⊿
1881.66	256.0	3.08	9.9...10.2	4*m*	β
1889.52	254.7	2.86	9.6... 9.8	4*m*	β
1898.65	255.4	2.90	...	3*m*	β

The close companion to the principal star of this well-known triple was discovered with the 36-inch. AUWERS gives the proper motion of the large star as 0″.067 in the direction of 70°.8, and this corresponds very nearly to the change in C, as shown by the measures. The distant stars, C and D, seem to be relatively fixed. A and B are moving together, and make a physical system.

[β (XVI)...β (2956,3114)...β (*Pub. L. O.* II)...β^{II}...β (*Ast. and Astro-Physics* XIII, 16)...]

A and C make the double H^{I} V. 83 (= Sh 18). D was discovered by Σ, the three stars making Σ 117. These evidently form a perspective group. Only a few of the measures of the old components are given above. These and other observations can be found as follows:

Madler (*Fixstern Systeme* I, 43, 82) (*Dorpat Obsns.* XI, XIII, XV)...Herschel (*Mem. R. A. S.* IV)...*Greenwich Obsns.*, 1840...*Radcliffe Obsns.* XXII...Dawes (*Mem. R. A. S.* XXXV) (*Obsns. at Bishop's Obsy.*)...Secchi (*Catalogo di 1321 Stelle Doppie*)...Mitchell (Cin^{ti})...Ferrari (*Misure Microm. Coll. Romano*, 1872–4)...Wilson and Seabroke (*Mem. R. A. S.* XLII. XLVI)...Ball (*Dunsink Obsns.* V)...Doberck (2196) (*Trans. R. I. Acad.* XXIX, Part 13)...d (1572)...d (II)...Tarrant (2898)...Flammarion (*Etoiles Doubles et Multiples*)...Hall^{a} (II)...Engelmann (2663)...Coleman (*Mem. R. A. S.* LIII)...]

β 505. θ *Ceti*

R.A. 1^{h} 18^{m} 1^{s}
Decl. — 8° 48′

	°	″			
1877.70	60.5	58.8	3 ...14	1*m*	β
1891.94	59.7	60.12	...13.7	3*m*	β
1898.69	59.5	60.64	...13.7	2*m*	β

A minute companion noted with the 18½-inch. The proper motion of the principal star is given by AUWERS as 0″.233 in the direction of 206°.0. With this proper motion and the position of the small star from the measures of 1898, its place at the date of the observation in 1877 should have been 62° : 56′.6. That was only a single measure, and the companion noted as "excessively faint." The small star is certainly fixed in space.

[β (X)...β^{II}...β (3114)...β (*Pub. L. O.* II)...]

β 1163. *Ceti* 199

R.A. 1^{h} 18^{m} 18^{s}
Decl. — 7° 32′

	°	″			
1890.68	192.3	0.19	6.0... 6.2	3*m*	β

Discovered with the 36-inch. In GOULD 5. W^{I} I. 271.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...]

β 1102. O. Arg. N. 1510

R.A. 1^{h} 19^{m} 39^{s}
Decl. + 59° 40′

B and C

	°	″			
1889.58	336.3	0.84	10.3...10.3	3*m*	β
1898.61	336.1	0.85	9.5... 9.5	1*m*	β

A and BC

	°	″			
1889.58	265.4	60.29	8.5...	3*m*	β
1898.54	265.0	60.67	8.0...	2*m*	β

Discovered with the 36-inch. The measures show no change. The principal star is Radcliffe 430. It is 1^{m} 41^{s} *f* δ *Cassiopeiae*, and 2° 58′ *n*.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...]

β 999. ω *Andromedae*

R.A. 1^{h} 20^{m} 29^{s}
Decl. + 44° 47′

A and B

	°	″			
1881.84	91.9	2.29	...12	4*m*	β
1888.70	95.4	2.64	...11.8	3*m*	β
1892.01	100.2	2.28	5.3...11.5	3*m*	β
1898.38	96.7	2.71	...	3*m*	β

A and C

1881.84	110°.3	134".26	...	2*n*	β
1888.75	110.3	132.49	...	3*n*	β
1891.97	110.3	130.93	...	1*n*	β
1897.82	110.4	128.84	...	2*n*	β

C and D (= β 82)

1881.84	140°.1	5".04	10.7...10.7	3*n*	β
1888.75	137.9	4.96	10.2...10.2	3*n*	β
1892.03	139.0	4.53	10.5...10.5	2*n*	β
1897.82	138.3	5.07	...	2*n*	β
1898.87	136.8	5.32	10.5... 10.5	1*n*	L

The distant double companion was noted with the 6-inch in 1872, and the close companion to the bright star with the 12-inch at Mt. Hamilton in 1881. The principal star has a considerable proper motion:

Bonn	-	-	0".347	in	107°.1
Bossert	-	-	0.355	in	106.3

The measures of 1881 and 1897, give an annual movement of 0".339 in the direction of 110°.3. It is obvious from the observations of AB that the small star is moving in space with the other, and that they form a physical system, with probably slow direct angular motion. The distant stars, CD, are apparently unchanged relatively.

[β (II, XIII)...β (*Mem. Not.* XXXIII, 437)...β¹...β (2875.3114) ...β (*A. & A. P.* XIII, 15)...β (*Pub. L. O.* II)...Lewis (*Mem. Not.* LIX, 400)...]

β 1164. 95 *Piscium*

R.A. 1ʰ 21ᵐ 26ˢ
Decl. + 4° 44′

1890.82	168°.4	0".39	6.7... 7.0	3*n*	β
1892.07	167.4	0.33±	...	4*n*	Sp
1895.49	162.4	0.43	...	2*n*	L
1896.53	171.0	0.32±	...	2*n*	Sp
1898.73	163.0	0.36	6.5... 7.0	1*n*	β
1898.94	160.2	0.40	7.0... 7.5	1*n*	A

Discovered with the 36-inch. In B.A.C, 7 m; in D.M., 8.0; and Boss, 7.3. The principal star has some proper motion:

Boss	-	-	0".162	in	193°.2
Porter	-	-	0.155	in	202.7

These stars certainly make a binary system, as they are evidently moving in space together. So far there is but little relative change. Assuming as correct the relation shown in the first set of measures, the distance should be 0".94 and the angle 36° in 1898 if the proper motion belonged to only one star.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Lewis (*Mem. Not.* LVI, 359) (*Greenwich Obsns.* 1895)...Sp (III)...Aitken ( )...]

β 399. *Ceti* 211

R.A. 1ʰ 21ᵐ 48ˢ
Decl. − 11° 31′

1876.90	302°.3	1".56	6.3...10.0	3*n*	J
1886.61	301.6	1.66	5.8... 8.4	4*n*	LM
1893.81	307.0	1.78	6.2... 9.5	2*n*	W
1898.65	301.7	1.66	6.4... 9.2	3*n*	Bd
1898.72	305.4	1.84	6.0... 9.0	2*n*	β

Discovered with the 6-inch. A naked-eye star; The change, if any, is slight. HRIS, 6–7 m. L 2675.

[β (VII)...β (2103)...Δ (1)...LM...Wilson ( )...Boothroyd ( )...]

β 1230. Lacaille 427

R.A. 1ʰ 24ᵐ 43ˢ
Decl. − 26° 50′

1891.84	224°.5	2".62	7.0...12.5	4*n*	β
1898.69	225.9	2.90	6.7...12.2	3*n*	Cg
1898.80	221.0	2.91	6.2...11.5	2*n*	β

Discovered with the 12-inch. In GOULD 6.2 m.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Cogshall ( )...]

β 1165. W^s I. 510

R.A. 1ʰ 25ᵐ 4ˢ
Decl. + 40° 27′

1890.83	62°.4	1".82	8.4...12.1	4*n*	β
1898.71	66.5	1.86	8.0...10.5	1*n*	β

Discovered with the 12-inch.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...]

β 506. η *Piscium*

R.A. $1^h\ 25^m\ 4^s$ *f*
Decl. $+14^\circ\ 44'$ N

1878.73	12.9	1.02	4	...11.0	4*n*	β
1880.12	14.2	1.16		...10.7	3*n*	β
1888.73	16.5	1.10		...10.0	3*n*	β
1890.78	14.8	0.99		...11.0	3*n*	β
1895.88	25.0	0.63		...10.5	1*n*	L
1897.88	14.1	1.16		...	1*n*	L

Discovered with the 18½-inch. Down to this time there is no evidence of relative motion. The proper motion of the principal star is very small. The value, according to AUWERS, is 0".0035 in the direction of 124°.6. The time covered by the measures is too short to show whether or not this movement belongs to the small star. It will probably turn out to be a physical pair.

[β (XI)...β²...β²...β (2875,1048)...β (*Pub. L. O.* II,... Lewis (*Mon. Not.* LVI, 359; LIX, 490) (*Greenwich Obsns.* 1893)...]

β 507. D.M. (26°) 264

R.A. $1^h\ 23^m\ 18^s$ *f*
Decl. $+26^\circ\ 9'$ N

1879.91	155.9	2.16	7.8	...10.6	3*n*	β
1891.99	151.2	2.01	8.0	...11.0	3*n*	β
1895.87	156.9	2.16		...	1*n*	L
1897.81	153.5	2.20		...	1*n*	Bow
1897.97	158.6	1.75		...	1*n*	Bry
1897.97	158.3	2.24		...	1*n*	L
1897.87	158.9	1.56		...	1*n*	L

Discovered with the 18½-inch. The magnitude in D.M. is 8.6. No change is shown by the measures.

[β (XI)...β²...β²...β (3114)...β (*Pub. L. O.* II)... Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsns.* 1895)... Lewis, Bowyer and Bryant (*Mon. Not.* LIX, 499)...]

β 1000. O. Arg. S. 935

R.A. $1^h\ 29^m\ 27^s$ *f*
Decl. $-30^\circ\ 32'$ S

1881.84	336.4	1.80	7.6	...12.0	2*n*	β
1891.84	356.4	1.42	8.0	...13.0	3*n*	β
1898.69	8.8	1.40	7.0	...12.0	1*n*	β

Discovered with the 12-inch at Mt. Hamilton in 1881. The companion is in rapid motion, but the character of the movement is uncertain at this time. It is probably a binary, as the change does not at all correspond to what appears to be the proper motion of A, as shown by the measures of an 8½ m star, *nf*, O. Arg. S. 938:

A and O. Arg. S. 938

1850	19.1	146.51	O. Arg. S.
1875	20.9	142.41	Cord. G.C.
1891.85	20.5	142.09	3*n* β
1898.69	20.7	141.61	2*n* β

The first two positions are derived from meridian observations. A comparison of O. Arg. S. with the mean place from the micrometrical measures, assuming that the change is due to the movement of A, gives the proper motion of that star, 0".132 in the direction of 340°.9. The smaller star may have some proper motion of its own. The measures of AB in the next few years will show whether or not the motion is rectilinear. The 40-inch shows a 14 m star, 329°.5 : 28".0.

[β (XIII)...β²...β (3114)...β (*Pub. L. O.* II)...]

β 869. Lalande 2935

R.A. $1^h\ 30^m\ 3^s$ *f*
Decl. $+3^\circ\ 42'$ N

1880.06	198.2	5.13	8.0	...11.7	5*n*	β
1892.00	197.9	5.31	8.1	...11.2	3*n*	β
1898.78	196.6	5.25	8	...12	3*n*	Bd

Discovered with the 18½-inch. Apparently fixed.

[β (XIII)...β²...β (3114)...β (*Pub. L. O.* II)...Boothroyd ( )...]

β 1166. Lalande 2980

R.A. $1^h\ 31^m\ 15^s$ *f*
Decl. $+38^\circ\ 3'$ N

A and B

1890.82	345.8	2.63	8.4	...11.5	3*n*	β
1898.70	349.7	2.69	8.5	...11.2	2*n*	β
1898.71	346.6	3.02		...	2*n*	Hu

A and C

1898.79	8.9	24.82	...13.5	2*n*	*β*

Discovered with the 12-inch.

[*β* (XVII)...*β* (3047)...*β* (*Pub. L. O.* II)...Hussey ( )...]

β 508. D.M. (26°) 276

R.A. 1h 32m 27s
Decl. + 26° 20′

1877.72	71.1	1.02	9.0... 9.5	1*n*	*β*
1890.47	63.1	0.6±	...	6*n*	Sp
1898.82	64.6	0.68	...	3*n*	Hu

Discovered with the 18½-inch.

[*β* (X)...*β*²...Sp (III)...Hussey ( )...]

β 783. O. Arg. N. 1777

R.A. 1h 32m 39s
Decl. + 73° 56′

1881.71	318.0	0.95	8.5... 8.9	4*n*	*β*
1888.82	315.5	0.96	9.0... 9.9	3*n*	Com

Discovered with the 15½-inch.

[*β* (XII)...*β*²...Comstock (*Pub. Washburn Obsy.* VI)...]

β 5. 103 *Piscium*

R.A. 1h 32m 47s
Decl. + 16° 1′

1875.52	289.4	1.34	7.0... 9.0	4*n*	J
1876.76	287.7	1.40	7.0... 9.5	1*n*	OΣ
1880.78	297.3	1.31	6.9... 9.3	3*n*	*β*
1883.85	292.5	1.4	...	1*n*	Per
1887.92	294.3	1.26	7.0... 9.2	2*n*	T
1888.68	295.1	1.31	7.0... 9.0	2*n*	T
1889.01	292.8	1.15	6.9... 9.2	2*n*	Lv
1889.95	292.0	1.07	...	3*n*	Sp
1898.00	290.7	1.38	...	3*n*	Br

Discovered with the 6-inch. No relative change is shown by the measures. The principal star has a proper motion of 0″.040 in the direction of 228°.3 (AUWERS). If the small star was fixed, its position at the date of the last measures in 1898 would be 330°.4 : 1″.20. It is therefore certain that the two stars are moving together, and that they form a physical system.

[*β* (I)...*β*²...J (I)...Lv¹...]. M. Perry (*Engl. Mech.* XXXIX, 11)...Tarrant (2899,2991)...OΣ (*Poulkova Obsns.* X)...Sp (III)...Brown ( )...]

β 1167. W. I. 716

R.A. 1h 33m 16s
Decl. + 38° 7′

1890.82	56.2	1.25	9.3...10.7	3*n*	*β*
1898.73	56.2	1.32	...	3*n*	Hu

Discovered with the 12-inch. The magnitude in D.M. is 8.8.

[*β* (XVII)...*β* (3047)...*β* (*Pub. L. O.* II)...Hussey ( )...]

β 1103. 44 *Cassiopeiae*

R.A. 1h 35m 13s
Decl. + 59° 57′

1889.54	3.8	1.73	6.2...12.5	3*n*	*β*
1898.61	4.6	1.73	...13.0	1*n*	*β*

Discovered with the 36-inch. KRUEGER gives the proper motion of the large star as 0″.060 in the direction of 103°.1. If the companion was fixed in space, its position with reference to A at the date of the last measures would be 347°.3 : 1″.89. The measures show clearly that the two stars are moving together.

[*β* (XVI)...*β* (2956)...*β* (*Pub. L. O.* II)...]

β 1104. Groombridge 370

R.A. 1h 36m 2s
Decl. + 52° 17′

1889.60	197.2	2.86	7.2...11.8	3*n*	*β*
1898.72	194.5	2.97	7.0...11.7	2*n*	*β*
1898.73	195.2	3.04	...	3*n*	Hu

Discovered with the 12-inch. Apparently unchanged.

[*β* (XVI)...*β* (2956)...*β* (*Pub. L. O.* II)...Hussey ( )...]

β 870. B.A.C. 525

R.A. 1h 36m 23s
Decl. + 56° 56′

1880.81	68°.9	1″.02	6.9... 8.3	3n	β
1888.82	59.5	0.76	...	3n	Sp
1891.60	59.7	1.11	6.6... 8.9	3n	β
1898.61	54.4	1.20	...	1n	β

Discovered with the 18½-inch. The measures show slow angular motion. The proper motion of this star from KRUEGER is 0″.036 in the direction of 152°.9. This is sufficient to show that the components are moving together, as otherwise at the date of the last measure the position of B would be, 35° : 1″.15.

[β (XIII)...β...β (3114)...β (*Pub. L. O.* II)...Sp (III)...]

β 453. D.M. (56°) 338

R.A. 1h 37m 7s
Decl. + 56° 31′

1880.81	224°.1	0″.91	8.8... 9.1	3n	β
1891.60	228.5	0.86	8.4... 8.5	3n	β

Discovered with the 6-inch. There is a pair of small stars 5′ n of this, D.M. (56°) 337, found and measured by J in 1877; 332°.9 : 2″.74 : 9.4...10.9 (1877.47) 4n.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...J (I, p. 372)...β...β (3114)...β (*Pub. L. O.* II)...]

β 509. Lalande 3170

R.A. 1h 37m 25s
Decl. + 8° 58′

1878.42	93°.5	0″.71	8.4... 8.7	3n	β
1890.47	258.0	0.70	...	3n	Sp
1891.74	259.2	0.70	8.4... 8.7	3n	β
1895.93	257.5	0.74	...	1n	L
1897.92	251.8	0.83	...	3n	A
1897.94	251.6	0.80	...	1n	Br
1899.00	254.8	0.59	8.0... 8.4	1n	β

Discovered with the 18½-inch. Slow retrograde motion. In a low-power field with Σ 155, 28″.9 p and 5″.6 n.

[β (IX)...β...β (3114)...β (*Pub. L. O.* II)...Sp (III)...Lewis (*Mem. Not.* LXI, 359) (*Greenwich Obsvt.* 1895)...Aitken (*A. J.* 429)...Brown ( )...]

β 6. Lalande 3205

R.A. 1h 38m 43s
Decl. − 7° 22′

1875.55	167°.1	2″.58	6.4... 9.2	4n	J
1877.80	166.8	2.70	7.0... 9.0	2n	Cin
1886.92	166.1	2.62	6.8... 8.8	2n	LM
1888.65	167.6	2.65	6.9... 9.6	3n	Lv
1893.81	168.0	2.61	7.0... 9.7	3n	W

Discovered with the 6-inch. Without change.

[β (I)...β (*Mon. Not.* XXXIII, 351)...J (I)...Cin⁴...LM...Lv⁴...Wilson ( )...]

β 784. D.M (22°) 269

R.A. 1h 39m 34s
Decl. + 22° 18′

1881.70	46°.7	1″.86	8.9... 9.5	3n	β
1887.79	47.9	2.16	8?... 9.5	3n	Com
1893.84	45.7	1.26	8.5... 9.5	1n	W

Discovered with the 15½-inch at the Washburn Observatory. Probably without change.

[β (XII)...β...Comstock (*Pub. Washburn Obsy.* VI)...Wilson ( )...]

β 736. D.M. (38°) 347

R.A. 1h 39m 38s
Decl. + 38° 20′

A and B

1879.94	209°.0	0″.86	8.5...10.3	3n	β
1890.90	209.3	0.77	8.5...11.0	3n	β
1898.76	207.5	0.82	8.4... 8.7	1n	β
1898.77	210.5	0.86	...	3n	Hu

A and C (= Σ 157)

1832.03	115°.5	12″.26	8.5... 9.0	3n	Σ
1845.08	113.9	11.49	...	1n	Ma
1850.72	117.5	12.69	...	1n	Ma
1865.49	116.0	12.19	8.3... 9.2	3n	J
1879.87	115.8	12.40	8.7... 9.2	2n	β
1890.90	115.9	12.56	... 8.7	3n	β
1898.75	115.4	12.55	8.5... 9.6	3n	β
1898.77	116.6	12.79	...	3n	Hu
1898.87	116.2	12.48	8.5...	1n	L

The duplicity of the principal star of Σ 157 was discovered with the 6-inch. Thus far no change

is shown. The distant star appears to be fixed. The foregoing are all the measures of AC.

[β (xi)...β''...β...β (3048)...β (*Pub. L. O.* 1, 11)...Δ (11) ...Madler (*Dorpat Obsns.* xiii) (*Fixstern-Systeme* 1)... Hussey ( )...Lewis (*Mon. Not.* LIX, 400)...]

β 871. Lalande 3289

R.A. $1^h\ 41^m\ 49^s$
Decl. $-\ 1°\ 33'$

1879.79	350.3	1.4±	8.5... 9.5	3*n*	Cin
1879.88	352.6	1.88	8.4... 9.0	4*n*	β
1886.66	351.3	2.28	8.4... 9.2	3*n*	LM
1888.30	352.0	1.97	8.1... 9.4	3*n*	Lv
1898.68	352.3	2.08	8.0... 9.0	3*n*	Cg

Discovered with the 18½-inch. Apparently without motion.

[β (xiii)...β?...Cin^2...LM...Lv^1...Cogshall ( )...]

β 510. Rumker 430

R.A. $1^h\ 42^m\ 4^s$
Decl. $+\ 15°\ 43'$

A and B

1878.06	337.4	1.59	8.0...12.0	1*n*	β
1891.92	335.3	1.54	8.1...10.5	3*n*	β
1895.90	333.9	2.08	...	1*n*	Lew

A and C (= H^2 V. 92)

1783.04	322.2	51.27	...	1*n*	H^2
1878.06	326.4	53.56	...	1*n*	β
1891.92	327.2	53.35	8.2...	3*n*	β

The close pair was discovered with the 18½-inch. The measures of both companions are insufficient to determine the question of motion, but the change, if any, is very slow. All the measures of AC are given above.

[β (x)...β''...β (3114)...β (*Pub. L. O.* 11)...Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsns.*, 1895)...]

β 511. S.D. (2°) 299

R.A. $1^h\ 42^m\ 40^s$
Decl. $-\ 2°\ 1'$

B and C

1878.29	316.0	3.69	8.4...12.5	3*n*	β
1878.94	310.1	4.20	8.5... 13	1*n*	β
1891.92	317.4	3.91	8.2...11.6	3*n*	β
1898.71	315.2	3.81	...13.0	2*n*	β
1898.72	315.2	4.11	...13.2	3*n*	Bd

A and B (= Σ 171)

1829.91	157.6	27.89	8.5... 8.5	2*n*	Σ
1847.07	158.7	...	...	1*n*	Ma
1865.44	159.1	29.14	8.2... 8.6	5*n*	J
1879.05	159.6	29.68	8.5... 8.5	7*n*	β
1891.92	159.9	30.23	8.2...	3*n*	β
1898.71	160.0	30.83	8.5... 8.5	2*n*	β
1898.72	160.1	30.40	8.0... 8.3	3*n*	Bd

The close companion to B was discovered with the 18½-inch. There is probably no change to this time. The distance of AB is increasing. The motion is undoubtedly rectilinear. This change from 1829 to 1898 gives for the proper motion of A, 0".046 in the direction of 2°.4. All the measures of AB are given above.

[β (x)...β'...β?...β (3114)...β (*Pub. L. O.* 11)...β (*A. & A. P.* XIII, 17)...Δ (11)...Madler (*Fixstern-Systeme* II)... Boothroyd ( )...]

β 1016. D.M. (32°) 324

R.A. $1^h\ 42^m\ 52^s$
Decl. $+\ 32°\ 20'$

1890.90	207.8	0.59	8.5... 8.5	3*n*	β
1897.95	202.5	0.46	...	2*n*	Bow
1897.86	202.6	0.47	...	1*n*	L
1898.79	209.6	0.67	...	3*n*	Hu
1898.93	208.3	0.60	...	1*n*	Bow

Discovered with the 18½-inch

[β (xiii)...β? (app.)...β (3048)...β (*Pub. L. O.* 11)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...Hussey ( )...]

β 1001. O. Arg. S. 1090

R.A. $1^h\ 43^m\ 5^s$
Decl. $-\ 18°\ 59'$

1881.55	2.7	1.32	8.0...11.5	3*n*	β
1893.81	358.2	0.98	8.2...11.5	1*n*	W
1898.89	6.0	0.97	8.2...12.7	2*n*	Cg

Discovered with the 12-inch. Probably no change.

[β (xiii)...β?...Wilson ( )...Cogshall ( )...]

β 1168. W². I. 758

R.A. $1^h\ 43^m\ 48^s$ *f*
Decl. $-10°\ 58'$ *S*

1890.71	203.0	0.″32	8.0...8.3	4*n*	*β*
1898.89	210.3	0.35	8.2... 8.2	2*n*	A
1899.00	202.0	0.72	8 ... 9.0	1*n*	Bd

Discovered with the 36-inch. It is $1^m\ 44^s$ *p* and 2′.4 *s* of *ζ Ceti*.

[*β* (xvii)...*β* (3047)...*β* (*Pub. L. O.* ii)...Aitken ( )... Boothroyd ( )...]

β 1169. D.M. (51°) 420

R.A. $1^h\ 44^m\ 17^s$ *f*
Decl. $+51°\ 46'$ *S*

1890.85	206.4	2.″20	8.5...12.3	3*n*	*β*
1898.71	203.5	2.35	8.4...11.3	2*n*	*β*
1898.73	206.7	2.32	...	3*n*	Hu

Discovered with the 12-inch.

[*β* (xvii)...*β* (3047)...*β* (*Pub. L. O.* ii)...Hussey ( )...]

β 259. W². I. 805

R.A. $1^h\ 46^m\ 20^s$ *f*
Decl. $-10°\ 19'$ *S*

1875.82	236.0	4.″51	8.7...11.2	3*n*	J
1877.86	236.8	4.25	8.2... 9.7	3*n*	Cin
1889.97	239.7	4.52	8.0...10.4	2*n*	Lv
1898.69	237.8	4.56	7.7... 9.8	3*n*	Cg

Discovered with the 9.4-inch of the Dartmouth College Observatory. Probably without change.

[*β* (v)...J (1)...Cin⁴...Lv⁴...Coggshall ( )...]

β 260. Lalande 3444

R.A. $1^h\ 46^m\ 45^s$ *f*
Decl. $+14°\ 51'$ *S*

1875.81	228.1	0.″56	8.3... 9.0	3*n*	J
1884.97	230.6	0.64	8.0... 8.0	2*n*	Ho
1892.86	232.7	0.70	8.0... 8.0	1*n*	J
1893.73	232.6	0.70	8.0... 8.1	1*n*	W
1897.98	234.0	0.70	...	2*n*	Br

Discovered with the 6 inch. The change, if any, is very slow.

[*β* (v)...*β* (*Mem. Nat.* xxxv, 11)...J (1)...Hough (2978)... Jones (*Proc. Haverford Coll. Obsy* 1892)...Brown ( ) Wilson ( )...]

β 512. D.M. (18°) 244

R.A. $1^h\ 47^m\ 12^s$ *f*
Decl. $+18°\ 42'$ *S*

1878.01	27.3	1.″45	9.0...13	2*n*	*β*
1890.58	23.8	1.64	8.6...11.7	3*n*	*β*
1895.87	292.0	1.25	8.6...11.7	1*n*	L
1897.86	17.2	1.84	8.6...11.7	1*n*	L
1898.88	18.3	1.97	8.0...12.5	1*n*	A
1898.96	23.8	1.54	8.9...13.2	3*n*	*β*

Discovered with the 18½-inch. This star is a distant companion to *γ Arietis*. The measures are not sufficient to decide as to relative motion. There seems to be an error in the angle of 1895. The following are all the measures connecting the star with *γ Arietis*:

γ Arietis (A) and *β* 512

1823.86	85.°6	228.″76	1*n*	Sh
1878.71	84.3	223.82	1*n*	*β*
1898.92	83.9	223.73	1*n*	*β*

The principal star of *γ Arietis* has a proper motion of 0.″107 in the direction of 152°.4 (Auwers), and this substantially accounts for the change.

[*β* (x)...*β*²...*β* (3048)...*β* (*Pub. L. O.* ii)...Lewis (*Mon. Not.* lvi, 359; lix, 400) (*Greenwich Obsvs.* 1895)...Aitken ( )...]

β 183. Lalande 3287

R.A. $1^h\ 47^m\ 21^s$ *f*
Decl. $-17°\ 20'$ *S*

1875.92	226.4	....	8.5...10.5	1*n*	Cin
1876.03	227.9	2.69	8.4... 9.4	4*n*	J
1877.79	226.9	....	8.0... 9.0	1*n*	Cin
1879.77	226.7	2.42	8.0... 9.5	1*n*	Cin
1882.76	229.6	2.72	8.5... 9.5	1*n*	W
1885.95	227.5	2.40	8 .. 11	1*n*	LM
1893.81	227.6	2.62	8.0... 9.8	2*n*	W
1898.85	229.2	2.60	8 ... 8.7	3*n*	Bd

Discovered with the 6-inch. Evidently fixed.

[*β* (iv)...*β* (*Mem. Nat.* xxxiv, 382)...J (1)...Cin³...Cin⁴... Cin⁵...Wilson (Cin⁶)...LM... Wilson ( )...Boothroyd ( )...]

β 7. 58 *Ceti*

R.A. $1^h\ 51^m\ 43^s$ }
Decl. — $2°\ 39'$ }

	°	"			
1875.53	12.1	2.86	7.0 . . . 12.0	3n	Δ
1877.78	11.4	2.85	6.7 . . . 10.8	3n	Cin
1880.94	12.8	2.73	6.2 . . . 11.0	2n	β
1886.91	10.9	3.10	7.0 . . . 10.8	4n	LM
1888.99	12.6	2.63	7.0 . . . 11.5	2n	T
1898.63	20.5	2.70	6.0 . . . 10.7	2n	β

Discovered with the 6-inch. Auwers gives the proper motion of this star as 0".025 in the direction of 36°.8. The position of the small star, if fixed in space, should be at the date of the last measures in 1898, 6°.2 : 2".35. It is probable that the two stars are moving together.

[β (1) . . . β (*Mon. Not.* XXXIII, 351) . . . $β^1$ . . . Δ (1) . . . Cin^4 . . . LM . . . Tarrant (2091) . . .]

β 513. 48 *Cassiopeiae*

R.A. $1^h\ 52^m\ 7^s$ }
Decl. + $70°\ 19'$ }

A and B

	°	"				
1878.69	265.0	1.05	5.0 . . .	7.0	1n	Δ
1878.70	264.4	1.04	. . .		3n	β
1879.23	264.5	0.96	5.0 . . .	7.0	1n	OΣ
1879.56	265.6	1.00	. . .	8.0	2n	β
1881.67	271.9	0.76	. . .	7.5	1n	β
1883.78	269.7	1.07	. . .	7.0	5n	En
1885.77	284.9	. . . .	. . .		1n	HΣ
1886.03	270.1	1.03	. . .	7.3	4n	T
1888.70	298.1	0.83	. . .	6.3	4n	β
1888.99	304.9	0.80	. . .	8	3n	Hl
1889.30	294.5	0.69	. . .		2n	T
1889.52	304.4	0.76	. . .	9	3n	β
1890.23	301.0	0.57	. . .		2n	T
1890.62	308.6	0.55	. . .	7.5	4n	β
1891.61	313.5	0.58	. . .	7.7	4n	β
1892.99	317.2	0.5 ±	. . .		1n	Sp
1893.47	322.2	0.65	. . .		2n	Bar
1896.09	333.7	0.5 ±	. . .		2n	Sp
1898.92	5.9	0.36	5.2 . . .	7.2	3n	A

A and C

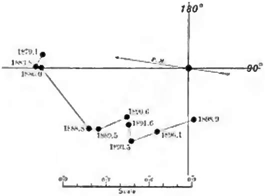
	°	"			
1878.80	49.4	23.98	. . . 13.5	1n	β
1891.62	51.2	23.67	. . . 13.6	3n	β
1898.78	50.3	23.81	. . . 13.0	3n	β

A and D

	°	"			
1898.86	83.3	47.09	. . . 13	1n	β

This most interesting binary was discovered with the 18½-inch, but at that time it was easily seen with the 6-inch. It is now (1898) a very difficult object, and only measurable with a large aperture under the best conditions. The motion of the companion has been nearly a quadrant since the first measures, and it may prove to have a short period, but a much larger arc is required to give even a rough approximation of the orbit.

The principal positions are shown on the following diagram:



48 Cassiopeiae. β 513

Auwers gives the proper motion of this star 0".069 in the direction of 262°.2. If the small star did not have this movement its position at the date of the measures in 1896 should be 68°.3 : 0".16. It is obvious that the smaller star has the same proper motion, and at the same time a retrograde motion, around the principal star. If the change shown by the measures was due to the difference of two proper motions, it would have been an easy pair at the time of the observations of Σ and OΣ, and therefore catalogued as a double star long ago. It is probable that the distance at the time of discovery was about maximum.

[β (X) . . . $β^2$ . . . $β^3$ . . . $β^5$ . . . $β^6$ . . . β (2875, 2957, 3048, 3114) . . . β (*Pub. L. O.* II) . . . Δ (1) . . . HΣ (   ) . . . OΣ (*Poulkowa Obsns.* X) . . . Engelmann (2678) . . . Tarrant (2876, 3186) . . . Hall (II) . . . Barnard (*A. J.* 447) . . . Sp (III) . . . Aitken (   ) . . .]

β 514. Lalande 3698

R.A. $1^h\ 53^m\ 57^s$ *f*
Decl. $-13°\ 54'$ *f*

1877.69	135°.3	6".20	8.0...12.0	1*n*	*β*
1891.92	134.2	6.36	8.1...10.0	3*n*	*β*
1898.84	133.0	6.31	8.0...10.2	3*n*	Bd

Discovered with the 18½-inch. By a clerical error the angle in *β* (X) is erroneously printed 285°.5. The components seem to be fixed.

[*β* (x)...*β*'...*β* (3114)...*β* (*Pub. L. O.* 11).. Boothroyd ( )...]

β 785. 49 *Cassiopeiae*

R.A. $1^h\ 54^m\ 4^s$ *f*
Decl. $+75°\ 32'$ *f*

1881.70	245°.7	5".22	6.0...13	4*n*	*β*
1885.87	243.4	5.82	...	2*n*	HΣ
1888.83	247.3	5.13	6.0...13	4*n*	Com
1889.52	243.7	5.40	5.1...13.2	3*n*	*β*
1898.65	244.3	5.35	6.0...12.5	2*n*	*β*

Discovered with the 15½-inch at the Washburn Observatory. The proper motion of this star is given by Auwers as 0".041 in the direction of 242°.2. This is nearly in the direction of the small star, and would, therefore, affect only the distance. If the small star was fixed in space, the distance at the date of the last measures in 1898 would be 5".90. The measures show no change in this respect, and there is no doubt that the two are moving together.

[*β* (xii)...*β*'...*β* (2957)...*β* (*Pub. L. O.* 11)...Comstock (*Pub. Washburn Obsy.* vi)...HΣ ( )...

β 872. Lalande 3694

R.A. $1^h\ 54^m\ 28^s$ *f*
Decl. $+32°\ 44'$ *f*

1880.75	182°.1	5".25	8.1...11.6	4*n*	*β*
1891.97	185.5	4.95	8.3...11.8	2*n*	*β*
1898.71	186.5	4.62	8.3...12.0	2*n*	*β*

Discovered with the 18½-inch. The measures indicate change.

[*β* (xiii)...*β*'...*β* (3114)...*β* (*Pub. L. O.* 11)...]

β 515. Lalande 3707

R.A. $1^h\ 54^m\ 38^s$ *f*
Decl. $+15°\ 59'$ *f*

1878.38	243°.3	1".51	7.7...12.5	2*n*	*β*
1892.00	244.4	1.31	8.1...11.3	3*n*	*β*

Discovered with the 18½-inch. Without change.

[*β* (x)...*β*'...*β* (3114)...*β* (*Pub. L. O.* 11)...]

β 873. *Radcliffe* 597

R.A. $1^h\ 56^m\ 7^s$ *f*
Decl. $+63°\ 48'$ *f*

1880.77	29°.1	2".03	7.3...10.9	6*n*	*β*
1891.51	27.2	2.12	7.0...10.9	3*n*	*β*

Discovered with the 18½-inch. Apparently fixed.

[*β* (xiii)...*β*'...*β* (3114)...*β* (*Pub. L. O.* 11)...]

β 516. Lalande 3851

R.A. $1^h\ 59^m\ 6^s$ *f*
Decl. $-1°\ 33'$ *f*

1877.92	285°.0	1".07	8.0,.. 8.0	2*n*	*β*
1886.83	287.4	0.84	8.2.... 8.4	3*n*	LM
1888.85	282.6	0.69	7.8... 8.5	3*n*	Lv
1890.48	288.0	0.7±	...	4*n*	Sp
1892.91	288.1	0.6±	...	1*n*	Sp
1893.77	286.2	0.93	8.0... 8.1	2*n*	W
1898.70	289.4	0.90	8.8... 8.8	3*n*	Cg

Discovered with the 18½-inch. Change is uncertain.

[*β* (x)...*β*'...LM...Lv'...Sp (iii)...Wilson ( )...Cogshall ( )...]

β 874. 5 *Persei*

R.A. $2^h\ 3^m\ 8^s$ *f*
Decl. $+57°\ 5'$ *s*

1880.60	273°.6	5".60	6.5...12.5	3*n*	*β*
1891.51	274.1	5.40	6.0...13.2	3*n*	*β*
1898.57	272.0	5.34	6.0...13.5	2*n*	*β*

Discovered with the 18½-inch. Krueger gives the annual proper motion of this star 0".060 in the

direction of 277°.0. This would change only the distance of the companion. If the small star was fixed, the distance should have decreased 1″ from 1880 to 1898. The measures show no material change in the position of B, so that it is certain, if this value of the proper motion is substantially correct, that the two stars are moving together, and probably make a physical system.

[*β* (XIII)...*β*²...*β* (*Observatory* III, 582)...*β* (3114)...*β* (*Pub. L. O.* II)...]

β 1275. O. Arg. N. 2491

R.A. 2ʰ 6ᵐ 21ˢ
Decl. + 54° 45′

1898.66	203.°7	3.″26	7.5...13.0	4*n*	*β*

Discovered with the 40-inch in looking for the next pair, *β* 786.

β 786. D.M. (55°) 563

R.A. 2ʰ 9ᵐ 18ˢ
Decl. + 55° 12′

1881.57	353.°0	4.″89	8.5... 9.9	4*n*	*β*
1886.86	350.6	5.07	...	2*n*	UL
1888.06	349.7	5.30	8.2... 9.7	3*n*	Com
1898.60	351.1	5.20	8.5... 8.7	2*n*	*β*

Discovered with the 15½-inch at the Washburn Observatory. There seems to be no material change.

[*β* (XII)...*β*⁴...Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI)...]

β 1170. χ *Persei*

R.A. 2ʰ 9ᵐ 39ˢ
Decl. + 56° 57′

B and C

1890.74	313.°3	0.″27	11.5...11.7	3*n*	*β*

A and BC

1879.55	352.°6	70.″47	...10.5	2*n*	*β*
1890.74	353.3	70.39	6.2...11.0	3*n*	*β*
1898.60	353.6	70.22	6.0...10.7	2*n*	*β*

A and D (= S 409)

1824.99	136.°5	124.″53	...	1*n*	S
1879.54	136.3	122.66	... 9.0	1*n*	*β*
1898.60	136.2	123.12	... 8.6	2*n*	*β*

The close pair was discovered with the 36-inch. It is a difficult pair even with that aperture. A is the principal star in the great cluster in *Perseus*. A and D make the double star, South 409. All the measures of this are given above.

The principal star has a proper motion of 0″.020 in the direction of 239°.8 (KRUEGER). The distant companions have no connection with it.

[*β* (XVII)...*β* (3047)...*β*³...*β* (*Pub. L. O.* II)...]

β 437. Lalande 4291

R.A. 2ʰ 12ᵐ 26ˢ
Decl. + 3° 39′

1877.95	32.°4	7.″16	8.0...12.5	2*n*	*β*
1879.66	29.6	5.81	8.0...12.0	1*n*	Cin
1891.96	33.4	7.19	8.0...11.3	3*n*	*β*
1898.73	31.7	7.12	8.3...11.5	1*n*	*β*

Discovered with the 18½-inch. The components appear to be relatively fixed.

[*β* (VIII)...*β* (*Am. Jour. Sci.*, July 1877)...*β* (3114)...*β* (*Pub. L. O.* II)...Cin⁸...]

β 1171. D.M. (56°) 556

R.A. 2ʰ 12ᵐ 46ˢ
Decl. + 56° 18′

1890.71	21.°4	1.″01	8.6...13.2	3*n*	*β*

Discovered with the 36-inch. In the great *Perseus* cluster; the *s* star of two about 1′ apart. It is 9.2 m in D.M.

[*β* (XVII)...*β* (3047)...*β* (*Pub. L. O.* II)...]

β 875. 9 *Persi*

R.A. 2ʰ 14ᵐ 0ˢ
Decl. + 55° 18′

1880.61	162.°0	11.″58	5.5...12.3	3*n*	*β*
1891.51	161.0	11.64	5.8...13.5	3*n*	*β*
1898.70	161.7	11.40	6.0...13.0	2*n*	*β*

Discovered with the 18½-inch. The proper motion, according to KRUEGER, is 0″.023 in the

direction of 241°8. The measures show no relative motion, but it is probably only an optical pair.

[β (XIII)...β¹...β (*Ast. Reg.* XVIII, 286)...β (3114)... β (*Pub. L. O.* II)...]

β 8. W² II, 210

R.A. 2ʰ 14ᵐ 59ˢ }
Decl. + 8° 20′ }

1875.31	200.4	0.96	8.3... 9.2	4*n*	β	
1880.92	204.3	0.90	8.0... 9.0	1*n*	β	
1888.87	204.8	1.07	8.0... 9.1	5*n*	Lv	
1898.78	207.2	1.37	7.8... 9.0	3*n*	Cg	

Discovered with the 6-inch. Apparently unchanged.

[β (1)...β (*Mem. Not.* XXXIII, 351)...β¹...Δ (1)...Lv¹...Lv (*Stel. Mess.* VIII, 77)...Coghill ( )...]

β 876. D.M. (32°) 433

R.A. 2ʰ 16ᵐ 46ˢ }
Decl. + 32° 58′ }

A and B

1880.13	235.0	1.19	7.5...12.3	4*n*	β
1891.87	231.1	1.04	7.7...11.9	2*n*	β
1895.87	233.6	1.00	7.7...11.9	1*n*	L
1898.74	237.3	1.17	...	2*n*	Hu

C and D (= Σ 258)

1832.53	26.8	5.89	9.5...10.2	3*n*	Σ
1845.44	25.6	5.97	...	1*n*	Ma
1867.00	28.7	5.89	9.7...10.3	3*n*	Δ
1880.13	28.7	6.01	...	4*n*	β
1891.87	28.1	6.09	8.9... 9.1	2*n*	β
1895.87	33.7	6.14	8.9... 9.2	1*n*	L
1898.75	28.2	6.21	...	3*n*	Hu

A and C

1832.18	143.6	70.26	7.5...	2*n*	Σ
1867.99	145.0	70.28	7.3...	3*n*	Δ
1879.49	145.4	70.31	...	2*n*	β
1891.87	146.2	70.06	...	2*n*	β
1898.74	146.3	70.74	...	2*n*	Hu

The duplicity of the principal star of Σ 258 was detected with the 18½-inch. The above are all the measures of the Σ components. Evidently they are relatively fixed.

[β (XIII)...β¹...β (3114)...β (*Pub. L. O.* II)...Lewis (*Mem. Not.* LVI, 359) (*Greenwich Obsvt.* 1895)...Hussey ( ) ...Madler (*Fixstern-Systeme* I)...Δ (II)...]

β 738. Lacaille 720

R.A. 2ʰ 18ᵐ 0ˢ }
Decl. — 30° 25′ }

1879.70	182.6	0.64	7.5... 7.5	2*n*	β
1891.80	174.3	0.55	7.1... 7.4	3*n*	β
1899.00	184.1	0.79	7 ... 8	1*n*	Bd

Discovered with the 6-inch at Mt. Hamilton in 1879. The magnitude in LACAILLE is 6½, and 7½ in GOULD. PORTER gives the proper motion 0″.165 in the direction of 217°.3. It is obvious that this is common to both components. The relative motion is slow.

[β (XI)...β¹...β (3114)...β (*Pub. L. O.* I, II)...Boothroyd ( )...]

β 517. *Ceti* 374

R.A. 2ʰ 18ᵐ 54ˢ }
Decl. — 4° 26′ }

A and B

1877.99	248.4	10.82	7.5...12.5	1*n*	β
1878.99	247.4	10.84	6.7...12.5	3*n*	β
1898.69	248.6	11.13	7.0...10.5	2*n*	β
1898.76	248.8	11.33	7.0...12.0	2*n*	A
1898.91	248.4	11.37	6.5... 9.5	1*n*	Bd

A and C

1878.99	286.9	54.07	...11.5	1*n*	β
1898.69	289.1	55.54	...10.5	2*n*	β
1898.76	289.0	56.29	...12.2	2*n*	A
1898.91	289.2	56.11	... 9.5	1*n*	Bd

Discovered with the 18½-inch. There seems to be no material change. The principal star is Lalande 4486.

[β (X)...β¹...β¹...Aitken ( )...Boothroyd ( )...]

β 739. O. Arg. S. 1542

R.A. $2^h\ 19^m\ 33^s$
Decl. $-30°\ 24'$

1879.68	264.5	2.13	8.1 ... 8.7	3n	β
1891.77	266.0	1.45	8.1 ... 8.4	3n	β
1897.04	261.4	1.69	...	2n	A

Discovered with the 6-inch on Mt. Hamilton in 1879. There is but little, if any, change.

[β (XI)...β¹...β (3114)...β (*Pub. L. O.* 2, 11)...Aitken (3465)...]

β 1172. D.M. (56) 635

R.A. $2^h\ 21^m\ 27^s$
Decl. $+56°\ 42'$

1840.71	238.3	1.64	8.4 ... 10.9	3n	β

Discovered with the 36-inch; in the borders of the cluster in *Perseus*.

[β (XVII)...β (3047)...β (*Pub. L. O.* 11)...]

β 518. *Ceti* 389

R.A. $2^h\ 23^m\ 11^s$
Decl. $+9°\ 2'$

1878.00	138.4	1.57	6.5 ... 11.0	3n	β
1891.75	138.7	1.70	6.4 ... 11.3	3n	β

Discovered with the 18½-inch. A naked-eye star in *Cetus*. It has no appreciable proper motion. B.A.C. 764.

[β (X)...β¹...β (3114)...β (*Pub. L. O.* 11)...]

β 519. W¹ 11. 367

R.A. $2^h\ 23^m\ 38^s$
Decl. $-2°\ 48'$

1877.95	61.2	...	8.5 ... 10.0	1n	Cin
1878.40	58.8	0.80	8.2 ... 9.7	2n	β
1886.69	55.2	1.17	8.3 ... 9.5	3n	LM
1891.86	54.4	0.69	8.3 ... 8.9	2n	β
1898.79	59.2	0.86	8.2 ... 9.2	3n	A
1898.91	57.5	0.93	8.5 ... 9.3	3n	Bd

Discovered with the 18½-inch. Change is uncertain.

[β (X)...β¹...β¹...β (3114)...β (*Pub. L. O.* 11)...Cin⁴...LM...Aitken ( )...Boothroyd ( )...]

β 304. Lalande 4613

R.A. $2^h\ 24^m\ 5^s$
Decl. $+36°\ 56'$

1878.90	282.3	17.70	7.5 ... 11.5	1n	β
1880.77	283.9	18.02	7.5 ... 11.5	1n	β
1891.99	282.8	19.09	7.7 ... 11.2	3n	β
1898.18	282.4	19.30	...	2n	β

Discovered with the 6-inch. The distance is increasing, and the change in a pair of this kind would be almost necessarily due to proper motion. The measures indicate an annual movement of about 0".08 in the direction of 102°.

[β (VI)...β¹...β (2062,3114)...β (*Pub. L. O.* 11)...]

β 520. Lalande 4858

R.A. $2^h\ 36^m\ 49^s$
Decl. $-4°\ 6'$

1877.96	210.2	0".78	9.0 ... 10.5	1n	β
1888.94	199.8	0.89	8.6 ... 10.5	1n	LM
1898.81	201.7	0.92	8.4 ... 10.2	4n	A
1898.82	207.0	0.88	8.5 ... 10.5	2n	Bd

Discovered with the 6-inch.

β (X)...β¹...LM...Aitken ( )...Boothroyd ( )...]

β 305. *Persei* 58

R.A. $2^h\ 30^m\ 53^s$
Decl. $+37°\ 12'$

1875.82	205.2	20.80	7.0 ... 11.2	4n	J
1888.71	205.5	20.77	7.0 ... 10.7	2n	β

Discovered with the 6-inch. The measures by J, given above, are credited by him to β 304, which is in the same vicinity. LALANDE 4830.

[β (VI)...J (1)...β (2062,2957)...β (*Pub. L. O.* 11)...]

β 521. *Persei* 67

R.A. $2^h\ 34^m\ 59^s$
Decl. $+47°\ 45'$

1878.66	153°.7	5".86	6.2...11.2	2*n*	β
1885.95	153.1	5.63	...	2*n*	HΣ
1891.97	154.5	5.62	6.5...11.5	2*n*	β

A naked eye star in *Perseus*, Heis 6·7 m (= L 4942). Discovered with the 18½-inch. Without change.

[β (x)...β"...β (3114)...β (*Pub. L. O.* II)...HΣ ( )...]

β 522. μ *Arietis*

R.A. $2^h\ 35^m\ 36^s$
Decl. $+19°\ 30'$

1878.75	265°.8	19".10	6 ...12.5	1*n*	β
1892.00	263.1	19.25	6 ...13.3	3*n*	β
1898.71	263.9	19.36	5½...13	1*n*	β

Discovered with the 18½-inch. The proper motion of this star is 0".042 in the direction of 162°.3 (Auwers). The change is undoubtedly due to the proper motion of A.

[β (x)...β"...β (3114)... (*Pub. L. O.* II)...]

β 306. *Arietis* 307

R.A. $2^h\ 36^m\ 53^s$
Decl. $+25°\ 8'$

1876.43	15°.9	3".08	7 ...11	4*n*	Hl
1876.74	18.1	2.99	6.7...10	1*n*	OΣ
1876.79	17.3	2.93	6.4...11.0	4*n*	J
1881.78	19.6	3.10	6.5...11.0	2*n*	Ho
1886.00	17.5	3.18	...	2*n*	HΣ
1887.95	21.5	3.03	7 ...11	3*n*	Hl
1892.85	18.9	3.11	...	3*n*	Bar

Discovered with the 6 inch. This is a naked-eye star in *Aries* (B.A.C. 834). It has no sensible proper motion. The measures show no change.

[β (VI)...β (2062)...A (1)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...Hall (2147)...Hall (I, II)...Hough (2978)... Barnard (*A. J.* 447)...]

β 261. Lacaille 846

R.A. $2^h\ 38^m\ 32^s$
Decl. $-28°\ 25'$

1875.95	102°.4	3".10	7.7...10.0	3*n*	Cin
1877.91	97.7	3.02	7.4... 8.9	2*n*	Cin
1885.19	99.3	2.87	8.0... 9.5	3*n*	W
1891.72	100.1	2.77	...	1*n*	Col
1898.77	100.1	2.88	7.6... 9.4	4*n*	Cg

Discovered with the 9·4-inch at the Dartmouth College Observatory. Apparently unchanged.

[β (V)...β (*Mem. Not.* XXXV, 31)...Cin², ..Cin⁴...Wilson (Cin^m)...Collins (*Proc. Haverford Coll. Obsy.* 1891)... Cogshall ( )...]

β 9. Lalande 5107

R.A. $2^h\ 39^m\ 40^s$
Decl. $+35°\ 3'$

1875.94	160°.6	1".52	6.3... 8.4	6*n*	J
1876.74	164.2	1.62	6.5... 8.0	1*n*	OΣ
1883.72	162.6	1.73	6.4... 8.5	6*n*	En
1885.95	162.3	1.63	...	3*n*	HΣ
1893.12	162.6	1.28	...	1*n*	Maw

Discovered with the 6-inch. No evidence of motion. The proper motion of this star, if any, is small.

[β (I)...β (*Mon. Not.* XXXIII, 351)...J (I)...Engelmann (2678)...OΣ (*Poulkowa Obsns.* X)...Maw (*Mem. R. A. S* 11)...HΣ ( )...]

β 83. Lalande 5140

R.A. $2^h\ 40^m\ 0^s$
Decl. $-5°\ 28'$

1876.03	121°.3	1".40	7.5...10.1	4*n*	J
1877.91	122.2	1.00	7.2... 9.5	2*n*	Cin
1886.85	116.2	0.98	7.1... 8.7	4*n*	LM
1888.77	109.4	1.01	7.8... 9.8	2*n*	Lv
1891.77	111.7	0.90	7.9... 9.1	3*n*	β
1891.78	117.1	1.03	8.5...10.5	2*n*	Col
1892.88	112.6	0.86	8.0... 8.8	1*n*	J
1896.06	106.6	0.83	...	3*n*	Sp
1898.76	104.8	0.98	7.2... 9.2	2*n*	A

Discovered with the 6-inch. Change in both angle and distance is clearly shown by the measures, and it is certainly a binary system.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β (3114)...β (*Pub. L. O.* II)...Cin⁴,..LM ...Lv¹...Collins and Jones (*Proc. Haverford Coll. Obsy.*, 1891, 1892)...Sp (III)...Aitken ( )...]

β 307. Lalande 5133

R.A. $2^h\ 40^m\ 29^s$
Decl. $+29°\ 11'$

1876.79	315°.6	14".97	7.1...11.5	4*n*	J
1877.18	315.9	15.44	8 ...11	3*n*	Hl
1877.72	315.4	14.91	7.0...11.5	1*n*	β
1880.92	316.0	15.49	7.0...11.8	1*n*	β

Discovered with the 6-inch. The principal star was thought to be slightly elongated with the same instrument on Mt. Hamilton in 1879, and it was entered in the list of new pairs discovered at that place as β 740. A subsequent examination with the 18½-inch at Chicago failed to show any certain elongation. It appeared round with the 36-inch in 1890, and Sr found it single in 1887, 1888, and 1889. It may, therefore, be rejected as a close pair.

[β (vi, xi)...β...β...β (2062,3048)...β (*Pub. L. O.* i, ii) ...Hall (i)...Sp (iii)...]

β 262. W* H. 944

R.A. $2^h\ 40^m\ 33^s$
Decl. $+30°\ 33'$

1876.29	65°.7	1".57	8.0...10.0	6*n*	J
1881.85	68.4	1.34	7 ... 8	2*n*	Ho
1884.75	72.4	1.93	8.1 ... 9.9	6*n*	En
1891.75	61.6	1.64	8.2... 9.5	4*n*	β
1895.89	59.7	1.59	8.2 ... 9.6	2*n*	L
1896.84	65.6	1.35	...	1*n*	Bow
1897.89	62.3	1.50	...	4*n*	Bow
1898.73	63.7	1.60	8.2... 9.1	2*n*	β
1898.97	247.2	...	...	1*n*	Bow

Discovered with the 9.4-inch at the Dartmouth College Observatory. The β star of a small quadrilateral triangle. But little, if any, change.

[β (v)...β (*Mon. Not.* xxxv, 31)...β (3114)...β (*Pub. L. O.* ii)...J (1)... Engelmann (2742)...Hough (2978)... Lewis (*Mon. Not.* LVI. 359) (*Greenwich Obsns.* 1895)... Bowyer (*Mon. Not.* LIX, 400)...]

β 1002. O. Arg. S. 1810

R.A. $2^h\ 41^m\ 29^s$
Decl. $-15°\ 53'$

1881.84	333°.7	1".78	8.0...11.3	3*n*	β
1886.76	336.6	1.64	8.0...11.8	1*n*	LM
1898.87	333.6	1.56	7.8...12.7	2*n*	Cg

Discovered with the 12-inch.

[β (xiii)...β...LM...Cogshall ( )...]

β 523. D.M. (33°) 517

R.A. $2^h\ 41^m\ 55^s$
Decl. $+33°\ 28'$

1877.85	210°.3	2".25	9.0...11.0	1*n*	β
1898.76	208.6	1.65	9.0... 9.9	3*n*	β

Discovered with the 18½-inch. In the field with Σ 310.

[β (x)...β...]

β 10. Lalande 5276

R.A. $2^h\ 44^m\ 23^s$
Decl. $-5°\ 29'$

1874.82	99°.2	2".66	7.2...11.1	4*n*	J
1877.85	96.2	2.80	7.2...10.2	2*n*	Cin
1879.08	100.1	2.56	8.0...12.0	1*n*	Cin
1898.01	98.6	2.88	...	1*n*	Br

Discovered with the 6-inch. Without change.

[β (i)...β (*Mon. Not.* xxxiii, 351)...J (1)...Cin^a...Cin^a... Brown ( )...]

β 877. γ *Fornacis*

R.A. $2^h\ 44^m\ 32^s$
Decl. $-25°\ 3'$

A and B

1880.93	144°.4	11".53	6 ...13	4*n*	β
1891.96	145.5	12.03	6 ...12.7	2*n*	β
1898.94	143.7	11.69	6.5...11.8	3*n*	Bd

A and C (= H 2161)

1830	169°.4	45"±	6 ...11	1*n*	H
1880.68	157.0	48.85	...11.2	4*n*	β
1891.96	155.6	47.24	...10.5	2*n*	β
1898.94	153.3	46.71	...10.7	3*n*	Bd

The faint companion was detected with the 18½-inch. The foregoing are all the measures of the Herschel star. PORTER finds the proper motion of A, $0".155$ in the direction of $205°.9$. The measures of C give $0".178$ in $203°.8$. It is certain, therefore, that A and B are moving together, and that C is not a member of the system.

[β (xiii)...β...β (3114)...β (*Pub. L. O.* ii)...Boothroyd ( )...Herschel (Fifth Catalogue, *Mem. R. A. S.* vi)...]

β 524. 20 *Persei*

R.A. $2^h\ 46^m\ 8^s$ }
Decl. $+37°\ 51'$ }

A and B

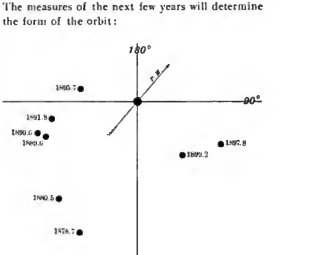
1878.72	336.0	0.25>	...		4*n*	β
1880.53	321.4	0.22	6	... 6.7	3*n*	β
1881.67	334.9	0.28	6	... 6.5	1*n*	β
1883.31	336.2	0.20	...		7*n*	En
1886.23	300.4	0.3±	...		1*n*	HΣ
1889.59	291.3	0.17	5.5...	6.0	1*n*	β
1890.61	287.6	0.18	5.0...	6.0	3*n*	β
1891.79	281.7	0.15	5.7...	7.0	3*n*	β
1895.72	257.9	0.1>	...		2*n*	Bar
1895.72	253.5	0.16±	...		2*n*	See
1896.09	190.2	0.22	...		1*n*	L
1897.82	62.5	0.16	...		1*n*	β
1898.02	184.5	Elong.	...		2*n*	L
1898.92	47.6	0.12	...		1*n*	A
1899.18	31.4	0.12	...		1*n*	A

AB and C (= Σ 318)

1829.14	236.8	14.08	5.5...	10.0	2*n*	Σ
1851.79	238.2	13.99	5.6...	9.0	1*n*	OΣ
1878.15	236.1	14.04	...		1*n*	β
1880.82	236.9	14.00	...	8.8	1*n*	β
1881.68	237.3	14.02	...	9.2	2*n*	β
1890.61	237.2	14.08	...	9.2	3*n*	β
1898.82	237.5	13.90	...		3*n*	β

The duplicity of the principal star was discovered with the 18½-inch. It is at all times a difficult pair, and the motion is rapid. It is now known to be one of the most interesting binaries in the heavens. The distance never much exceeds 0".2, so that it is always a difficult pair, and beyond the reach of most telescopes. With the measures down to 1891 I made an attempt to find an approximate orbit, which gave a period of 27.7 years, and GLASENAPP, from the same apparent ellipse, found substantially the same elements. These results are of somewhat doubtful value from uncertainty in the adjustment of the measures as to quadrants. As the components are of about the same magnitude, some of the angles may require a correction of 180°. It is possible that all the positions since 1891 should be in the first quadrant, and that being so, the distance should gradually increase until the first revolution since discovery is completed. The apparent orbit will be very eccentric, and the period probably more than 30 years. Even if the described arc is not less than 270°, as it would appear from the most probable arrangement of the measures, the data would be insufficient for even an approximate determination of the orbit, as there would be nothing to define the limits of the apparent ellipse in the unexpired part of the orbit. The measures of the next few years will remedy this, and furnish material for getting the elements of the orbit with substantial accuracy.

In the following diagram I have given the principal measures with what seems now to be the most probable arrangement with reference to each other. The measures of the next few years will determine the form of the orbit:



20 Persei, β 524

AUWERS gives the proper motion of 20 *Persei*, 0".081 in the direction of 141°.1. This would change the position-angle of C more than 20° in the interval covered by the measures if that star was fixed in space. As the measures show no relative change, the Herschel companion must be a member of the system.

[β (x)...β'...β'...β'...β (2057,2038,3114)...β (*Pub. L. O.* II, pp. 33, 235)...β (*Ast. & A.-P.* XII, 404)...Engelmann (2678)...Barnard (*A. J.* 447)...See (*A. J.* 359)...Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...Glasenapp (*Ast. & A.-P.* XII, 499)...HΣ ( )...]

There are other measures than those cited of the wide pair (= H I 111. 60 = S 420 = Σ 318). All

the observations will be found in the references above given, in the original catalogues of HERSCHEL, SOUTH and STRUVE, and in the following:

Madler (*Fixstern-Systeme* I) (*Dorpat Obsrn.* XI, XII, XIII) ...Herschel II (*Mem. R. A. S.* IV)...OΣ (*Poulkowa Obsrn.* IX)...Ball (*Dunsink Obsrn.* Part V)...Δ (II)...]

β 1173. *Arietis* 133

R.A. $2^h\ 51^m\ 38^s$ *f*
Decl. $+\ 23°\ 39'$ *f*

A and B

1890.88	325°.4	0".13	7·7...	7.8	3*n*	β
1898.88	331.3	0.15	...		1*n*	Hu

AB and C

1890.88	283°.6	4".63	...13		3*n*	β
1893.88	284.7	4.86	...		1*n*	Hu
1898.96	288.3	4.32	...13		1*n*	β

A fine triple; discovered with the 36-inch. The close pair is very difficult. The principal star (Lalande 5468) is 6.8 m in D.M.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Hussey ( )...]

β 741. Lacaille 932

R.A. $2^h\ 51^m\ 58^s$ *f*
Decl. $-\ 25°\ 27'$ *f*

A and B

1879.69	158°.2	0".57	7·7...	7·9	4*n*	β
1891.77	165.6	1.26	7.8...	8.0	3*n*	β
1898.69	167.4	1.39	8.0...	8.2	2*n*	β

AB and C (= S 423)

1824.93	219°.1	27".75	8½...	9	2*n*	S
1851.04	221.4	27.70	7·3...	7·5	2*n*	WJ
1879.69	221.4	27.80	...	7·9	2*n*	β
1884.83	222.3	27.55	...		1*n*	W
1891.77	221.1	28.04	...	7·9	3*n*	β
1898.69	222.1	28.11	...	8.0	2*n*	β

The duplicity of the principal star of SOUTH's wide pair was discovered with the 6-inch. The measures show decided motion in angle and distance.

[β (XI)...β²...β (3114)...β (*Pub. L. O.* I, II)...]

There has been no change in the position of the distant star. The principal measures are given above. The following references relate to the wide pair:

[Dunlop (*Mem. R. A. S.* III)...Jacob (same, XVII)... Powell (same, XXV)...Hershel (same, VI) (*Cape Obsrn.*)... Worster and Jacob (*Madras Obsrn.* first series)...Glasenapp (II)...Cin^4...Cin^5...Wilson (Cin^m)...]

β 525. B.A.C. 920

R.A. $2^h\ 52^m\ 0^s$ *f*
Decl. $+\ 21°\ 8'$ *f*

1877.72	105°.1	0".59	7.0...	7.0	1*n*	β
1879.69	107.3	0.39	7.5...	7.5	1*n*	β
1881.87	119.2	...	...		1*n*	Big
1883.30	100.2	0.26	...		8*n*	En
1886.16	109.0	0.45	...		2*n*	HΣ
1888.69	100.2	0.45	7.0...	7.0	5*n*	T
1890.06	114.6	0.4±	...		3*n*	T'
1890.58	124.6	0.3±	...		9*n*	Sp
1890.87	122.2	0.33	7.2...	7.3	3*n*	β
1891.74	121.3	0.29	7.5...	7.5	3*n*	β
1895.89	125.9	0.23	...		2*n*	Lew
1896.06	128.3	0.35±	...		1*n*	Sp
1896.66	134.4	0.33	...		3*n*	Lew
1897.91	132.6	0.29	...		4*n*	Lew
1898.05	142.5	0.35±	...		1*n*	Sp
1898.10	127.3	0.30	...		3*n*	Lew
1898.80	134.5	0.32	...		3*n*	Hu
1898.95	131.0	0.40	...		1*n*	Bry

Discovered with the 26 inch at the Naval Observatory. An interesting binary near ε *Arietis*. The *Berlin Catalogue* gives the proper motion of this star, 0".062 in the direction of 130°.0. The distance is decreasing, and rapid change in the angle may be expected.

[β (X)...β²...β³...β (3048, 3114)...β (*Pub. L. O.* II)...Engelmann (2678)...Tarrant (2991, 3186)...Bigourdan (*Paris Obsrn.* 1883)...Lewis (*Mem. Not.* LVI, 359) (*Greenwich Obsrn.*, 1895)...Sp (III)...Lewis and Bryant (*Mem. Not.* LIX, 400)...Hussey ( )...H2 ( )...]

β 11. ρ[2] *Eridani*

R.A. 2h 56m 49s
Decl. — 8° 9′

1875.64	87°.2	2″.72	5.4 . . . 9.6	5*n*	J
1877.82	85.9	2.45	5.5 . . . 8.8	2*n*	Cin
1879.95	85.1	2.47	6.0 . . . 10.2	3*n*	β
1884.83	81.8	2.64	5.8 . . . 9.0	1*n*	W
1886.82	81.8	2.72	6.2 . . . 9.2	2*n*	LM
1887.88	86.5	2.49	5.0 . . . 10.0	2*n*	T
1888.05	84.5	. . .	6.0 . . . 10.3	1*n*	Lv
1888.86	85.0	2.47	5.5 . . . 9.5	2*n*	T
1891.80	84.8	2.64	4.5 . . . 8.5	2*n*	Col
1898.83	83.8	2.41	6.2 . . . 11.3	3*n*	Cg

Discovered with the 6-inch. There appears to be no sensible change in either angle or distance. This star has no appreciable proper motion.

[β (I) . . . β (*Mon. Not.* XXXIII, 351) . . . β[3] . . . Δ (1) . . . Δ (2081) . . . Cin[4] . . . Wilson (Cin[10]) . . . LM . . . Lv[1] . . . Tarrant (2899, 2091) . . . Collins (*Proc. Haverford Coll. Obty.* 1891) . . . Cogshall ( ) . . .]

β 1174. Lalande 5683

R.A. 2h 57m 46s
Decl. — 11° 27′

1890.82	305°.9	1″.22	7.7 . . . 11.3	3*n*	β
1898.69	298.9	1.21	8.0 . . . 12.0	1*n*	β

Discovered with the 12-inch. The principal star has a considerable proper motion:

Rad[1]	0″.163	in	169°.6
Porter	0.201	in	178.3

The measures are sufficient to show that this is a physical system, since the two stars are moving together.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . .]

β 1175. Lalande 5636

R.A. 2h 57m 49s
Decl. + 43° 14′

1890.68	280°.9	0″.26	7.3 . . . 8.7	3*n*	β

Discovered with the 36-inch.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . .]

β 526. β *Persei* (ALGOL)

R.A. 3h 0m 22s
Decl. + 40° 30′

A and B

1878.81	155°.3	59″.06	Var. . . . 12.7	3*n*	β
1891.97	155.4	57.48	. . . 13.5	2*n*	β
1898.96	155.4	58.79	. . .	1*n*	β

A and C

1878.81	144°.8	68″.07	. . . 12.5	3*n*	β
1891.97	144.3	68.38	. . . 14.2	1*n*	β
1898.96	144.8	67.19	. . .	1*n*	β

A and D

1879.30	192°.6	81″.91	. . . 10.5	4*n*	β
1891.97	192.5	81.51	. . . 11.0	2*n*	β
1898.96	192.4	81.78	. . . 11.5	1*n*	β

D and E

1878.81	116°.2	10″.80	. . . 12.5	3*n*	β
1891.97	115.0	11.52	. . . 12.5	2*n*	β
1898.96	118.0	11.98	. . . 12.0	1*n*	β

The faint stars near the well-known variable *Algol* were noted with the 18½-inch. No elongation of the principal star, or any close companion, could be seen with the 36-inch under favorable conditions. The large star has a small proper motion, 0″.013 in the direction of 242°.3 (AUWERS). There is no possibility of these faint stars being other than optical companions.

[β (X) . . . β[6] . . . β[1] . . . β (3114) . . . β (*Pub. L. O.* II) . . .]

β 527. W[2] II. 1057

R.A. 3h 0m 35s
Decl. — 13° 43′

1877.83	60°.4	0″.85	8.0 . . . 8.5	1*n*	β
1877.95	237.6	0.76	7.8 . . . 8.3	1*n*	Cin
1892.03	66.0	0.83	8.1 . . . 8.4	3*n*	β
1898.88	65.3	0.81	8.2 . . . 8.2	3*n*	Bd

Discovered with the 18½-inch; closely *sp* Σ 356.

[β (X) . . . β[1] . . . β (3114) . . . β (*Pub. L. O.* II) . . . Cin[4] . . . Boothroyd ( ) . . .]

β 528. W³ II. 1086

R.A. $3^h\ 2^m\ 25^s$
Decl. $-4°\ 3'$

1877.97	197°.5	1".01	8.5 . . . 8.5	2*n*	β	
1886.84	12.5	0.91	8.2 . . . 8.3	1*n*	β	LM
1889.02	197.3	. . .	8.5 . . . 8.6	1*n*	β	Lv
1891.72	195.4	1.00	. . .	1*n*	β	Col
1898.82	197.6	0.95	8.8 . . . 8.8	3*n*	β	Cg

Discovered with the 18½-inch. In the field with Σ 358.

[β (x) . . . β² . . . LM . . . Lv¹ . . . Collins (*Proc. Haverford Coll. Obsy.* 1891) . . . Cogshall ( ) . . .]

β 1030. W³ III. 5

R.A. $3^h\ 3^m\ 12^s$
Decl. $+21°\ 17'$

1888.83	164°.6	0".58	8.4 . . . 8.4	3*n*	β	
1890.64	168.9	0.5±	. . .	10*n*	β	Sp
1893.92	165.0	0.71	. . .	2*n*	β	Lew
1896.52	161.7	0.48	. . .	2*n*	β	Lew
1897.89	162.6	0.53	. . .	2*n*	β	Lew
1897.93	160.9	0.76	. . .	3*n*	β	A
1898.11	159.9	0.42	. . .	1*n*	β	Lew
1898.12	154.2	0.48	. . .	1*n*	β	Bow

Discovered with the 36-inch. The measures taken together do not indicate any sensible motion.

[β (XIV) . . . β (2853) . . . β (*Pub. L. O.* 11) . . . Sp (III) . . . Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsvt.* 1895) . . . Aitken (*A. J.* 429) . . . Lewis and Bowyer (*Mon. Not.* LIX, 400) . . .]

β 1176. 48 *Cephei* (H)

R.A. $3^h\ 5^m\ 9^s$
Decl. $+77°\ 17'$

A and B

1890.65	277°.6	1".18	5.7 . . . 12.5	3*n*	β	

A and C

1890.63	227°.9	10".95	. . . 13.3	2*n*	β	

Discovered with the 36-inch. The close pair is difficult. The principal star (B.A.C. 979) has a proper motion, according to AUWERS, of 0".073 in the direction of 137°.5. A measure of AB at this time would show at once whether this movement is common to both components.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* 11) . . .]

β 400. *Eridani* 103

R.A. $3^h\ 5^m\ 18^s$
Decl. $-4°\ 16'$

1877.95	53°.2	21".69	7.0 . . . 11.5	1*n*	β	
1879.01	53.1	22.19	6.4 . . . 12.0	3*n*	β	
1891.96	54.1	22.74	7.0 . . . 11.7	2*n*	β	
1898.71	53.7	22.61	6.2 . . . 11.7	2*n*	β	

Discovered with the 6-inch. This is a naked-eye star, Heis 6 m (= Lalande 5925 = W¹ III. 50).

[β (VII) . . . β (2103) . . . β² . . . β³ . . . β (3114) . . . β (*Pub. L. O.* 11) . . .]

β 530. *Arietis* 161

R.A. $3^h\ 7^m\ 18^s$
Decl. $+22°\ 30'$

B and C

1879.21	195°.8	1".77	9.7 . . . 10.4	4*n*	β	
1892.00	194.2	1.70	9.7 . . . 10.1	3*n*	β	
1896.85	. . .	1.68	. . .	1*n*	β	Bow
1896.93	197.0	1.84	. . .	1*n*	β	Lew
1898.11	193.3	2.23	. . .	1*n*	β	Lew
1898.75	194.0	1.66	8.7 . . . 9.2	2*n*	β	

A and B (= Σ 366 *rej.*)

1879.21	41°.5	48".88	7.0 . . .	4*n*	β	
1892.00	40.9	48.40	7.8 . . .	2*n*	β	
1898.75	40.8	48.08	7.1 . . .	2*n*	β	

The distant companion of this rejected pair of Σ was found to be double with the 18½-inch. Thus far the measures indicate no change. The above are all the measures of AB. Lalande 5961.

[β (x) . . . β¹ . . . β (3114) . . . β (*Pub. L. O.* 11) . . . Lewis and Bowyer (*Mon. Not.* LIX, 400) . . .]

β 529. Lalande 6006

R.A. $3^h\ 8^m\ 9^s$
Decl. $-9°\ 1'$

1877.89	220°.0	2".40	8.0 . . . 12.0	2*n*	β	
1891.86	222.4	3.11	8.0 . . . 12.2	2*n*	β	
1898.76	222.4	2.94	8.5 . . . 11.5	1*n*	β	
1898.82	220.7	3.50	7.5 . . . 13.7	2*n*	β	Cg

Discovered with the 18½-inch.

[β (x) . . . β¹ . . . β (3114) . . . β (*Pub. L. O.* 11) . . . Cogshall ( ) . . .]

β 84. W¹ III. 147

R.A. 3ʰ 10ᵐ 5ˢ
Decl. — 6° 22′

1875.85	10.3	0.44	7.2 . . . 7.4	5*n*	J	
1877.83	25.7	. . .	6.0 . . . 8.0	2*n*	Cin	
1879.39	32.4	0.72	6.4 . . . 7.5	5*n*	β	
1879.69	27.9	0.56	7.2 . . . 8.5	1*n*	β	
1879.78	30.6	0.73	6.0 . . . 8.0	1*n*	Cin	
1886.71	27.1	0.76	6.2 . . . 8.0	3*n*	LM	
1888.52	22.4	0.51	7.0 . . . 8.0	4*n*	T	
1888.94	21.5	0.58	6.4 . . . 7.7	2*n*	Lv	
1889.05	21.8	0.59	. . .	2*n*	T	
1889.52	26.0	0.66	. . .	5*n*	Sp	
1890.89	27.3	0.73	6.8 . . . 7.3	4*n*	β	
1897.05	21.4	0.87	7.0 . . . 8.0	1*n*	A	
1898.02	17.8	0.57	6.8 . . . 8.3	1*n*	Bry	

Discovered with the 6-inch. This is a naked-eye star in *Cetus;* Argelander and Heis, 6 m. While the measures are somewhat discordant for so easy a pair, they do not point to any sensible change.

[(11) . . . β (*Mon. Not.* XXXIII, 437) . . . β . . . β . . . β (3048) . . . β (*Pub. L. O.* 11) . . . J (1) . . . J (2082) . . . Cin⁴ . . . Cin⁸ . . . LM . . . Lv¹ . . . Tarrant (2991) . . . Glasenapp (11) . . . Sp 111) . . . Aitken (3365) . . . Bryant (*Mon. Not.* LIX, 400) . . .]

1039. Lalande 6084

R.A. 3ʰ 11ᵐ 0ˢ
Decl. + 7° 13′

1889.00	209.4	1.87	7.0 . . . 13	3*n*	β
1898.92	208.2	2.43	7.0 . . . 13	1*n*	A

Discovered with the 36-inch.

[β (XV) . . . β (2929) . . . β (*Pub. L. O.* 11) . . . Aitken ( ) . . .]

β 1177. D.M. (—1°) 473

R.A. 3ʰ 12ᵐ 45ˢ
Decl. — 1° 28′

1890.82	24.7	0.38	9.1 . . . 9.1	3*n*	β

Discovered with the 36-inch while examining 95 *Ceti* (= A.C. 2). This new pair is 31".7 *f* and 5′ 42" *s* of that star. The magnitude in D.M. is 9.3.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* 11) . . .]

β 742.

R.A. 3ʰ 17ᵐ
Decl. + 48° 50′

This star was suspected to be a very close pair with the 6-inch on Mt. Hamilton in 1879. I made a careful search with the 36-inch in 1891 without finding any close pair in or near this place. The suspected elongation was probably not real.

[β (XI) . . . β . . . β (3114) . . . β (*Pub. L. O.* 11) . . .]

β 1178. *Tauri* 7

R.A. 3ʰ 17ᵐ 20ˢ
Decl. + 4° 27′

1890.89	347.8	0.99	6.6 . . . 12.3	3*n*	β

Discovered with the 36-inch. The magnitude in D.M. is 7.7, and in Boss 7.3, while GOULD gives 6.6. It is Lalande 6267.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* 11) . . .]

β 531. Lalande 6275

R.A. 3ʰ 17ᵐ 26ˢ
Decl. — 8° 13′

1877.92	60.1	2.13	6.7 . . . 12.3	2*n*	β
1891.75	53.6	2.94	6.5 . . . 11.7	3*n*	β
1898.74	57.4	2.88	6.7 . . . 11.2	2*n*	β

Discovered with the 18½-inch. A naked-eye star in *Eridanus;* Heis 6-7 m, S.D. 6.5 m. It has a considerable proper motion, which obviously belongs to both opponents:

Stumpe	. .	0".250 in 180°
Porter	. .	0.225 in 189.5

[β (X) . . . β . . . β (3114) . . . β (*Pub. L. O.* 11) . . .]

β 12. Lalande 6313

R.A. 3ʰ 18ᵐ 47ˢ
Decl. — 14° 25′

1875.40	271.8	2.35	7.5 . . . 10.4	4*n*	J
1877.83	273.3	2.36	6.9 . . . 9.0	3*n*	Cin
1886.88	274.8	2.45	7.1 . . . 9.1	4*n*	LM
1888.53	272.6	2.31	7.2 . . . 9.5	2*n*	Lv
1898.85	272.4	2.14	7.3 . . . 9.7	3*n*	Bd

Discovered with the 6-inch. Without change.

[β (1) . . . β (*Mon. Not.* XXXIII, 451) . . . Cin⁴ . . . LM . . . Lv⁴ . . . Boothroyd ( ) . . .]

β 1179. 34 *Persei*

R.A. $3^h\ 20^m\ 47^s$
Decl. $+49°\ 6'$

1890.64	163.4	0.68	5.9...11.6	4*n*	β
1898.73	164.5	0.70	...	3*n*	Hu

Discovered with the 36-inch. A difficult pair. The proper motion of this star is 0".034 in the direction of 175°.0 (AUWERS) The measures show that this is common to both stars.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Hussey ( )...]

β 878. 66 *Arietis*

R.A. $3^h\ 21^m\ 28^s$
Decl. $+22°\ 23'$

1881.06	78.0	1.10	6.0...12.2	2*n*	β
1890.89	76.1	1.29	5.8...13.7	3*n*	β
1897.88	74.1	1.05	...	1*n*	Lew

Discovered with the 18½-inch. A more difficult pair than the distance and magnitude would indicate. This star has a considerable proper motion:

Auwers	-	-	0".120 in 185°.3
Porter	-	-	0.115 in 186.9

It is apparent from the measures that this is a physical pair. If the small star was fixed in space, the proper motion of A in the interval would decrease the position-angle 36°, and add 0".7 to the distance.

[β (XIII)...β"...β (3048)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...]

β 879. B.A.C. 1076

R.A. $3^h\ 22^m\ 3^s$
Decl. $+10°\ 58'$

1878.98	71.1	24.65	6.5...12.5	3*n*	β
1898.72	70.4	24.50	6.5...11.2	2*n*	β
1898.76	71.8	24.70	6.5...12.2	2*n*	A

A distant attendant noted with the 18½-inch. Lalande 6400.

[β (XIII)...β"...Aitken ( )...]

β 1180. Lalande 6417

R.A. $3^h\ 22^m\ 23^s$
Decl. $-4°\ 59'$

A and B

1890.82	24.8	0.44	8.3... 9.3	3*n*	β

A and C

1890.82	117.9	7.13	...11.5	3*n*	β
1899.09	119.4	7.07	...10.5	2*n*	β

Discovered with the 36-inch.

[β (XVII)...β (3048)...β (*Pub. L. O.* II)...]

β 787. Lalande 6473

R.A. $3^h\ 25^m\ 49^s$
Decl. $+48°\ 13'$

1881.69	228.5	2.05	8.0...12.0	3*n*	β
1885.96	227.3	2.35	...	1*n*	HΣ
1888.59	233.1	2.02	7.9...12.4	3*n*	Com
1898.70	245.6	2.39	...	1*n*	Hu
1899.13	243.3	2.40	8.0...11.5	1*n*	β

Discovered with the 15½-inch at the Washburn Observatory. There seems to be some change in the angle.

HUSSEY measures a third star, 175°.8: 12".70 (1898.70) 1*n*. I could not see this on one night with the 40-inch, but measured 11 m star in nearly the same direction, 175°.6: 36".78 (1899.13) 1*n*.

[β (XII)...β"...Comstock (*Pub. Washburn Obsy.* VI)...HΣ ( )...Hussey ( )...]

β 788. D.M. (32°) 786

R.A. $3^h\ 27^m\ 0^s$
Decl. $+42°\ 11'$

A and B

1881.69	306.2	2.78	8.3...10.5	4*n*	β
1888.06	302.2	2.66	8.5...10.2	3*n*	Com

A and C

1881.69	82.2	34.44	... 8.8	4*n*	β
1887.99	82.4	34.00	... 8.8	2*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β"...Comstock (*Pub. Washburn Obsy.* VI)...]

β 532. Lalande 6585

R.A. 3h 27m 25s
Decl. − 10° 27′

1877.29	266°.7	3″.05	7.7 . . . 12.5	3*n*	β
1891.86	271.2	3.05	8.1 . . . 11.7	2*n*	β
1898.89	271.4	2.99	8.5 . . . 14.0	2*n*	Cg

Discovered with the 18½-inch. There is an 8 m star 80″ distant in the direction of 310°.

[β (x). . .β′. . .β″. . .β³. . .β (3114). . .β (*Pub. L. O.* II). . .Cogshall ( ). . .]

β 533. B.A.C. 1101

R.A. 3h 28m 9s
Decl. + 31° 17′

1878.67	149°.3	0″.43	7.0 . . . 7.0	1*n*	β
1878.91	66.1	0.42	6.8 . . . 7.0	1*n*	β
1883.12	59.8	0.25	7.2	5*n*	En
1886.15	47.4	0.53	. . .	2*n*	HΣ
1890.61	50.7	0.5 ±	. . .	5*n*	Sp
1891.69	52.2	0.51	8.0 . . . 8.0	3*n*	β
1896.11	50.3	0.56	. . .	1*n*	Sp
1898.12	49.7	0.51	. . .	2*n*	Bow
1897.99	50.2	0.60	. . .	1*n*	Hu
1898.41	49.1	0.55	8.5 . . . 8.5	2*n*	L
1898.82	52.4	0.64	. . .	3*n*	Hu
1898.97	53.0	0.51	. . .	1*n*	Bry

Discovered with the 18½-inch. There is evidently an error in reading my first angle. There may be some motion in angle. This star has an annual movement of 0″.031 in the direction of 196°6, and this must belong to both components.

[β (x). . .β′. . .β (3114). . .β (*Pub. L. O.* II). . . Engelmann (2678). . .HΣ ( ). . .Sp (III). . .Hussey (*A. J.* 427). . . Lewis and Bowyer (*Mon. Not.* LIX, 400) . . Hussey ( ). . .]

β 1040. Lalande 6591

R.A. 3h 28m 49s
Decl. + 29° 35′

1888.91	337°.0	3″.54	8.0 . . . 11.7	3*n*	β
1898.73	338.0	3.56	8.3 . . . 12.0	1*n*	β

Discovered with the 36-inch. The magnitude in D.M. is 7.4.

[β (XV). . .β (2929). . .β (*Pub. L. O.* II). . .]

β 308. W[1] III. 564

R.A. 3h 32m 4s
Decl. − 8° 2′

1876.02	332°.9	1″.65	9 . . . 10	3*n*	Hl
1876.84	329.9	1.50	8.7 . . . 9.7	3*n*	J
1877.87	329.5	1.80	8.2 . . . 9.0	1*n*	Cin
1886.67	331.7	1.78	8.2 . . . 9.4	3*n*	LM
1888.05	331.8	1.80	9 . . . 10	2*n*	Hl
1898.86	330.8	1.88	8.7 . . . 10.1	3*n*	Cg

Discovered with the 6-inch. Probably fixed This is Lalande 6709.

[β (VI). . .β (2002). . .J (I). . .Cin[4]. . .LM. . .Hall (I, II). . . Cogshall ( ). . .]

β 1231. D.M. (65°) 359

R.A. 3h 32m 45s
Decl. + 65° 36′

A and B

1891.84	15°.1	2″.64	8.2 . . . 12.5	5*n*	β
1898.89	13.1	2.61	8.0 . . . 13.0	1*n*	A

A and C

1891.84	252°.4	83″.75	. . . 8.3	5*n*	β
1898.89	252.6	84.06	. . . 8.0	1*n*	A

Discovered with the 12-inch. C is D.M. (65°) 358.

[β (XVIII). . .β (3113). . .β (*Pub. L. O.* II). . .Aitken ( ). . .]

β 1181. Lalande 6685

R.A. 3h 32m 54s
Decl. + 45° 30′

1890.66	270°.5	0″.35	8.1 . . 8.3	3*n*	β
1898.70	88.9	0.40	. . .	1*n*	≥Hu

Discovered with the 36-inch. Near OΣ 59.

[β (XVII). . .β (3047). . .β (*Pub. L. O.* II). . .Hussey ( ) . . .]

β 534. Lalande 6741

R.A. $3^h\ 33^m\ 1^s$
Decl. $-\ 8^\circ\ 54'$

1879.24	195°.3	2".40	7.5 . . . 11.1	4*n*	β
1891.86	193.1	2.58	8.0 . . . 11.7	2*n*	β
1898.87	194.1	2.66	8.0 . . . 12.5	2*n*	Bd

Discovered with the 18½-inch. No material change.

[β (x) . . . β^1 . . . β^2 . . . β (3114) . . . β (*Pub. L. O.* II) . . . Boothroyd ( ) . . .]

β 1182. Lalande 6759

R.A. $3^h\ 35^m\ 30^s$
Decl. $+\ 48^\circ\ 8'$

A and B

1890.62	261°.2	4".37	6.4 . . . 14.2	3*n*	β
1898.71	260.4	4.45	. . .	1*n*	Hu

A and C

1890.62	242°.6	19".27	. . . 13.5	3*n*	β
1898.71	242.8	18.76	. . .	1*n*	Hu

Discovered with the 36-inch. BATTERMAN (A N. 3507) gives the proper motion of this star, 0".028 in the direction of 186°.1.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . . Hussey ( ) . . .]

β 535. o, 38 *Persei*

R.A. $3^h\ 36^m\ 47^s$
Decl. $+\ 31^\circ\ 54'$

1877.84	60°.5	0".96	. . .	1*n*	J
1878.25	56.8	0.83	4.0 . . . 8.5	4*n*	β
1879.69	53.2	0.67	4.0 . . . 7.0	1*n*	β
1888.42	51.1	0.97	. . .	5*n*	HΣ
1888.71	59.2	1.09	. . . 8.7	3*n*	β
1890.10	56.1	1.01	. . .	3*n*	T
1890.61	49.7	0.87	. . .	5*n*	Sp
1891.16	50.3	0.99	. . .	1*n*	Big
1894.36	48.2	0.97	. . .	7*n*	HΣ

Discovered with the 18½-inch. The measures are not very accordant, but the motion, if any, is very slow. AUWERS gives the annual movement of this star, 0".023 in the direction of 243°.8, so that with the small star stationary, the distance between the components, would increase by this amount annually, and at this time (1898) the distance should be about 1".5. It is obvious from the measures that the two stars are moving together.

[β (x) . . . β^1 . . . β^2 . . . β (2875) . . . β (*Pub. L. O.* II) . . . Tarrant (3186) . . . Bigourdan (*Bul. Ast.* XVIII) . . . Sp (III) . . . HΣ ( ) . . .]

β 880. D.M. (31°) 634

R.A. $3^h\ 37^m\ 3^s$
Decl. $+\ 31^\circ\ 47'$

A and B

1880.90	353°.7	0".45	8.7 . . . 8.9	2*n*	β
1891.69	354.7	0.51	8.4 . . . 8.4	3*n*	β
1898.12	349.2	0.40	. . .	1*n*	Bow
1898.76	354.9	0.55	8.5 . . . 8.5	1*n*	β
1898.97	346.9	0.42	. . .	1*n*	L

AB and C (= Σ 439)

1830.99	38°.1	23".20	8.0 . . . 9.2	2*n*	Σ
1866.85	38.3	23.39	7.8 . . . 9.0	3*n*	J
1879.82	38.0	23.70	8.0 . . . 9.1	2*n*	β
1891.69	38.3	23.42	. . . 9.2	3*n*	β
1898.82	38.2	23.46	8.5 . . . 8.9	2*n*	β

The duplicity of the principal star of Σ 439 was discovered with the 18½-inch. It is near the last preceding pair, 38 *Persei*. There is no change in the distant star. A few of the measures are given.

[β (XIII) . . . β^1 . . . β (3114) . . . β (*Pub. L. O.* II) . . . Madler (*Dorpat Obsns.* XIII, XV) (*Fixstern-Systeme* 1) . . . J (II) . . . Cin^o . . . Lewis and Bowyer (*Mon. Not.* LIX, 400) . . .]

β 1041. W^s III. 793, 798

R.A. $3^h\ 37^m\ 19^s$
Decl. $+\ 27^\circ\ 31'$

B and C

1888.91	347°.8	7".87	. . . 12.8	3*n*	β
1898.71	338.8	10.14	. . . 13.2	2*n*	β
1898.76	340.4	9.84	. . . 12.4	2*n*	A

A and B (= OΣ (app.) 38)

1875.41	38°.3	122".63	6.2 . . . 6.3	3*n*	J
1888.91	39.9	123.57	7.0 . . . 7.0	3*n*	β
1890.73	40.0	123.63	6.5 . . . 6.6	4*n*	Fr
1898.71	40.9	124.37	. . .	2*n*	β
1898.72	41.0	124.48	7.5 . . . 8.0	1*n*	A

The minute companion to the preceding star of this wide pair was discovered with the 36-inch.

The proper motion of the bright stars is given by RECHENBERG (A.N. 3482) as follows:

A	0".065	in 201°.8
B	0.331	in 123.3

From the position of the faint star given by the measures of 1888, with the above proper motion, the place of C in 1898.7 should be 335°.2 : 10".44. It is evident from the latest measures that this star is fixed in space, and that the two form only an optical pair. All the measures of A and B are given here.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Δ (1)...Franz (3464)...Aitken ( )...]

β 1183. B.A.C. 1142

R.A. 3h 37m 36s
Decl. + 45° 18'

1890.65	139°.9	6".48	6.3...14.7	3*n*	β
1898.71	137.4	6.71	...	1*n*	Hu

Discovered with the 36-inch. A naked-eye star in *Perseus*.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Hussey ( )...]

β 536. W° III. 846

R.A. 3h 39m 8s
Decl. + 23° 49'

A and B

1878.69	336°.4	0".44	8.3... 9.3	3*n*	β
1890.81	322.4	0.19	8.0... 8.5	3*n*	β
1891.74	317.1	0.19	8.5... 8.9	3*n*	β
1892.01		Single with 36-inch			Bar
1893.71		Single with 36-inch			Bar

C and D

1878.67	11°.2	18".17	...12	1*n*	β
1891.74	9.4	18.35	...13	3*n*	β
1894.09	10.0	17.98	...12	2*n*	W
1898.89	8.2	18.02	...13	1*n*	A

AB and C (= S 437)

1823.99	299°.7	34".57	9 ...10	2*n*	S
1878.70	302.4	36.72	8.0...	2*n*	β
1891.74	303.1	36.92	... 8.4	3*n*	β
1894.05	303.1	36.84	8.3... 8.0	3*n*	W
1898.89	303.3	37.47	8.0... 8.0	1*n*	A

The wide pair, first observed by SOUTH, is in the *Pleiades*, 1m 15s *p Alcyone*, and 4' 52" *n*. The close pair and the faint star D were discovered with the 18½-inch. It is a physical system, and it is probable that the period will not be a long one.

There has been no change in the position of C, and this and the faint attendant form only a perspective group. C is W° III. 845. All the measures of this star are given above.

[β (X)...β°...β (3048,3114)...β (*Pub. L. O.* II)...Barnard (*A. J.* 447)...Wilson ( )...Aitken ( )...]

β 537. D.M. (24°) 563

R.A. 3h 39m 54s
Decl. + 24° 28'

1877.84	194°.4	0".37	8.2...10.0	2*n*	J
1877.91	185.9	0.60	8.5...10.5	2*n*	β
1890.88	184.8	0.48	8.4... 9.8	3*n*	β

Discovered with the 18½-inch. In the *Pleiades*. Apparently unchanged.

[β (X)...β°...β (3048)...β (*Pub. L. O.* II)...Δ (1)...]

β 1003. O. Arg. S. 2518

R.A. 3h 40m 25s
Decl. − 28° 15'

1881.54	20°.5	2".69	8.1...12.0	2*n*	β
1892.01	30.4	2.48	8.2...11.3	3*n*	β
1898.97	34.4	2.76	8.0...13.2	2*n*	Bd

Discovered with the 12-inch. There may be some change in the angle. BOOTHROYD suspected the principal star to be a close pair, 15° : 0".4.

[β (XIII)...β°...β (3114)...β (*Pub. L. O.* II)...Boothroyd ( )...]

β 538. Yarnall 1631

R.A. 3h 40m 51s
Decl. + 23° 44'

1877.73	138°.0	2".27	10 ...11	1*n*	β
1898.89	130.0	1.94	9.1...10.4	2*n*	β
1898.92	128.6	1.59	10 ...11	1*n*	A

A pair of faint stars in the *Pleiades*, 30°.4 *f* and 20".5 *s* of *η Tauri* (ALCYONE). Not in D.M.

[β (X)...β°...Aitken ( )...]

β 1184. D.M. (21°) 526

R.A. $3^h\ 41^m\ 14^s$
Decl. $+22°\ 0'$

1890.83	272°.2	0".62	8.1...	8.3	3*n*	β
1893.07	269.6	0.75	...		1*n*	Sp
1896.08	267.8	0.5±	...		4*n*	Sp
1897.86	273.8	0.59	...		1*n*	Lew
1897.88	266.3	0.73	...		3*n*	A
1897.92	264.7	0.48	...		2*n*	Bow
1898.12	275.2	0.62	...		1*n*	Bow

Discovered with the 36-inch. Very little, if any, change.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Sp (III)...Aitken (*A. J.* 429)...Lewis and Bowyer (*Mon. Not.* LIX, 406)...]

β 1105. D.M. (23°) 554

R.A. $3^h\ 41^m\ 26^s$
Decl. $+23°\ 49'$

1889.62	57°.7	0".33	9.3...10.3		3*n*	β.

Difficult pair in the *Pleiades*, $1^m\ 4^s$ *f* and 4'.3 *n* of η *Tauri* (ALCYONE). Discovered with the 36-inch.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...]

β 1106. *Pleiades*

R.A. $3^h\ 42^m\ 58^s$
Decl. $+23°\ 51'$

1889.59	51°.7	0".40	11.5...11.5		1*n*	β

Another difficult pair in the *Pleiades*, discovered with the 36-inch. It is too faint for the D.M. The place is taken from the Paris map of this group. It is 55° *f* and 4'.6 *n* of 28 *Tauri* (PLEIONE).

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...]

β 539. W^I III. 809

R.A. $3^h\ 43^m\ 13^s$
Decl. $-1°\ 53'$

1877.88	271°.2	2".79	9 ...11		2*n*	β
1891.86	271.6	2.69	8.3...10.6		2*n*	β

Discovered with the 18½-inch. Near β 401. Unchanged.

[β (X)...β^I...β (3114)...β (*Pub. L. O.* II)...]

β 401. Lalande 7109

R.A. $3^h\ 44^m\ 10^s$
Decl. $-1°\ 53'$

1877.20	254°.5	4".65	6.8...10.8		3*n*	J
1878.05	255.8	4.37	6.5...10.0		1*n*	Cin
1879.77	255.8	4.00	6.0...10.0		1*n*	Cin
1891.86	256.0	4.64	6.7...11.1		2*n*	β

Discovered with the 6-inch. Evidently fixed.

[β (VII)...β (2103,3114)...β (*Pub. L. O.* II)...J (I)...Cin^5...Cin^6...]

β 743. D.M. (51°) 802

R.A. $3^h\ 46^m\ 36^s$
Decl. $+51°\ 54'$

1880.06	250°.2	0".82	8.5...	9.0	1*n*	β
1891.77	246.1	0.74	8.2...	9.0	3*n*	β

Discovered with the 6-inch in 1879 on Mt. Hamilton.

[β (XI)...β^2...β^1...β (3114)...β (*Pub. L. O.* I, II)...]

β 1276. Lalande 7190

R.A. $3^h\ 47^m\ 4^s$
Decl. $-2°\ 12'$

B and C

1898.73	81°.1	0".96	8.7...	9.0	3*n*	β

A and BC (= Σ 468 = H 5458)

1823+	105°±	25".±	8 ...	9	1*n*	H
1831.40	97.7	20.06	8.7...	9.7	3*n*	Σ
1844.13	98.5	19.37	...		1*n*	Ma
1868.57	98.0	20.03	8.7...	9.7	4*n*	J
1879.66	97.1	20.80	8.5...	9.5	1*n*	Cin
1892.92	97.7	19.35	8.1...	9.0	2*n*	G
1898.73	97.7	20.13	8.2...		3*n*	β

Discovered with the 40 inch. It is not a difficult pair, and should have been seen before with the present distance. The STRUVE components are evidently fixed. The foregoing are all the measures. A and B are respectively S.D. (2°) 745 and 746.

[Madler (*Fixstern-Systeme* II...J (II)...Cin^6...Glasenapp (II)...]

β 540. D.M. (31°) 669

R.A. 3h 48m 21s
Decl. + 31° 48'

A and B

1878.65	326°.0	1".22	8.1...11.5	2n	β
1891.69	324.7	1.28	8.5...11.8	3n	β

A and C

1878.70	57°.2	57".14	... 8.2	2n	β
1891.69	57.3	57.11	... 8.5	3n	β

Discovered with the 18½-inch.

[β (x)...β¹...β (3114)...β (*Pub. L. O.* II)...]

β 85. W³ III. 1031

R.A. 3h 48m 34s
Decl. + 17° 17'

1875.66	216°.9	4".14	7.9...10.1	4n	J
1883.53	220.2	4.48	7.8...10.0	6n	En
1891.81	217.2	4.00	8.2...10.3	3n	β

Discovered with the 6-inch. There is no evidence of motion.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β (3114)...β (*Pub. L. O.* II)...J (I)...Engelmann (2678)...]

β 263. W³ III. 1028

R.A. 3h 48m 50s
Decl. + 32° 50'

1875.93	70°.6	0".67	8.2... 8.5	6n	J
1882.09	71.9	...	...	1n	Big
1882.95	76.1	0.80	8.0... 8.3	5n	En
1898.76	75.3	0.87	8.0... 8.5	2n	A

Discovered with the 9.4-inch at the Dartmouth College Observatory.

[β (V)...β (*Mon. Not.* XXXV, 31)...J (I)...Engelmann (2678)...Bigourdan (*Paris Obsns.*, 1883)...Aitken ( )...]

β 541. W³ III. 923

R.A. 3h 48m 53s
Decl. − 1° 37'

1877.95	259°.8	1".34	8.5...10.5	1n	β
1879.11	255.2	...	8.0...10.5	1n	Cin
1884.83	261.0	1.41	9.0...11.0	1n	W
1898.72	260.2	1.33	8.2...10.5	2n	β

Discovered with the 18½-inch. Without change.

[β (x)...β¹...Cin⁵...Wilson (Cin²⁶)...]

β 542. S.D. (7°) 707

R.A. 3h 50m 21s
Decl. − 7° 18'

1877.86	198°.4	1".65	9 ...10	1n	β
1886.78	193.1	1.56	8.2... 9.0	2n	LM
1892.01	192.9	1.52	8.4... 8.9	3n	β
1898.88	192.5	1.50	8.3...10.2	3n	Cg

Discovered with the 18½-inch. Apparently fixed.

[β (x)...β¹...β (3114)...β (*Pub. L. O.* II)...LM...Cogshall ( )...]

β 543. W³ III. 974

R.A. 3h 51m 25s
Decl. − 1° 30'

1877.82	32°.0	11".15	8.5...10.5	1n	β
1891.75	28.4	11.19	8.0...10.8	3n	β
1896.08	29.9	11.88	...	1n	Sp
1898.70	28.8	11.02	8.1...10.7	2n	β
1898.86	26.8	11.00	7.7...11.0	3n	Cg

Discovered with the 18½-inch. This star has some proper motion:

Stumpe	0".283 in	228°.3
Seeliger	0.284 in	224.1
Porter	0.279 in	232.7

It will be seen from the measures that this movement belongs to both stars. If the companion was stationary, the distance at the last date would be about 5" more than at the time of discovery.

[β (x)...β¹...β (3114)...β (*Pub. L. O.* II)...Sp (III)...Cogshall ( )...]

β 1042. Lalande 7372

R.A. 3h 52m 36s
Decl. − 3° 0'

A and BC

1888.92	93°.8	54".93	7.5...	3n	β
1893.11	93.2	55.62	7.5... 9.4	2n	Gl
1898.72	93.5	55.28	7.3...	2n	β
1898.80	94.1	55.88	7.0...	1n	A

B and C

1888.92	35°.1	1".09	8.7 . . . 9.5	3*n*	β
1898.73	38.1	1.01	8.8 . . . 10.0	3*n*	β
1898.80	35.3	0.97	9.5 . . . 10.5	1*n*	A

Discovered with the 36-inch. So far there appears to be no change in the close pair.

[β (XV) . . . β (2929) . . . β (*Pub. L. O.* II) . . . Glasenapp (II) . . . Aitken ( ) . . .]

β 544. 36 *Tauri*

R.A. 3h 57m 11s
Decl. + 23° 46′

1877.86	257°.9	25".06	6.0 . . . 12.5	1*n*	β
1892.04	256.6	26.10	5.5 . . . 13.2	3*n*	β
1897.84	256.7	25.17	. . .	3*n*	β

Discovered with the 18½-inch. The proper motion of this star is small, 0".012 in the direction of 214°.5 (AUWERS).

[β (X) . . . β¹ . . . β (3114) . . . β (*Pub. L. O.* II) . . .]

β 1004. Lacaille 1326

R.A. 3h 57m 27s
Decl. — 34° 49′

A and B

1881.85	154°.1	1".79	7.5 . . . 7.9	3*n*	β
1895.08	144.8	1.54	7.0 . . . 8.5	3*n*	Sel
1897.72	144.2	1.77	7.2 . . . 8.3	1*n*	See
1898.84	143.4	1.97	7.0 . . . 7.7	2*n*	A

A and C

1881.86	131°.2	62".98	. . . 11.2	2*n*	β
1898.84	134.6	60.04	. . . 11.7	2*n*	A

Discovered with the 12-inch on Mt. Hamilton in 1881. There appears to be some change in the angle of AB. The change in C indicates a proper motion of 0".27 in the direction of 81°.7.

[β (XIII) . . . β³ . . . Sellors (3369) . . . See (3495) . . . Aitken ( ) . . .]

β 1277. D.M. (27°) 630

R.A. 3h 58m 15s
Decl. + 28° 4′

A and B

1898.84	259°.0	1".34	8.0 . . . 12.2	2*n*	β

A and C

1898.87	69°.7	54".53	. . . 9.2	3*n*	β

Discovered with the 40-inch in looking for the next pair, β 1005.

β 1005. D.M. (28°) 618

R.A. 3h 59m 20s
Decl. + 28° 37′

1881.86	62°.7	3".35	8.5 . . . 11.7	2*n*	β
1891.89	61.7	2.47	8.4 . . . 12.0	3*n*	β
1898.74	62.1	2.77	. . .	3*n*	Hu
1898.84	60.8	2.56	. . .	2*n*	β

Discovered with the 12-inch at Mt. Hamilton in 1881.

[β (XIII) . . . β³ . . . β (3114) . . . β (*Pub. L. O.* II) . . . Hussey ( ) . . .]

β 545. Lalande 7556

R.A. 3h 59m 24s
Decl. + 37° 42′

1878.24	310°.0	1".02	8.0 . . . 11.5	4*n*	β
1890.79	310.1	1.09	8.0 . . . 10.6	4*n*	β
1891.78	309.3	1.05	8.3 . . . 11.0	3*n*	β
1898.82	303.6	1.04	8.1 . . . 10.0	2*n*	β

Discovered with the 18½-inch. There seems to be no material change. This star is in the field with OΣ 531. It has been used for the determination of the parallax of OΣ 531 (= P III. 242) by BALL (*Pub. Dunsink Obsy.*, Part V). The last named star has a proper motion of 0".260 in the direction of 146°.5 (PORTER). The following measures connect the two pairs:

β 545 and OΣ 531

1851.16	25°.4	239".76	2*n*	OΣ
1854.04	25.6	239.65	3*n*	OΣ
1858.20	25.8	239.03	2*n*	OΣ
1879.60	27.2	237.32	30*n*	Ball
1890.78	28.1	235.51	2*n*	β
1898.82	28.8	234.95	2*n*	β

[β (X) . . . β¹ . . . β (3048,3114) . . . β (*Pub. L. O.* II) . . . OΣ (*Poulkowa Obsns.* X, p. 61) . . .]

β 309. Lalande 7655

R.A. $4^h\ 1^m\ 22^s$
Decl. $+19°\ 25'$

1875.65	279°.1	5".66	8.0 . . . 11.3	3*n*	Δ
1876.03	278.7	5.94	8 . . . 11	2*n*	Hl
1890.00	276.8	5.94	. . .	3*n*	Hl
1899.09	277.1	5.59	8.0 . . . 10.5	1*n*	β

Discovered with the 3-inch. Probably fixed.

[β (VI) . . . β (2062) . . . Δ (I) . . . Hall (I, II) . . .]

β 1232. W³ III. 1286

R.A. $4^h\ 1^m\ 26^s$
Decl. $+28°\ 52'$

1891.98	350°.4	0".30	8.4 . . . 9.3	3*n*	β
1893.07	355.7	0.25 ±	. . .	1*n*	Sp
1896.08	354.6	0.22 ±	. . .	5*n*	Sp
1896.09	353.2	0.36	. . .	1*n*	L
1898.72	351.8	0.40	. . .	2*n*	Hu
1898.89	358.0	0.15	. . .	1*n*	L

Discovered with the 36-inch.

[β (XVIII) . . . β (3113) . . . β (*Pub. L. O.* II) . . . Sp (III) . . . Lewis (*Mon. Not.* LIX, 400) . . . Hussey ( ) . . .]

β 546. W³ III. 1323

R.A. $4^h\ 3^m\ 12^s$
Decl. $+41°\ 33'$

1878.67	24°.3	0".92	8.0 . . . 8.0	1*n*	β
1883.66	26.8	0.77	8.3 . . . 8.3	6*n*	En
1896.07	32.4	0.82	. . .	2*n*	Sp
1898.79	32.2	0.86	. . .	5*n*	Hu
1898.88	210.7	0.69	8.3 . . . 8.5	1*n*	β

Discovered with the 18½-inch. There may be some advance in the angle.

[β (X) . . . β' . . . Engelmann (2678) . . . Sp. (III) . . . Hussey ( ) . . .]

β 1233. D.M. (66°) 316

R.A. $4^h\ 6^m\ 6^s$
Decl. $+66°\ 47'$

1891.85	37°.1	5".17	8.0 . . . 13.2	4*n*	β
1898.73	38.4	5.10	7.7 . . . 11.9	2*n*	β

Discovered with the 12-inch. At first the principal star was suspected to be a close pair, but this was not verified with the large telescope. In D.M. 7.4 m; *Christiania Catalogue* 6.8 m.

[β (XVIII) . . . β (3113) . . . β (*Pub. L. O.* II) . . .]

β 1278. Lalande 7871

R.A. $4^h\ 7^m\ 0^s$
Decl. $+8°\ 35'$

A and B

1898.85	303°.4	7".45	6.5 . . . 13.7	3*n*	β

A and C

1898.92	252°.3	55".26	. . . 12.5	1*n*	β

Discovered with the 40-inch in looking for 47 *Tauri*. The D.M. magnitude is 6.8.

β 547. 47 *Tauri*

R.A. $4^h\ 7^m\ 25^s$
Decl. $+8°\ 58'$

A and B

1877.84	359°.4	0".89	5.5 . . . 8.0	3*n*	β
1877.90	359.7	0.82	5.0 . . . 7.5	3*n*	Δ
1878.93	359.8	0.89	5.0 . . . 9.0	3*n*	β
1886.20	363.4	1.18	. . .	2*n*	HΣ
1888.81	359.7	0.91	5.2 . . . 8.7	3*n*	β
1889.93	358.6	0.75	. . .	3*n*	Sp
1889.02	359.5	0.94	5.0 . . . 8.0	3*n*	T
1889.11	350.3	. . .	5.0 . . . 8.0	1*n*	Lv
1896.70	353.4	0.91	5.5 . . . 9.0	3*n*	A
1898.80	361.4	1.07	5.5 . . . 8.0	2*n*	β

AB and C

1877.99	223°.1	32".20	. . . 12.5	1*n*	β
1898.82	224.5	31.56	. . . 13.3	3*n*	β

Discovered with the 18½-inch. A fine pair, but the change, if any, is very slow. The proper motion of this star is small, 0".050 in the direction of 227°.5 (Auwers), but it is sufficient to show that it is common to both stars, as otherwise there would be a decided change in both angle and distance.

The distant companion appears to be fixed in space. With the position of C from the measures of 1898, and the proper motion of A given above,

the minimum distance between A and C of 1".6 will occur in about 630 years.

[β (x)...β^{2}...β^{2}...β (2875)...β (*Pub. L. O.* II)...HΣ ( ) ...J (1)...Lν^{1}...Tarrant (2991)...Sp (III)...Aitken (3395)...]

β 86. W^{2} IV. 129

R.A. $4^{h}\ 8^{m}\ 39^{s}$
Decl. $+23^{\circ}\ 13'$

1875.68	51°.1	4".05	9.0... 9.6	4*n*	J
1898.74	49.7	4.32	...	3*n*	Hu
1898.84	51.0	4.19	9.0... 9.2	1*n*	β

Discovered with the 6-inch. Without change. There is a 13 m star, 260°.4 : 26".6.

[β (II)...β (*Mon. Not.* XXXIII, 437)...J (1)...Hussey ( )...]

β 548. Lalande 8027

R.A. $4^{h}\ 10^{m}\ 58^{s}$
Decl. $-10^{\circ}\ 23'$

1877.86	347°.0	6".24	7.0...11.5	1*n*	β
1879.11	344.4	...	7.0...13	1*n*	Cin
1891.86	345.4	6.10	7.1...11.2	2*n*	β
1898.83	345.2	6.14	7.5...11.5	3*n*	Cg

Discovered with the 18½-inch. No material change.

[β (x)...β^{c}...Cin^{1}...β (3114)...β (*Pub. L. O.* II)...Cogshall ( )...]

β 1234. W^{2} IV. 205

R.A. $4^{h}\ 11^{m}\ 56^{s}$
Decl. $+21^{\circ}\ 1'$

1891.82	205°.5	1".77	8.3...12.6	3*n*	β
1898.80	203.2	2.04	...	4*n*	Hu

Discovered with the 36-inch.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Hussey ( )...]

β 310. W^{2} IV. 258

R.A. $4^{h}\ 14^{m}\ 21^{s}$
Decl. $+39^{\circ}\ 39'$

1878.02	172°.1	19".38	8.0...12.0	2*n*	HI
1890.91	170.7	19.51	...	1*n*	HI
1891.89	171.7	19.11	7.7...11.2	3*n*	β

Discovered with the 6-inch. Fixed.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...Hall (I, II)...]

β 87. P IV. 53

R.A. $4^{h}\ 15^{m}\ 18^{s}$
Decl. $+20^{\circ}\ 32'$

1875.46	170°.6	2".09	5.7... 8.8	5*n*	J
1877.23	173.4	1.85	6.5... 9.0	1*n*	OΣ
1886.15	171.0	2.10	...	2*n*	HΣ
1887.80	174.1	3.11	6.0... 9.7	2*n*	T
1891.81	169.4	1.97	6.6...10.5	3*n*	β

Discovered with the 6-inch. A fine colored pair; J gives, *golden : blue*. This is No. 74 of BIRMINGHAM'S *Catalogue of Red Stars*. A naked-eye star in *Taurus* (B.A.C. 1342). The components are evidently fixed.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β (3114)...β (*Pub. L. O.* II)...J (1)...J (2081)...Tarrant (2899)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...]

β 744. *Eridani* 299

R.A. $4^{h}\ 16^{m}\ 32^{s}$
Decl. $-26^{\circ}\ 1'$

A and B

1879.75	290°±	0".6±	6.5... 6.5	:	β
1891.78	306.6	0.79	7.6... 7.6	3*n*	β
1894.10	301.4	0.59	7 ... 7	1*n*	Sel
1897.73	312.1	0.52	...	1*n*	Sec
1898.88	314.0	0.81	7.0... 7.5	1*n*	A
1898.93	307.3	0.80	7.5... 8	1*n*	Bd

A and C (= H 3644)

1835.9	20°±	25".±	6 ...14		H
1891.79	6.8	35.42	...11.7	2*n*	β
1898.93	7.2	35.80	...11.0	1*n*	Bd

A and D (= H 3644)

1835.9	37°.5	40".±	... 8	1*n*	H
1891.78	40.4	44.63	... 8.3	3*n*	β
1898.93	40.8	44.88	... 9	1*n*	Bd

The principal star of the wide triple, H 3644, was found with the 6-inch to be a close pair. The measures indicate some motion in angle.

The Cordoba magnitude of the large star (Lalande 8264) is 6¼, and of D (O. Arg. S. 3022) 7¾ m.

[β (XI)...β^{2}...β (3114)...β (*Pub. L. O.* I, II)...Sellors (3303) ...See (3495)...Aitken ( )...Boothroyd ( )...]

β 402. W¹ IV. 318

R.A. 4h 17m 3s
Decl. − 1° 33′

	°	″			
1877.95	74.0	6.94	8.5 . . . 10.5	1n	β
1891.86	73.0	7.48	8.3 . . . 11.2	2n	β
1892.00	74.3	7.37	8.0 . . . 11.0	1n	Col
1898.72	74.2	7.51	8.6 . . . 10.1	2n	β
1898.91	70.9	7.28	8.2 . . . 11.5	3n	Cg

Discovered with the 6-inch. Unchanged. COGSHALL notes a third star 13 m, 110° : 7″.8, and also suspected the principal star of being a close pair in 270°.

[β (VII) . . . β⁸ . . . β (2103, 3114) . . . β (*Pub. L. O.* II) . . . Collins (*Proc. Haverford Coll. Obsy.* 1891) . . . Cogshall ( ) . . .]

β 1235. Lalande 8235

R.A. 4h 17m 20s
Decl. + 22° 28′

	°	″			
1891.84	60.8	0.35	8.4 . . . 8.5	3n	β
1896.09	46.2	0.35	. . .	1n	Lew
1896.09	54.5	0.25±	. . .	6n	Sp
1898.12	65.4	0.34	. . .	1n	Bow
1898.79	65.3	0.37	. . .	2n	Hu

Discovered with the 36-inch. Near κ *Tauri*.

[β (XVIII) . . . β (3113) . . . β (*Pub. L. O.* II) . . . Sp (III) . . . Lewis and Bowyer (*Mon. Not.* LIX, 400) . . . Hussey ( ) . . .]

β 1185. W² IV. 376

R.A. 4h 18m 52s
Decl. + 18° 35′

	°	″			
1890.70	25.6	0.16	7.8 . . . 8.4	4n	β
1896.09	18.0	0.2±	. . .	4n	Sp

Discovered with the 36-inch. The magnitude in D.M. is 7.5.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . . Sp (III) . . .]

β 745. D.M. (53°) 772

R.A. 4h 19m 11s
Decl. + 53° 38′

	°	″			
1877.95	150±	0.5±	8.5 . . . 8.5		β
1891.86	134.1	0.52	8.3 . . . 8.3	2n	β
1898.87	129.3	0.65	. . .	1n	Hu

Discovered with the 6-inch on Mt. Hamilton in 1879.

[β (XI) . . . β⁸ . . . β (3114) . . . β (*Pub. L. O.* I, II) . . . Hussey ( ) . . .]

β 403. W¹ IV. 379

R.A. 4h 19m 18s
Decl. − 2° 20′

	°	″			
1877.09	100.9	2.01	7.7 . . . 9.1	5n	Δ
1888.08	101.4	2.08	8.0 . . . 9.5	2n	T
1888.39	98.3	1.95	7.0 . . . 9.2	3n	Lv
1893.10	104.2	1.79	7.5 . . . 9.0	2n	Gl
1898.85	98.6	1.96	7.3 . . . 9.5	3n	Cg

Discovered with the 6-inch. Unchanged.

[β (VII) . . . β (2103) . . . Δ (I) . . . Lv¹ . . . Tarrant (2991) . . . Glasenapp (II) . . . Cogshall ( ) . . .]

β 1186. *Tauri* 248

R.A. 4h 20m 51s
Decl. + 10° 56′

	°	″			
1890.92	182.1	0.59	6.8 . . . 9.7	3n	β
1893.61	185.3	0.55±	. . .	2n	Sp
1896.09	180.5	0.64	. . .	5n	Sp
1898.03	174.4	0.75	6.2 . . . 10.0	3n	A

Discovered with the 36-inch. A naked-eye star in *Taurus;* 6 m in ARGELANDER and HEIS. Lalande 8372. The motion, if any, is slow.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . . Sp (III) . . . Aitken ( ) . . .]

β 311. *Eridani* 315

R.A. 4h 21m 52s
Decl. − 24° 21′

	°	″			
1875.92	148.4	. . .	7.5 . . . 7.5	1n	Cin
1877.61	146.9	1.06	6.5 . . . 7.0	1n	Cin
1883.91	162±	. . .	. . .	1n	W
1891.72	147.5	0.98	7.3 . . . 7.4	2n	Lv
1897.67	333.2	0.70	6.0 . . . 6.6	1n	See
1898.88	332.3	0.85	7.5 . . . 7.5	2n	Cg

Discovered with the 6-inch. Change uncertain. The Cordoba magnitude is 6.2. Lacaille 1451.

[β (VI) . . . β (2062) . . . Cin³ . . . Cin⁴ . . . Wilson (Cin¹⁰) . . . Lv (*Proc. Haverford Coll. Obsy.* 1891) . . . See (3495) . . . Cogshall ( ) . . .]

β 184. Lalande 8471

R.A. $4^h\ 22^m\ 45^s$
Decl. $-21°\ 46'$

1877.53	262.°5	1.″10	6.2 . . . 7.0	2*n*	Cin
1889.01	261.4	1.12	6.5 . . . 7.1	3*n*	Lv
1891.72	259.2	1.09	7.4 . . . 7.6	1*n*	Lv
1895.90	259.8	. . .	. . .	3*n*	Do
1897.76	240.4	1.30	7.4 . . . 7.6	1*n*	See
1899.09	257.8	1.19	. . .	1*n*	β

Discovered with the 6-inch. No sensible change. In Gould 6.9 m.

[β (IV)...β (*Mon. Not.* XXXIV, 282)...Cin⁴...Lv³...Lv (*Proc. Haverford Coll. Obsy.* 1891)...Doberck (3378)...See (3495)...]

β 549. W^s IV. 458

R.A. $4^h\ 23^m\ 2^s$
Decl. $-12°\ 13'$

1877.97	189.°0	7.″85	8.0 . . . 12.5	2*n*	β
1879.11	185.0	. . .	7.0 . . . 12.0	1*n*	Cin
1891.86	190.5	8.66	7.8 . . . 11.0	2*n*	β
1898.71	189.2	8.44	8.3 . . . 10.8	1*n*	β
1898.91	188.8	8.52	7.2 . . . 12.0	3*n*	Cg

Discovered with the 18½-inch. Without change.

[β (X)...β²...β (3114)...β (*Pub. L. O.* II)...Cm⁵...Cogshall ( )...]

β 789. Lalande 8426

R.A. $4^h\ 23^m\ 30^s$
Decl. $+37\ \ 24'$

1881.69	322.°6	1.″30	8.1 . . . 8.8	3*n*	β
1888.22	322.3	1.30	8.2 . . . 9.0	3*n*	Com

Discovered with the 15½ inch at the Washburn Observatory. Probably fixed.

[β (XII)...β⁵...Comstock (*Pub. Washburn Obsy.* VI)...]

β 746. Cord. G. C. 5107

R.A. $4^h\ 27^m\ 13^s$
Decl. $-36°\ 10'$

1879.79	30.°±	1.″2 ±	8.0 . . . 9.0		β
1895.10	11.9	1.05	7.9 . . . 9.0	3*n*	Sel

Discovered with the 6-inch at Mt. Hamilton in 1879. Later measures are needed.

[β (XI)...β⁵...Sellors (3369)...]

β 747. Lacaille 1518

R.A. $4^h\ 28^m\ 50^s$
Decl. $-38°\ 32'$

1879.79	240.°±	2.″5 ±	7.5 . . . 9.5		β
1894.09	218.4	2.25	7 . . . 9	2*n*	Sel

Discovered with the 6-inch at Mt. Hamilton in 1879.

[β (XI)...β⁵...β (*Pub. L. O.* I)...Sellors (3303)...]

β 550 and β 1031. α *Tauri* (ALDEBARAN)

R.A. $4^h\ 29^m\ 2^s$
Decl. $+16°\ 16'$

A and B (= β 550)

1877.89	109.°0	30.″45	1 . . . 13.5	3*n*	β
1878.00	110.5	31.26	. . . 15	3*n*	Hl
1880.11	111.2	31.46	. . . 14.0	2*n*	β
1888.82	109.5	30.90	. . .	2*n*	β
1890.87	109.0	31.34	. . . 14.2	3*n*	β
1897.79	108.8	31.03	. . .	3*n*	β
1898.10	109.7	31.30	. . .	3*n*	A

C and D (= β 1031)

1888.81	281.°1	2.″34	9.0 . . . 12.0	3*n*	β
1890.86	279.1	1.84	11.0 . . . 13.5	4*n*	β
1891.72	277.0	1.83	10.6 . . . 13.7	3*n*	β
1892.82	277.8	2.11	. . .	3*n*	Bar
1897.82	276.9	1.62	. . .	1*n*	β
1897.83	276.9	2.16	. . .	1*n*	Bar
1898.10	275.7	1.74	9.5 . . . 13.0	3*n*	A
1899.02	278.5	1.89	9.0 . . . 13.0	1*n*	β

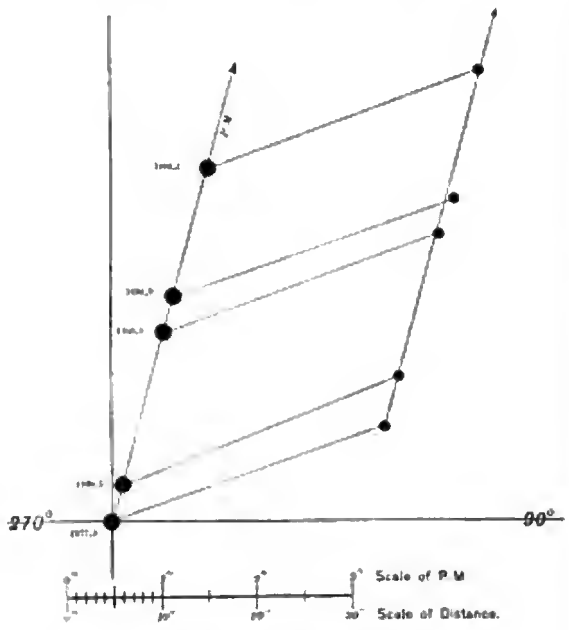
A and C (= H^s VI. 66)

1836.06	36.°0	109.″04	. . 11.2	2*n*	Σ
1854.66	35.4	111.76	. . . 10.6	25*n*	OΣ
1854.24	34.8	112.79	. . . 10.3	6*n*	⊿
1887.00	34.5	116.27	. . .	20*n*	Hl
1889.98	34.6	116.97	. . .	7*n*	β
1898.10	34.3	117.90	. . .	4*n*	A
1899.02	34.6	117.99	. . .	1*n*	β

The nearest companion to *Aldebaran* was found with the Chicago 18½ refractor in 1877, and this is now shown to have the same proper motion as the principal star; a result which would not be expected considering the distance and great difference in magnitudes. Both distance and position

angle appear to have remained unchanged, the small difference in measure being fully accounted for by the extreme minuteness of the companion, and the difficulty of measuring it so near a first-magnitude star. It was a very difficult object to see with the Chicago telescope, and might easily be overlooked even with the 36-inch refractor.

The more distant Herschel companion has been observed for more than a hundred years, and the change shown by the measures has usually been ascribed solely to the proper motion of *Aldebaran*. The distinguished French astronomer, FLAMMARION, was the first to notice the fact that the



Proper motion of ALDEBARAN and companion.

well-known proper motion of A could not account for the relative change, and therefore came to the conclusion that B must have a proper motion of its own, and in a different direction. Of the correctness of this view there can be no doubt, and the amount and direction of the relative displacement of C should be as well known as of most stars. This motion is almost exactly half that of A, and is perhaps larger than that of any known star as faint as the eleventh magnitude, which is not connected and moving with some brighter component.

In looking at this object in 1888 with the 36-inch, I found that the Herschel companion also was double, or had a very faint attendant a little more than 2″ distant. This is too difficult for most telescopes.

That the proper motion of the faint star B is exactly the same as that of *Aldebaran* will be apparent from the foregoing diagram, showing the several positions of both stars from 1877 to 1898, as given by the measures. The annual proper motion of A is given by AUWERS as 0″.190 in the direction of 164°.7. The several places of A along the line separating this movement are derived from this value of the proper motion, and the corresponding positions of B laid down from the measures. The scale of the distances AB is one-tenth that of the proper motion.

The wide pair, AC, is H I VI. 66 = S 452 = Σ 2 App. II. A few of the measures are given above. The early observations, made before the work of Σ, are not accurate in distance. The measures of AC, 1836–1898, taking into consideration the motion of A in space, give the annual proper motion of C as 0″.094 in the direction of 112°.2.

The diagram on opposite page, showing to scale the several positions of the three components is reproduced from *Monthly Notices*, March 1891.

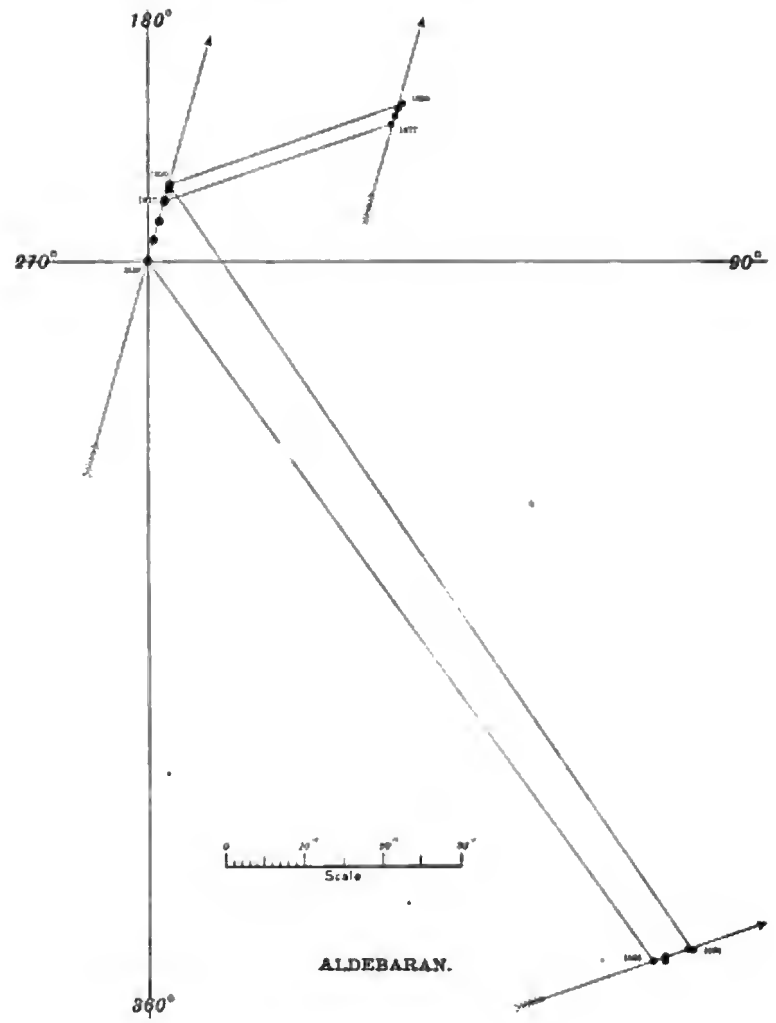
From the measures already made of C and D, it is practically certain that these two stars have a common proper motion, and therefore form a physical system. D appears to have a slow retrograde motion. Taking the relation of these stars as given by a mean of my three sets of measures at Mt. Hamilton, and applying the proper motion of C as given above, the position of D with reference to that star for 1898.10 should be 283°.0 : 2″.85. The measures all concur in showing a diminishing position-angle, and no increase in the distance.

The minimum distance between these two interesting systems occurred about A. D. 1130, when the separation of A and C was only 40″.

[β (x, xiv)...β^1...β^3...β (2189,2875,3048,3114)...β (*Mon. Not.* 11, 311)...β (*Pub. L. O.* 11)... Barnard (*A. J.* 447)... Aitken ( )...Barnard ( )...]

Other measures, etc., of the old stars, in addition to those given above, will be found in the catalogues of HERSCHEL I, SOUTH and STRUVE, and in the following:

[Δ (11)...Δ (1475)...OΣ (*Mon. Not.* XLIV, 237)...OΣ (*Poulkowa Obsns.* X, p. 64)... Flammarion (*L'Astronomie*, IV, 102) (*Etoiles Doubles et Multiples*)...Hall ′1)... Hall (*A. J.* 156)...β^3...]



β 881. 46 *Eridani*

R.A. $4^h\ 29^m\ 4^s$
Decl. $-\ 7°\ 0'$

1879.02	57.0	1.47	6.0 . . 10.8	4*n*	β
1879.10	55.3	1.35	5.5 . . 10.0	1*n*	Cin
1888.99	53.0	1.60	6.0 . . 10.5	2*n*	T
1891.77	52.7	1.29	6.0 . . . 10.8	3*n*	β
1891.93	52.6	1.52	. . .	4*n*	T
1896.10	50.6	1.32	. . .	3*n*	Sp
1898.12	49.0	1.80	6.2 . . . 11.5	2*n*	A
1898.74	52.4	1.94	6.0 . . . 9.5	1*n*	Cg

Discovered with the 18½-inch. A fine object in a large aperture. Slow angular motion, with no material change in the distance. AUWERS gives the proper motion of the principal star, 0".008 in the direction of 212°.5.

[β (XIII). . . β¹ . . . β (3114). . . β (*Pub. L. O.* II). . . Tarrant (2991,3186). . . Cin⁵. . . Sp (III). . . Aitken ( ). . . Cogshall ( ). . .]

β 1043. 3 *Camelopardali*

R.A. $4^h\ 30^m\ 28^s$
Decl. $+\ 52°\ 50'$

1888.92	297.3	3.92	5 . . . 12.0	3*n*	β
1898.80	294.3	3.95	. . .	3*n*	Bar

Discovered with the 36-inch. The principal star has a small proper motion of 0".020 in the direction of 196°.0 (AUWERS). This movement 1888–98 would increase the angle 2°.8 if the companion was fixed. It is very probable from the measures that the small star is moving with the other, but further observations are needed.

[β (XV)...β (2929)...β (*Pub. L. O.* II)... Barnard ( )...]

β 185. Lalande 8745

R.A. $4^h\ 31^m\ 24^s$
Decl. $-15°\ 10'$

1875.78	235°.4	3".00	8.1...11.1	4*n*	J
1877.11	235.9	3.13	8.0... 9.5	1*n*	Cin
1878.10	231.8	2.45	8.0... 9.5	1*n*	Cin
1888.10	236.7	3.03	8.0...11.0	2*n*	T
1898.16	236.4	3.09	...	1*n*	See

Discovered with the 6-inch. Relatively fixed.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (I)...Cin⁴...Cin⁵... Tarrant (2991)... See ( )...]

β 88. 51 *Eridani*

R.A. $4^h\ 31^m\ 34^s$
Decl. $-2°\ 43'$

1891.88	90°.1	32".38	5.7...12.2	2*n*	β
1898.72	89.6	32.03	...11.2	2*n*	β

Distant companion noted with the 6-inch. The proper motion of 51 *Eridani* is 0".081 in the direction of 151°.2 (AUWERS). The measures do not cover a sufficient time to show whether or not the small star has the same movement. It is probably only an optical pair.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β (3114)... β (*Pub. L. O.* II)...]

β 882. S.D. (11°) 921

R.A. $4^h\ 32^m\ 32^s$
Decl. $11°\ 38'$

1880.08	231°.6	2".04	8.8...10.0	1*n*	β
1891.89	226.4	2.25	8.7... 9.4	3*n*	β
1898.83	224.5	2.70	8.5...10.5	1*n*	Bd
1898.96	228.2	2.28	8.5... 9.7	1*n*	β

Discovered with the 18½-inch. The *np* of two small stars in the same field.

[β (XIII)...β?...β (3114)...β (*Pub. L. O.* II)... Boothroyd ( )...]

β 1044. D.M. (16°) 637

R.A. $4^h\ 33^m\ 1^s$
Decl. $+16°\ 17'$

1888.91	218°.5	1".03	9.0...11.0	3*n*	β
1898.11	220.2	0.93	9.0...11.0	2*n*	A

Discovered with the 36-inch. It is 3ᵐ 59ˢ *f* *Aldebaran*. The measures so far show no sensible change.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Aitken ( )...]

β 1236. Lalande 8833

R.A. $4^h\ 34^m\ 27^s$
Decl. $-21°\ 29'$

A and B

1891.84	118°.3	1".42	7.8...10.8	3*n*	β

A and C

1891.84	314°.1	40".24	... 8.5	3*n*	β
1899.09	313.7	40.13	... 8.3	1*n*	β
1899.11	313.9	40.53	... 8.5	1*n*	A

Discovered with the 36-inch. A and C are respectively, O. Arg. S. 3268 and 3266.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Aitken ( )...]

β 186. Lalande 8986

R.A. $4^h\ 40^m\ 10^s$
Decl. $-7°\ 12'$

1875.82	174°.1	2".00	8.2...11.0	3*n*	J
1877.87	175.4	1.68	7.0... 9.0	1*n*	Cin
1879.11	176.4	1.38	8.0... 9.5	1*n*	Cin
1886.61	177.5	1.79	8.0... 9.3	2*n*	Lv
1888.10	178.1	1.63	8.3...10.5	2*n*	T
1888.50	176.1	1.76	7.2... 9.2	2*n*	LM
1898.71	176.7	1.54	8.3... 8.8	1*n*	β
1898.92	181.6	1.65	8.0... 9.5	3*n*	Bd

Discovered with the 6-inch. Without change.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (I)... Cin⁴...Cin⁵... Lv⁴...LM...Tarrant (2991)... Boothroyd ( )...]

β 312. Lalande 9065

R.A. $4^h\ 42^m\ 36^s$
Decl. $-21°\ 1'$

	°	″			
1870.06	343.8	3.13	8.5 . . . 10.5	1*n*	Hd
1876.01	345.1	3.24	7.7 . . . 9.0	3*n*	Cin
1876.03	345.7	3.35	8.0 . . . 9.5	2*n*	Hl
1877.52	343.6	3.29	8.0 . . 9.0	2*n*	Cin
1888.15	345.8	3.26	8.0 . . . 10.0	3*n*	Hl
1898.84	345.2	3.05	8.5 . . . 10.0	1*n*	Cg
1898.88	344.5	3.43	7.7 . . . 8.5	2*n*	Bd

Discovered with the 6-inch. Relatively fixed. This had been previously seen at the Harvard Observatory, but not published until 1882.

[β (VI). . . β (2062). . . Cin[3]. . . Cin[4]. . . Hall (I, II). . . *Annals Harvard Coll. Obsv.*, XIII. . Boothroyd and Cogshall ( ). . .]

β 551. 96 *Tauri*

R.A. $4^h\ 42^m\ 52^s$
Decl. $+15°\ 42'$

B and C

	°	″			
1878.09	205.7	6.26	. . .	1*n*	β
1891.94	205.5	5.83	11.0 . . . 12.8	3*n*	β
1898.72	205.0	6.21	11.9 . . 13.5	2*n*	β

A and B (=H 3261)

	°	″			
1831	55.8	25 ±	6 . . . 13	1*n*	H
1878.09	57.2	30.75	. . .	1*n*	β
1891.94	57.0	29.79	6 . . .	3*n*	β
1898.72	56.4	29.37	6 . . .	2*n*	β

The faint attendant to Herschel's companion was noted with the 18½-inch. There is another faint star in the group. The above are all the measures of AB. It is probably a perspective group only.

The proper motion of the principal star is small. It is given in the *Berlin A. G. Catalogue* as 0″.008 in the direction of 43°.9.

[β (X). . . β[1]. . . β (3114). . . (*Pub. L. O.* II.). . .]

β 883. Lalande 9091

R.A. $4^h\ 44^m\ 33^s$
Decl. $+10°\ 52'$

A and B

	°	″				
1879.00	17.5	0.35	7.0 . . . 7.0	1*n*	β	
1887.17	84.7	0.15	. . .	3*n*	Sp	
1888.09	124.4	0.18	. . .	2*n*	Sp	
1889.15	149.6	0.22	. . .	4*n*	Sp	
1890.14	203.4	0.16	. . .	3*n*	Sp	
1891.08	Single		. . .	7*n*	Sp	
1891.14	Single with 36-inch		. . .	2*n*	β	
1891.97	303.1	0.12	7.8 . . . 7.5	3*n*	β	
1894.66	356.3	0.19	. . .	3*n*	Barnard	
1895.74	6.4	0.39	. . .	2-1*n*	See	
1895.74	8.9	. . .	. . .	1*n*	Moulton	
1896.10	8.9	0.25 ±	. . .	12*n*	Sp	
1896.88	16.9	0.28	. . .	3*n*	A	
1896.97	26.3	0.24	. . .	10*n*	See	
1897.00	25.5	. . .	. . .	1*n*	Dy	
1897.13	23.8	0.27 ±	. . .	3*n*	Sp	
1897.16	36.0	0.35	. . .	1*n*	Moulton	
1897.31	37.3	0.38	. . .	2*n*	Lew	
1897.72	30.2	0.25	. . .	2*n*	Do	
1897.76	32.7	0.21	. . .	3*n*	Barnard	
1897.78	37.9	0.31	7.8 . . . 7.8	2*n*	See	
1897.81	33.6	0.25	. . .	2*n*	β	
1897.83	31.5	0.28	. . .	6*n*	A	
1897.90	35.2	0.34	. . .	3*n*	Lew	
1897.90	34.7	0.39	. . .	1*n*	Bow	
1897.90	34.7	0.39	. . .	2*n*	Br	
1897.95	34.8	0.27	. . .	3*n*	Hu	
1898.08	41.3	0.23	. . .	1*n*	Hu	
1898.09	37.7	0.26	. . .	6*n*	A	
1898.09	41.5	0.26	. . .	3*n*	Lew	
1898.18	24.8	0.25	. . .	2*n*	Sp	
1898.69	43.9	0.28	6.5 . . . 6.5	5*n*	A	
1898.74	45.3	0.19	. . .	3*n*	Barnard	
1898.74	46.0	0.24	. . .	2*n*	β	
1898.95	51.4	0.36	. . .	1*n*	Lew	
1899.20	54.5	0.20	. . .	3*n*	A	

AB and C

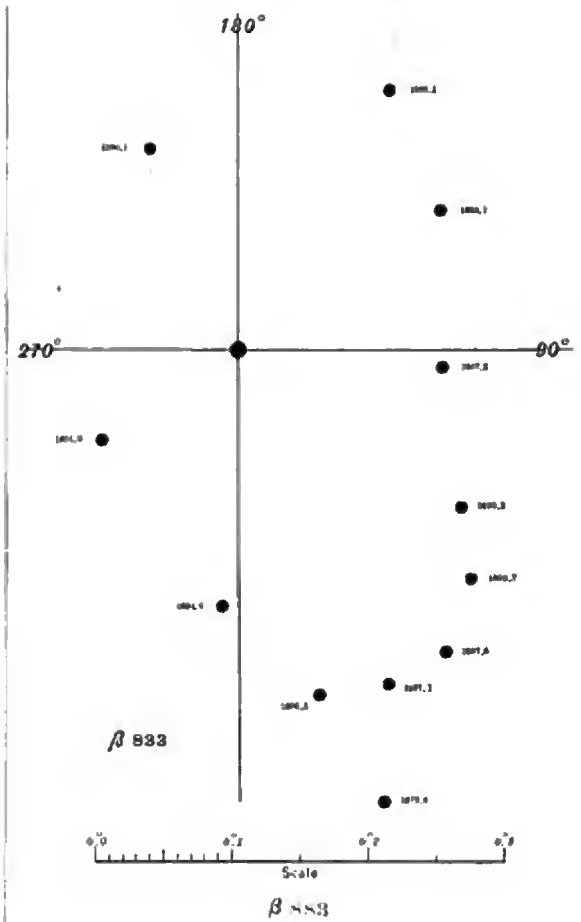
	°	″			
1879.00	148.5	18.35	. . . 14	1*n*	β
1891.05	152.2	18.22	6.8 . . . 13	1*n*	β
1897.74	154.7	17.74	. . . 13	1*n*	Barnard
1897.80	153.1	18.04	. . .	1*n*	Lew
1897.98	153.9	17.92	. . .	1*n*	Bow
1898.17	154.5	17.55	. . .	1*n*	A
1898.74	154.7	17.74	. . .	1*n*	Barnard

This very remarkable and interesting binary system was discovered with the 18½-inch. The motion has been rapid, and apparently more than one revolution has already been passed over by the companion. As the components are sensibly equal in magnitude, there is, as in all cases of this kind where the angular motion is rapid and the early measures separated by considerable intervals of time, some uncertainty as to the proper quadrant to be given to some of the measured angles. It is always a difficult pair. The maximum distance probably does not exceed 0″.25.

Two orbits have been computed for this pair, the first by GLASENAPP, using the measures down to 1891.97, giving a period of 16.35 years (A.N. 3119); and the other by SEE from the measures to 1897.19, with a period of 5.5 years (*Mon. Not.* June 1897). To reach the last result, it was necessary to subject some of the measures to corrections of 180° in the angles, which seemed hardly warranted when the observations were considered as a whole. It also required the rejection of the three measures of 1891.97 with the 36-inch refractor. On the whole, from a careful consideration of all the measured positions made, it is practically certain that the period of five and one-half years is not correct, and, furthermore, that in consequence of the non-agreement of some of the measures with any apparent ellipse which can be selected, the real period, even approximately, cannot be known until the companion has moved over a larger arc, and particularly through the first quadrant. It has been well observed during the last two or three years, but even now (1899) the true form of the apparent orbit, for the reasons stated, is somewhat uncertain. It is probable that the period will not be far from that of GLASENAPP, but the other elements may differ very widely.

This star, according to PORTER, has no sensible proper motion.

[β (XIII)...β^2...β (3048,3114)...β (*Pub. L. O.* II)...Sp (III)...Glasenapp (3119)...Comstock (*Pub. Washburn Obsy.* X)...See (*Mon. Not.* LVII, 577) (*Pop. Ast.* V, 245) (*A. J.* 359)...See (3496)...Hussey (*A. J.* 427)...Aitken (3465)...Aitken (*A. J.* 415, 429) (*Proc. A. S. P.* IX, 238)...Barnard (*A. J.* 435)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...Hussey ( )...Aitken ( )...Barnard (*A. J.* 435, 447)...Barnard ( )...]



β 552. *Orionis* II. Lalande 9109

R.A. $4^h\,45^m\,4^s$
Decl. $+13°\,27'$

1874.95	340° ±	0.″5 ±	7	... 7		β
1877.97	360 ±	0.8 ±	7	...10	1*n*	β
1886.19	265.0 ?	0.5 ±		...	1*n*	HΣ
1886.22	....	Single		...	1*n*	HΣ
1889.19	144.7	0.35 ±		...	1*n*	Sp
1890.96	156.7	0.33	6.9	...10.2	3*n*	β
1891.13	153.8	0.3 ±		...	8*n*	Sp
1892.06	Apparently single with 36-inch				2*n*	β
1893.07	165.3	0.35 ±		...	1*n*	Sp
1894.15	178.2	0.38 ±		...	2*n*	Sp
1894.88	177.0	0.40		...	2*n*	Bar
1896.11	179.9	0.35 ±		...	7*n*	Sp

1896.84	187.7	0.43	..	1*n*	Hu
1896.88	186.2	0.40	...	3*n*	A
1897.13	193.5	0.25±	..	2*n*	Sp
1897.82	193.7	0.44	...	5*n*	A
1897.95	193.4	0.43	...	3*n*	Hu
1898.01	189.9	0.45	6.9...10.2	2*n*	Lew
1898.12	197.2	0.43	...	3*n*	A
1898.74	199.1	0.45	...	3*n*	A

This pair was discovered with the 18½-inch in 1877, but in looking over the old observing books used with the 6-inch, I find that on December 14, 1874, this star was noted as "possibly a close pair," and the angle and distance estimated as given above. It seems to have received no further attention with the small telescope, and was discovered independently three years later with the large refractor of the Dearborn Observatory.

There seems to be something singular about the appearance and difficulty of this pair at times with large apertures. It was not noted as difficult at the time of the observation in 1877. In 1890 it was a hard star with the 36-inch, and on two nights in 1892, under favorable conditions, I failed to see it double at all. Since that it has been measured by several observers, and apparently the change is slow in the last five years. As the components are very unequal, there can be no uncertainty about the quadrant. The apparent orbit will probably be very eccentric.

The principal positions are shown on the accompanying diagram.

PORTER finds no evidence of proper motion in the meridian positions. To aid in determining this later I have measured a distant star in the field :

1898.11	212°.7	44".88	...13	3*n*	*β*

[*β* (x)...*β*^c...*β* (3048.3141)...*β* (*Pub. L. O.* II)...Sp (III)...Aitken (*A. J.* 415, 429)...Hussey (*A. J.* 397, 427)...Aitken (3465)...Lewis (*Mem. Not.* LIX, 400)...Aitken ( )...Barnard (*A. J.* 447)...]

β 1187. 5 *Camelopardali*

R.A. 4^h 45^m 14^s
Decl. + 55° 4'

1890.78	245°.2	12".89	5.5...12.8	3*n*	*β*
1898.84	246.0	12.70	5.5...12.2	2*n*	*β*

Discovered with the 36-inch. KRUEGER gives the proper motion of this star 0".018 in the direction of 241°.1. If the small star is fixed in space its distance should decrease annually by this amount.

[*β* (XVII)...*β* (3047)...*β* (*Pub. L. O.* II)...]

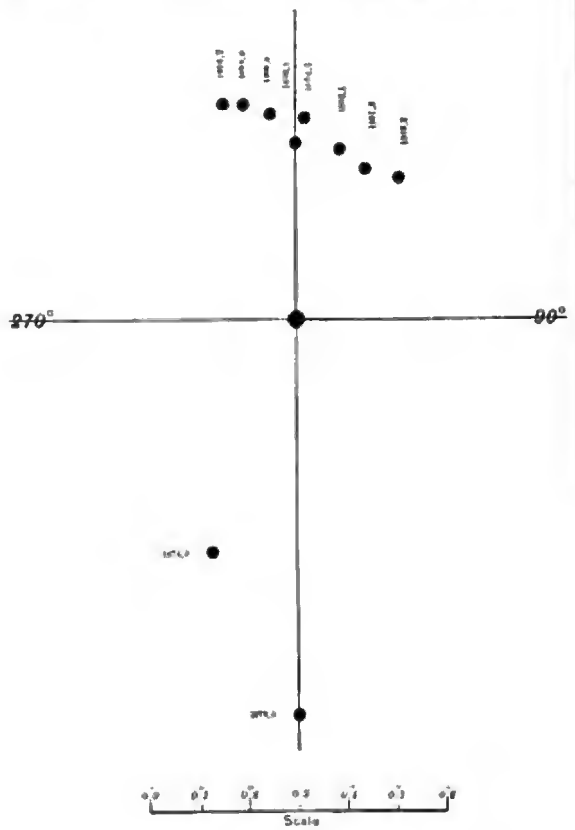
β 748. S.D. (8°) 961

R.A. 4^h 46^m 4^s
Decl. − 8° 3'

1879.68	131°.4	1".03	9.0... 9.0	2*n*	*β*
1891.85	131.1	1.25	8.6... 8.6	2*n*	*β*
1898.73	134.7	1.36	...	1*n*	*β*
1898.93	130.9	1.20	8.0... 8.5	1*n*	Cg

Discovered with the 6-inch on Mt. Hamilton in 1879. There is a small error in the place of this star in *β* (XI). The magnitude in S.D. is 8.6.

[*β* (XI)...*β*^c...*β* (3114)...*β* (*Pub. L. O.* I, II)...Cogshall ( )...]



β 552

β 1237. Lalande 9145

R.A. $4^h\ 46^m\ 28^s$
Decl. $+23°\ 21'$

1891.81	58°.6	4".32	8.0...10.6	2*n*	β
1898.11	58.0	4.52	8.0...11.2	2*n*	A

Discovered with the 36-inch. Evidently fixed.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Aitken ( )...]

β 316. Lalande 9181

R.A. $4^h\ 46^m\ 52^s$
Decl. $-5°\ 29'$

1876.12	178°.4	0".99	8.0... 9.3	2*n*	III
1876.60	176.8	1.18	8.1... 8.2	4*n*	J
1877.95	176.8	...	8.0... 8.0	1*n*	Cin
1879.11	178.0	1.16	8.0... 8.0	1*n*	Cin
1882.11	178.8	1.22	9.0... 9.0	1*n*	W
1886.94	179.9	1.31	...	1*n*	LM
1887.90	179.4	1.10	8.0... 8.0	4*n*	T
1888.15	178.6	1.01	9.0... 9.3	3*n*	III
1888.66	179.2	1.14	8.0... 8.1	3*n*	Lv
1895.90	178.5	...	...	3*n*	Dob

Discovered with the 6-inch. There has been no change in twenty years. In β (VI) the R.A. is 10^m too great. It is 10' *n* of ω *Eridani*.

[β (VI)...β (2062)...Δ (1)...Cin⁴...Cin⁵...Wilson (Cin^m)...LM...Lv⁴...Tarrant (2899)...Hall (I, II)...Doberck (3378)...]

β 313. Lalande 9114

R.A. $4^h\ 49^m\ 12^s$
Decl. $+68°\ 59'$

1874.98	250°±	10"±	6.5...11.5	1*n*	β

The 6-inch seemed to show a small attendant to this star, the position of which was estimated as given above, with the note, "Companion excessively faint. There is a more distant one *sf*." There are no other observations except of a negative character. I could not find any pair of this kind in or near this place with the 36 inch. It was recently examined with the 40-inch (1898), but no near companion seen. This star has two distant companions, 149°.8 : 40".3, and 179°.0 : 43".0. An examination of the original record throws no light on the question. There is no apparent error in the place. The magnitude in D.M. is 7.0.

[β (VI)...β (2062)...]

β 553. o² *Orionis*

R.A. $4^h\ 49^m\ 37^s$
Decl. $+13°\ 19'$

1877.86	47°.7	28".58	5 ...12	2*n*	β
1892.01	48.4	29.97	5.2...13	3*n*	β
1898.75	49.1	30.57	5 ...12.5	2*n*	β

Discovered with the 18½-inch. The proper motion of the principal star is 0".097 in the direction of 241°.9 (AUWERS). This accounts for the change shown in the measures, and it is therefore only an optical pair.

[β (X)...β²...β (3114)...β (*Pub. L. O.* II)...]

β 404. D.M. (8°) 805

R.A. $4^h\ 49^m\ 50^s$
Decl. $+8°\ 58'$

1877.11	111°.8	1".56	9.1... 9.3	4*n*	J
1888.69	291.6	1.52	8.8... 8.9	3*n*	Lv
1891.82	109.6	1.94	8.5... 8.5	2*n*	C
1898.72	111.4	1.72	...	2*n*	Hu

Discovered with the 6-inch. Without motion.

[β (VII)...β (2103)...Δ (1)...Lv¹...Collins (*Proc. Haverford Obsy.* 1891)...Hussey ( )...]

β 1045. 99 *Tauri*

R.A. $4^h\ 50^m\ 32^s$
Decl. $+23°\ 46'$

1889.09	6°.2	6".30	6 ...12.3	3*n*	β
1891.84	5.6	6.21	6 ...13.3	3*n*	β
1898.96	6.4	6.19	...13.7	1*n*	β

Discovered with the 36-inch. AUWERS gives this star a small proper motion, 0".021 in the direction of 238°.4. Further measures are necessary to show whether or not the companion has this movement.

[β (XV)...β (2929,3114)...β (*Pub. L. O.* II)...]

β 554. ε *Aurigae*

R.A. $4^h\ 53^m\ 22^s$
Decl. $+43°\ 39'$

A and B

1878.89	224°.5	29".31	3.2...14	1*n*	β
1891.86	224.8	29.30	...13.2	2*n*	β
1898.79	223.8	29.93	...13.5	1*n*	β

A and C

1878.42	275°.4	42".88	...12	1*n*	β
1878.97	275.3	42.91	...11.7	4*n*	β
1891.86	275.0	43.03	...11.7	2*n*	β
1898.79	275.0	43.03	...11.8	1*n*	β

A and D

1878.80	317°.9	...	...13	1*n*	β
1879.47	317.1	46.37	...12	2*n*	β
1891.86	317.0	46.29	...12.6	2*n*	β
1898.79	317.3	46.21	...13.0	1*n*	β

These minute stars were noted with the 18½-inch. The proper motion is very small, 0".022 in the direction of 231°.1 (BONN). The same catalogue gives the principal star as variable, 3.0 to 4.5 m. BALL in his parallax measures (*Dunsink Obsns.* IV) used a star 207".6 distant in the angle of 47°.3.

[β (X)...β^2...β (3114)...β (*Pub. L. O.* II)...]

β 314. *Leporis* 3

R.A. $4^h\ 53^m\ 39^s$
Decl. $-16°\ 34'$

A and B

1876.69	149°.9	0".43	6.6... 6.9	4*n*	⊿
1879.10	330.7	...	6.0... 7.0	1*n*	Cin
1879.78	331.9	0.5+	...	1*n*	Cin
1889.13	326.9	1.05	6.5... 8.3	3*n*	β
1890.40	321.6	0.82	...	2*n*	Sp
1898.11	326.2	0.86	7.0...10	1*n*	Br
1898.16	329.2	0.98	..	1*n*	See

AB and C

1889.13	29.0	54.45	.. 8.2	2*n*	β
1898.16	30.6	54.83	...	1*n*	See
1899.09	31.1	54.22	.. 9.0	1*n*	β

Discovered with the 6-inch. In HEIS and ARGELANDER 6 m, but placed in *Eridanus*. GOULD gives it in *Lepus* 6 m. LALANDE 9420. In all but one measure ⊿ rates the components of equal magnitude. The change, if any, is in the distance. At the time of discovery the distance was estimated 0".5.

[β (VI)...β (2062,2929)...β (*Pub. L. O.* II)...⊿ (I)...Cin^3... Cin^6...Sp (III)...See ( )...Brown ( )...]

β 1238. Lalande 9373

R.A. $4^h\ 53^m\ 53^s$
Decl. $+26°\ 21'$

1891.82	12°.6	1".42	8.1...11.3	3*n*	β
1899.11	7.0	1.57	7.0...11.0	1*n*	A

Discovered with the 36-inch. It is 25° *p* and 9' *s* of the wide pair, SOUTH 461.

[β (XVIII)...β (3113)...β (*Pub. L.O.* II)...Aitken ( )...]

β 315. O. Arg. N. 5402

R.A. $4^h\ 53^m\ 54^s$
Decl. $+49°\ 22'$

1877.35	226°.0	10".45	9.0...11.0	2*n*	⊿
1891.86	226.0	10.67	8.7 .. 9.4	2*n*	β

Discovered with the 6-inch. Unchanged.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...⊿ (I)...]

β 1046. 9 *Aurigae*

R.A. $4^h\ 57^m\ 17^s$
Decl. $+51°\ 26'$

A and B

1888.92	93°.8	6".29	5.5 ...12.7	3*n*	β
1898.79	92.0	6.38	..13.0	1*n*	β

A and C (= H^3 VI. 35)

1783.30	62°.2	79".50	...	1*n*	H^3
1858.19	61.0	90.10	5.1... 9.7	2*n*	Eng
1888.92	60.8	89.92	... 9.0	2*n*	β
1898.79	60.9	89.85	... 8.7	1*n*	β

The faint star, B, was detected with the 36-inch. The principal star, according to AUWERS, has a proper motion of 0".169 in the direction of 190°.5.

With this movement and the positions of 1888, at the time of HERSCHEL's measure in 1783, C should have been 70°.8 : 79".8. All the measures of AC are given above. It is practically certain that the new star is moving with A, as otherwise the position-angle would be 14° less in 1898 than at the date of the first measures.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Engelhardt (*Obsns. Astr.* Part 2)...]

β 884. Lalande 9534

R.A. $4^h\ 57^m\ 22^s$ /
Decl. $-12°\ 36'$ \

1879.09	19°.0	0".54	8.0... 8.0	2*n*	β
1891.15	20.7	0.6±	...	3*n*	Sp
1892.04	20.7	0.54	8.4... 8.5	3*n*	β
1896.11	21.1	0.6±	...	4*n*	Sp

Discovered with the 18½-inch. The measures furnish no evidence of motion.

[β (XIII)...β²...β (3114)...β (*Pub. L. O.* II)...Sp (III)...]

β 749. D.M. (55°) 958

R.A. $4^h\ 57^m\ 37^s$ /
Decl. $+55°\ 22'$ \

1879.73	225°.9	0".91	7.9...10.0	2*n*	β
1891.86	228.9	1.11	8.1... 8.9	2*n*	β

Discovered with the 6-inch on Mt. Hamilton in 1879. No material change.

[β (XI)...β²...β (3114)...β (*Pub. L. O.* I, II)...]

β 750. γ *Caeli*

R.A. $5^h\ 0^m\ 5^s$ /
Decl. $-35°\ 39'$ \

1853.50	315°.7	2".82	5.6... 9.0	5*n*	Ja
1855.13	318.6	...	4½... 9½	2*n*	Pow
1882.19	318.4	2.23	...	1*n*	Rus
1891.08	311.2	3.12	...	1*n*	Sel
1892.01	316.0	2.69	4.5... 8.7	3*n*	β
1894.08	307.7	2.34	4 ...10	1*n*	Sel
1897.09	313.4	3.17	5.7...10.5	2*n*	See

Discovered with the 6-inch on Mt. Hamilton in 1879, but it had been previously found by JACOB. The components are relatively fixed.

[Jacob (*Madras Obsns.* 1848-52)...Powell (*Mem. R. A. S.* (XXV)...β (XI)...β²...β (3114)...β (*Pub. L. O.* I, II)...Russell (*Syd. Obsns.* 1871-81)...Sellors (3154,3393)...See (3495)...]

β 751. D.M. (42°) 1184

R.A. $5^h\ 1^m\ 16^s$ /
Decl. $+42°\ 31'$ \

1891.85	258°.0	3".07	8.4...10.0	3*n*	β
1898.87	255.9	3.48	...	1*n*	Hu
1898.97	257.0	3.25	8.2...10.6	2*n*	β

Discovered with the 6-inch on Mt. Hamilton in 1879. Without change. A star 11.7 m. 204°.3 : 24".42 (1899.09) 1*n*.

[β (XI)...β²...β (3114)...β (*Pub. L. O.* I, II)...Hussey ( )...]

β 1047. *Aurigae* 47

R.A. $5^h\ 2^m\ 13^s$ /
Decl. $+27°\ 53'$ \

B and C

1889.09	75°.3	0".44	8.7... 9.2	3*n*	β
1890.78	58.2	0.24±	...	6*n*	Sp
1892.12	68.3	0.26	8.7... 8.8	3*n*	β
1896.11	50.3	0.21	...	1*n*	L

A and BC (= Σ 645)

1829.90	26°.8	11".71	6.2... 8.2	3*n*	Σ
1866.14	27.0	11.79	5.8... 8.0	3*n*	⊿
1889.09	26.6	11.69	7.2...	3*n*	β
1890.78	27.3	11.82	...	6*n*	Sp
1892.11	27.4	11.75	6.5...	3*n*	β

The duplicity of the smaller component of Σ645 was discovered with the 36-inch. It appears to be in rapid motion. The wide pair was first observed by HERSCHEL in 1782 (= H' III. 90). These stars are relatively fixed. A few of the measures are given above. The principal star is Lalande 9653.

[β (XV)...β (2929,3131)...β (*Pub. L. O.* II)...Sp (III)...Lewis (*Mon. Not.* LIX, 300)...]

The following references include all the measures of the wide pair:

[Herschel (*Mem. R. A. S* XXXV, XXXVIII)...Madler (*Fixstern-Systeme* I)...Secchi (*Cat. 1321 Double Stars*)...(*Radcliffe Obsns.* XXIV)...⊿ (1201)...⊿ (I, II)...Glasenapp (II)...]

β 885. Lalande 9758

R.A. $5^h\ 4^m\ 53^s$
Decl. $-\ 1^\circ\ 55'$

1880.80	196.1	0.71	8.3 . . . 8.4	3*n*	β
1888.92	190.7	0.65	8.0 . . . 8.6	2*n*	Lv
1892.13	186.5	0.72	8.0 . . 9.0	1*n*	C
1898.11	194.8	0.69	. . .	1*n*	Br

Discovered with the 18½-inch. Probably unchanged.

[β (XIII) . . . β^3 . . . Lv^1 . . . Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) . . . Brown ( ) . . .]

β 1006. S.D. (2°) 1169

R.A. $5^h\ 6^m\ 17^s$
Decl. $-\ 2^\circ\ 21'$

A and B

1882.00	201.7	0.78	9.6 . . . 11.0	2*n*	β
1891.93	203.5	0.66	8.5 . . . 9.0	2*n*	β

A and C

1882.00	177.8	52.29	. . . 9.7	2*n*	β
1891.93	178.2	52.40	. . . 8.7	2*n*	β
1899.09	177.8	52.37	. . . 8.9	2*n*	β

Discovered with the 12-inch on Mt. Hamilton in 1881.

[β (XIII) . . . β^3 . . . β (3114) . . . β (*Pub. L. O.* II) . . .]

β 555. β *Orionis*

R.A. $5^h\ 8^m\ 47^s$
Decl. $-\ 8^\circ\ 20'$

B and C

1871.90	B elongated in direction of A (100°)			β
1876.20	B elongated in 170°–180°			Sadler
1878.14	172.8	0.35	2*n*	β
1878.80	55.±	0.25 ±	2*n*	Russell
1879.68	125.9	. . .	5*n*	β
1879.76	158.7	0.4 ±	1*n*	Cin
1880.82	Doubtful with 18½-inch			β
1880.17	Single		2*n*	Sp
1882.21	Single		2*n*	Sp
1884.14	178.0	. . .	3*n*	Henry
1887	Always single			Tarrant
1889.09	Round with 36-inch			β
1890.83	Single with 2600, 36-inch		3*n*	β
1891.73	Single with all powers, 36-inch			β
1892.88	Single 36-inch			Barnard
1898.87	178.0	0.16	3*n*	Aitken
1898.88	178.4	0.12 ±	1*n*	Hussey
1899.17	196.2	0.12	1*n*	Aitken

A and B (= Σ 668)

1831.53	199.8	9.14	1.0 . . . 8.0	3*n*	Σ
1845.94	199.1	9.39	. . .	4*n*	Ma
1852.20	199.4	9.69	. . .	4*n*	Ma
1865.33	201.1	9.47	. 7.8	5*n*	J
1876.91	201.3	9.32	. . .	6*n*	Sp
1881.05	202.0	9.31	. . .	4*n*	Jed
1888.13	202.1	9.74	. . .	4*n*	Hl
1898.89	201.7	9.62	. . .	2*n*	A
1898.92	201.4	9.55	. . .	2*n*	β

A and D

1878.82	1.5	44.48	. . . 12.5	2*n*	β
1892.07	1.4	44.44	. . . 13.5	2*n*	β
1898.83	1.3	44.10	. . . 13.5	3*n*	β

In 1871, while examining Rigel with the 6-inch, I suspected an elongation of the companion, and called the attention of observers with larger instruments to this star. In 1878 I examined it very carefully with the 18½-inch, and saw and measured what I felt certain was a real and measurable elongation of the small star. The measured distances were noted at the time as being too large. When on Mt. Hamilton with the 6-inch, in 1879, I again measured the position angle, and regarded the elongation as not due to atmospheric causes. This star was scrutinized with the 18½-inch at Chicago a number of times from 1880 to 1882, but at all times it appeared either round or very doubtful. In 1889 and 1890 it was certainly single with the 36-inch with the highest powers under the very best conditions. If the distance had been as much as 0".05, it would have been noticed on some of these occasions with the large refractor. There are some other observations which tend to confirm the theory of duplicity. RUSSELL speaks of it as being divided at times with the SYDNEY refractor of 11

inches, although the distance was estimated as a quarter of a second. This would seem to be impossible for any ordinary telescope of that aperture, although with such a distance it should be plainly elongated. It is evident that one or the other of the measures of 1878 must be erroneous. STONE noted it as "pear-shaped" with the Cincinnati 11-inch refractor in 1879. The Paris measures by HENRY with the 15 inch I get at secondhand, as I have not seen the original observations in print. The angle agrees well enough with the previous measures. One of two conclusions seems obvious: Either this star is not double at all, the elongation supposed to be seen on the different occasions mentioned being due to atmospheric or other causes; or, if double, it must be moving with great rapidity. The negative results can be explained in no other way. I dislike to believe that I have been deceived by any spurious elongation of the small star, as this would be the first time such a mistake has happened in my experience in double-star observations; but certainly my subsequent failures to see this star double would tend to that conclusion. It should be carefully examined each year, because if it is really double, it cannot remain apparently single very long. On no occasion has the bright star presented an unusual appearance; and when B was seen double, other small stars in the vicinity were examined, and they were all apparently round.

There has been no change in the position of B with reference to A. It has been frequently measured by most of the double-star observers. Enough measures are given above to show relative fixity.

The faint star *C* was first mentioned by MITCHELL in 1846. The foregoing measures are all that have ever been made of this star.

[Since the foregoing was written I have received the recent measures of AITKEN and HUSSEY made with the great refractor at Mt. Hamilton. There is no longer any doubt of the duplicity of this star. It is equally certain that the period will be very short—perhaps shorter than that of any known system.]

AUWERS gives the proper motion of Rigel 0".018 in the direction of 293°.2. This movement would not affect the distance of the Herschel companion, but would decrease the angle 7°.6 between the measures of Σ and those of 1898. It is therefore practically certain that A and BC form a physical system.

The following references relate to the duplicity of B:

β (x)...β (*Eng. Mech.* Feb. 9, 1872) (*Mon. Not.* XXXVIII, 476)...β^2...β^3...β (2929,3048,3114)...Sadler (*Eng. Mech.* Feb. 4, 1887)...Russell (*Pub. Sydney Obs.* 1871–81) (*Observatory* II, 374)...Cin^6...Tarrant (2898)...Sp (II)... Aitken and Hussey ( )...]

There are many measures of the old pair (= H^4 II. 33 = Sh 53 = Σ 668) in addition to those given above. They will be found in the references given for BC in the original catalogues of H^4, Sh, and Σ, and in the following:

[Herschel II (*Mem. R. A. S.* V, VIII)...Madler (*Fixstern Systeme* I) (*Dorpat Obsns.* XI, XII, XIII, XV)...Dawes (*Mem. R. A. S.* VIII)...Secchi (*Cat. di 1321 Stelle Doppie*) (*Third Series of Measures*, 1855)...Lassell (1858)...Wrottesley (*Mem. R. A. S.* XXIX)...Fletcher (*Mem. R. A. S.* XXIII)...Wilson and Seabroke (*Mem. R. A. S.* XLII, XLIII)...Gledhill (*Mem. R. A. S.* XLII)...Knott (*Mem. R. A. S.* XLIII)...*Radcliffe Obsns.* XXII...J (1185,1735)...J (1, II)...Doberck (2106,2899) (*Trans. R. I. Acad.* XXIX, Part 13)...Lassell (*Mon. Not.* XIII, 183)...Winnecke (*Ast. Beob. Sternwarte zu Berlin*, V)... Mitchell (*Sid. Mess.* May 1847)...Cin^4...Cin^5...Cin^6...Sp (II)...Jedrzejewicz (2449)...Maw (*Mem. R. A. S.* L, 75)... Hall (II)...Glasenapp II)...]

β 317. Lalande 9852

R.A. 5^h 8^m 54^s
Decl. −23° 8'

1876.05	12°.4	9".16	7.5...11.0	1*n*	Cin
1877.11	11.6	8.06	7.5...10.0	1*n*	Cin
1891.87	11.8	8.53	7.4...10.1	3*n*	β
1898.14	11.3	8.95	...	1*n*	See

Discovered with the 6-inch. Evidently fixed. SEE measures a distant star 46°.5 : 18".75 (1898.14) 1*n*.

[β (VI)...β (2062,3114)..β (*Pub. L. O.* II)...Cin^3...Cin^4... See ( )...]

β 885½. Lalande 9823

R.A. 5^h 10^m 0^s
Decl. +37° 30'

1880.21	69°.3	2".31	7.5... 9.5	6*n*	β
1898.87	69.3	2.30	...	1*n*	Hu
1899.05	67.2	2.50	8.2...10.5	1*n*	β

Discovered with the 18½-inch.

[β (XIII)...β^2...Hussey ( )...]

β 318. Lalande 9873

R.A. $5^h\ 10^m\ 15^s$ }
Decl. $-\ 3°\ 37'$ }

1876.23	227°.2	0".66	8.3	8.7	3*n*	J
1878.61	226.6	...	8.2	8.5	2*n*	Cin
1883.13	226.2	0.55	8.5	8.7	1*n*	Sp
1886.11	227.3	0.48	8.0	8.0	1*n*	LM
1898.11	238.5	0.57	...		1*n*	Br
1898.78	234.2	0.64	8.0	8.0	3*n*	A
1898.93	229.9	0.78	8.5	8.5	2*n*	Cg

Discovered with the 6-inch. There seems to be no sensible change.

[β (VI)... (2062)...J (I)...Cin³...LM...Sp (III)...Brown ( )...Aitken ( )...Cogshall ( )...]

β 188. τ *Orionis*

R.A. $5^h\ 11^m\ 47^s$ }
Decl. $-\ 6°\ 58'$ }

B and C

1876.22	49°.1	3".77	11	...12	2*n*	Hl
1878.26	50.8	4.10	11	...13	4*n*	β
1891.94	51.4	3.79	11	...11.6	3*n*	β

A and B (= H^3 V. 25)

1830	250°.4	18".±	4	...14	1*n*	H^3
1868.08	248.3	31.28		...	1*n*	Hd
1876.22	250.1	36.01		...11	2*n*	Hl
1877.95	249.1	36.20		...	1*n*	β
1891.94	249.2	35.27		...	3*n*	β
1899.02	250.3	35.01		...	1*n*	β

A and D (= H 2259)

1830	63°.8	18".±	...12	1*n*	H^3
1868.08	60.8	36.03	...12	1*n*	Hd
1876.22	59.8	35.99	...12	2*n*	Hl
1877.95	60.0	36.09	...12	1*n*	β
1891.94	60.0	35.97	...10.7	3*n*	β
1899.02	60.0	36.02	...	1*n*	β

The attendant to the H^3 companion was discovered with the 18½-inch. H^3 failed to see D, which was added by H^3 (*Fifth Catalogue*). The above are all the measures of these stars.

AUWERS gives the proper motion of the principal star 0".035 in the direction of 290°.1.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...$β^1$...$β^3$...β (3114)... β (*Pub. L. O.* II)...*Annals Harvard Coll. Obsy.* XIII... Herschel (*Mem. R. A. S.* VI)...Hall (I)...]

β 886. D.M. (33°) 1020

R.A. $5^h\ 14^m\ 24^s$ }
Decl. $+\ 33°\ 41'$ }

C and D

1882.22	246°.9	0".90	8.5	10.0	1*n*	β
1892.07	253.8	0.77	9.1	9.6	3*n*	β
1898.19	258.2	0.82	...		2*n*	Lew

A and B (= Σ 687)

1829.24	67°.6	17".17	8.2	9.0	2*n*	Σ
1844.26	68.6	16 61	...		1*n*	Ma
1867.22	68.7	17.20	8.0	9.0	3*n*	J
1882.23	68.5	17.51	8.5	8.6	3*n*	β
1892.06	67.9	17.30	8.1	8.6	2*n*	β
1898.19	68.9	17.57	...		2*n*	Lew

A and C (= Σ 687)

1829.24	153°.5	48".73	...	9.2	2*n*	Σ
1867.22	153.6	48.78	...	8.9	3*n*	J
1882.24	153.2	48.48	...	8.8	2*n*	β
1892.06	153.9	48.53	...		2*n*	β

The duplicity of the distant Σ companion was discovered with the 18½-inch. There is no change in the wide triple. The above are all the measures of AB and AC. The measures indicate some change in CD.

[β (XIII)...$β^3$...β (3141)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...Madler (*Fixstern-Systeme* I) (*Derpat Obsns.* XIII)...J (II)...]

β 887. D.M. (33°) 1026

R.A. $5^h\ 14^m\ 33^s$ }
Decl. $+\ 33°\ 18'$ }

A and B

1882.22	194°.3	1".00	9.0	10.5	2*n*	β
1891.90	192.0	0.96	8.9	9.7	3*n*	β
1898.25	198.0	0.91	...		1*n*	L.
1898.84	189.4	0.87	9.0	10.5	1*n*	β
1898.89	193.6	1.10	...		1*n*	Bar

A and C

1898.84	112.8	9.54	...13.5	1*n*	β

A and D

1882.24	332.8	10.56	...12	3*n*	β
1891.90	332.1	10.66	...11.8	3*n*	β
1898.24	335.2	10.55	...	1*n*	L
1898.84	332.0	10.47	...13.2	1*n*	β

A and E

1898.84	201.6	14.80	...13.5	1*n*	β

Discovered with the 18½-inch. The two faint stars were added with the 36-inch.

[β (XIII)...β^1...β (3113)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...Barnard ( )...]

β 189. *Orionis* 81

R.A. $5^h\ 14^m\ 33^s$
Decl. $-\ 5°\ 28'$

1875.86	283.6	4.27	6.8...11.5	3*n*	J
1891.92	286.5	4.09	6.9...10.2	3*n*	β
1898.92	286.8	4.40	7.2...11.0	3*n*	Bd

Discovered with the 6-inch. The change, if any, is small. Lalande 10023.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3114)...β (*Pub. L. O.* II)...J (I)...Boothroyd ( )...]

β 190. *Orionis* 82

R.A. $5^h\ 14^m\ 38^s$
Decl. $-\ 8°\ 9'$

A and B

1876.15	355.3	0.71	7.9... 8.7	4*n*	J
1877.97	360.7	...	8.0... 8.5	1*n*	Cin
1879.88	363.8	0.53	8.0... 8.0	4*n*	β
1887.98	363.7	0 60	7.9... 8.7	3*n*	T
1890.98	358.5	0.54	8.0... 8.1	3*n*	β
1898.86	356.4	0.64	8.0... 8.5	2*n*	A

AB and C (= Σ 692)

1783.73	7.7	29.30	...	1*n*	H^1
1825.05	6.8	35.68	8 ...10	2*n*	S
1831.48	4.2	34.86	7.8... 8.8	3*n*	Σ
1863.10	3.9	35.62	...	4*n*	En
1867.64	3.9	34.84	7.3... 8.0	3*n*	J
1890.99	3.9	34.90	... 8.7	2*n*	β
1898.86	3.7	34.98	... 8.0	2*n*	A

The close pair was discovered with the 6-inch. Evidently there is no change in the wide pair (= H^1 IV. 87 = S 475 = Σ 692). All the measures are given above. The principal star is Lalande 10029.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β^2...β^3...β (3048)...β (*Pub. L. O.* II)...J (II, p. 121)...Cin^4...Tarrant (2899)...Aitken ( )...Engelmann (*Mess. Neunzig Doppelsternen*, 1805)...]

β 888. σ *Aurigae*

R.A. $5^h\ 16^m\ 30^s$
Decl. $+\ 37°\ 16'$

A and B

1880.14	171.0	7.91	6.0...12.0	4*n*	β
1890.97	167.1	8.60	6.0...13.2	3*n*	β
1898.82	166.3	8.65	...12.5	4*n*	β

A and C

1898.87	330.5	27.24	...14.2	2*n*	β

C and D

1898.96	348.1	4.4	15 ...16	1*n*	β

Discovered with the 18½-inch. The proper motion of this star is 0".027 in the direction of 272°.1 (AUWERS). The interval covered by the measures is too short to tell with certainty whether the companion is moving with it. The faint stars, C and D, were noted with the 40-inch.

[β (XIII)...β^1...β (*Observatory*, III, 451)...β (*Pub. L. O.* II)...β (3048)...]

β 191. D.M. (34°) 1033

R.A. $5^h\ 17^m\ 19^s$
Decl. $+\ 34°\ 27'$

1875.94	24.8	3.24	10.1...10.4	4*n*	J
1891.85	24.5	3.40	9.1... 9.1	2*n*	β

Discovered with the 18½-inch. Unchanged. In D.M. 8.9 m. The 36-inch shows a 13 m star, 144°.4 : 16".7.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3114)...β (*Pub. L. O.* II)...J (I)...]

β 556. Lalande 10159

R.A. $5^h\ 18^m\ 39^s$
Decl. $-\ 2°\ 36'$

1878.17	242.2	0.76	7 ...12	2*n*	β
1891.85	239.2	0.89	7.0...11.3	3*n*	β
1898.76	238.0	1.18	7.0...10.0	1*n*	β

Discovered with the 18½-inch. It is a bright star near η *Orionis*, and wanting in many of the star catalogues. In Lalande and S.D. 8 m.

[β (IX)...β^2...β^3...β (3114)...β (*Pub. L. O.* II)...]

β 889. W³ V. 518

R.A. $5^h\ 20^m\ 10^s$
Decl. $+\ 34°\ 19'$

A and B

1878.91	223.5	1.11	8.5...10.0	1*n*	β
1891.95	223.7	0.80	8.4... 8.8	3*n*	β
1898.86	229.1	0.85	8.3... 9.0	1*n*	β
1898.87	227.4	1.04	...	2*n*	Bar

A and C

1891.95	102.6	3.76	...14.1	3*n*	β
1898.85	108.0	4.09	...	1*n*	Bar

A and D

1891.95	108.0	12.04	...13.8	3*n*	β
1898.86	105.3	11.65	...13.5	1*n*	β

A and E (= Σ 707)

1830.75	131.6	18.29	8.0...10.2	2*n*	Σ
1844.26	134.7	17.61	...	1*n*	Ma
1873.17	131.0	18.02	8.5...10.0	2*n*	J
1878.91	131.4	18.04	...10.0	1*n*	β
1891.95	133.3	18.22	... 9.4	3*n*	β
1898.86	132.0	18.26	...10.0	1*n*	β

A and F

1878.91	200.7	27.77	...11.5	1*n*	β
1891.90	200.2	27.85	...10.1	2*n*	β
1898.86	200.3	27.84	...11.0	1*n*	β

The duplicity of the principal star of Σ 707 was discovered with the 18½-inch, and the very faint companions, C and D, added with the 36-inch. The Σ components are fixed. The above are all the measures.

[β (XIII)...β^3...β (*Mon. Not.* XXXIV, 392)...β (3114)...β (*Pub. L. O.* II)...Barnard ( )...J (1979)...J (II)...Madler (*Fixstern-Systeme* I) (*Dorpat Obsn.* XI)...]

β 890. Lalande 10175

R.A. $5^h\ 20^m\ 49^s$
Decl. $+\ 37°\ 41'$

1880.14	286.6	1.17	8.4... 8.8	3*n*	β
1891.89	285.3	1.08	8.6... 8.7	2*n*	β

Discovered with the 18½-inch. Thus far there is no evidence of motion.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...]

β 319. O. Arg. S. 3957

R.A. $5^h\ 21^m\ 15^s$
Decl. $-\ 20°\ 49'$

1876.09	231.3	3.98	8.0...11	3*n*	Hl
1877.11	228.1	3.80	7.7...10.0	2*n*	Cin
1879.13	226.6	3.72	7.8...11.5	1*n*	β
1891.06	229.7	4.29	...	2*n*	Hl
1898.14	227.7	4.26	...	1*n*	See

Discovered with the 6-inch. It is near β *Leporis*. The change, if any, is small.

[β (VI)...β (2062)...β^3...Cin⁴...Hall (I, II)...See ( )...]

β 891. W³ V. 615

R.A. $5^h\ 22^m\ 48^s$
Decl. $+\ 18°\ 19'$

A and B

1879.10	121.6	9.89	7.0...13	1*n*	β
1891.98	126.7	10.66	8.0...12.5	3*n*	β
1898.85	122.2	10.66	7.5...12.7	2*n*	β

A and C (= H 3275)

1875.31	20.6	52.86	7.2... 7.7	3*n*	J
1879.63	22.0	52.82	7.5... 7.5	2*n*	β
1891.98	21.0	53.10	8.0... 8.1	3*n*	β
1892.56	21.0	53.27	7.4... 7.8	4*n*	Fr
1898.45	20.7	53.54	... 7.6	2*n*	β

The small star was detected with the 18½-inch. H has no measure of AC. The wide pair is also OΣ (App) 64. The foregoing are all the measures. C is W³ V. 617. The distance between A and C is slowly increasing. The meridian positions for 1825 make the distance 51".0 at that time.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...J (I, p. 246)...Franz (3404)...]

β 320. β *Leporis*

R.A. $5^h\ 23^m\ 6^s$
Decl. $-20^\circ\ 51'$

A and B

	°	″				
1875.09	267.7	2.89	3	...11.0	1*n*	J
1876.07	280.0	2.78		...10.0	2*n*	J
1876.96	290.7	2.98		...11.0	4*n*	J
1877.33	283.1	2.80		... 8.6	4*n*	Cin
1877.46	282.5	3.12		...11.0	7*n*	Hl
1877.76	294.4	3.01		...10.8	3*n*	J
1878.10	283.6	2.63		...	5*n*	Rus
1878.35	293.1	3.07		...10.8	3*n*	J
1879.10	289.3	2.74		... 9.0	1*n*	Cin
1879.18	285.0	2.88		...	8*n*	Sp
1879.47	284.6	2.54		...10.9	7*n*	β
1879.77	286.3	2.57		... 7.8	1*n*	Cin
1879.98	281.3	3.05		...	2*n*	Hl
1880.10	282.8	2.85		...	2*n*	Hl
1880.56	287.8	2.72		...	2*n*	Pt
1882.10	282.4	2.70		...	3*n*	Hl
1882.68	287.0	3.03		...	8*n*	Sp
1889.02	292.5	2.79		...10.0	3*n*	T
1889.06	293.0	2.83		... 9.0	1*n*	Lv
1891.12	282.1	2.89		...	2*n*	Hl
1897.78	288.5	3.05		...	2*n*	See
1898.12	295.7	2.72		...10.5	3*n*	A

A and C (= H 3761)

		″			
1835.90	145.9	70±	...13	1*n*	H
1898.94	146.3	65.58	...11.5	2*n*	β

The close star was discovered with the 6-inch. The measures are not wanting, but are not as accordant, especially in the angles, as might be expected in an easy pair of this class. The apparent change in the position-angle shown by the earlier measures made the companion appear to have rapid direct motion, but the subsequent measures show that the change, if any, is very slow.

Auwers gives the proper motion of β *Leporis* 0″.0817 in the direction of 194°.9. The interval covered by the measures is sufficient to establish the common proper motion of the two components. Assuming 285°: 2″.88 for the position of the companion in 1876.5, its place, if fixed in space, should be 317°: 3″.4 for 1898.5. It is certain that no such relative change has taken place.

Two distant stars are:

	°	′			
1879.88	75.0	206.36	...10	1*n*	β
1879.88	57.6	241.53	...10	1*n*	β

[β (VI)...β (2020,2062)...β^2...β^3...Δ (1)...Δ (2105)...Hall (2295,2430) (I, II) (*Wash. Obsns.* 1880, 1882)...Cin^6... Cin^5...Cin^4...Pritchett (*Pub. Morrison Obsy.* No. 1)... Russell (*Sidney Obsns.* 1871-81)...Lv^4...Tarrant (2091) ...Sp (II)...Sp (2133)...See (3405)...Aitkin ( )...]

β 557. Lalande 10311

R.A. $5^h\ 23^m\ 16^s$
Decl. $+\ 3^\circ\ 3'$

B and C

	°	″				
1878.16	142.4	0.46	9.5...	9.5	2*n*	β
1890.80	153.2	0.3±	...		6*n*	Sp
1890.90	147.3	0.36	9.0...	9.0	3*n*	β
1895.46	152.2	0.4±	...		3*n*	Sp
1898.98	151.8	0.42	9.0...	9.0	1*n*	A

A and BC (= Σ 721)

	°	″				
1783.72	152.4	20.05	...		1*n*	H I
1823.14	152.7	24.73	7 ...	9	1*n*	Sh
1830.18	150.9	24.21	7.0...	9.0	2*n*	Σ
1847.07	150.7	...	...		1*n*	Ma
1863.14	151.2	23.99	7.0...	9.0	5*n*	En
1868.65	149.7	24.57	7.0...	8.9	4*n*	J
1878.15	149.8	24.32	...		1*n*	β
1890.88	149.4	24.72	...		3*n*	Sp
1890.91	149.8	24.61	7.6...		2*n*	β
1893.12	148.8	24.49	6.8...	8.7	2*n*	Gl
1898.93	149.3	24.68	7.0...		2*n*	A

The close pair was discovered with the 18½-inch. All the measures of the wide pair (= 11^s IV. 45 = Sh 57 = Σ 721) are given. It is evidently unchanged.

[β (8)...β^1...β (3048)...β (*Pub. L. O.* II)...Sp (III)... Auken ( )...Madler (*Fixstern Systeme*, II)...Engelmann (*Mess. Neunzig Doppelsternen*, 1805)... Glasenapp (II)...]

β 1239. D.M. (34°) 1074

R.A. 5h 23m 28s
Decl. + 34° 11′

B and D

	°	″			
1891.77	324.6	2.31	...15.2	2*n*	β

A and B (= H 367)

	°	″			
1873.77	239.2	7.1	...	1*n*	Rosse
1891.77	233.8	8.00	9.5... 9.9	3*n*	β
1899.11	232.3	8.18	9.5...10.5	1*n*	A

A and C (= H 367)

	°	″			
1873.77	310.5	9.7	...	1*n*	Rosse
1891.77	310.1	10.53	...11.2	3*n*	β
1899.11	308.5	9.88	...11.0	1*n*	A

HERSCHEL's description of the wide triple is: "One of the most curious objects in the heavens. It is a triple star forming an equilateral triangle, and placed exactly in the center of a small circular nebula, which extends a little beyond the stars on all sides, surrounding them like an atmosphere." The second star of this triangle, in order of magnitude, was found to be double with the 36-inch. The small star is extremely faint. The only previous measures of the HERSCHEL stars which I have been able to find were made with one of the reflectors of Lord Rosse's Observatory. They are evidently only approximate, and no change can be inferred from the differences in distance. The 36-inch shows another faint star 14 m, 13″.6 from A in the direction of 18°.7. AITKEN, 16°.8 : 14″.76 (1899.11) 1*n*.

[β (XVIII)...β (*Mon. Not.* LII, 454)...β (3141)...β (*Pub. L. O.* II, pp. 178, 224)...]

β 558. δ *Orionis*

R.A. 5h 25m 52s
Decl. — 0° 23′

A and B

	°	″			
1878.46	226.9	33.27	2.0...13.5	4*n*	β
1892.06	226.8	32.40	...14	3*n*	β
1898.84	226.5	32.35	...13.7	2*n*	β

A and C (= H' V. 10)

	°	″			
1781.90	358.2	52.97	...	1*n*	H'
1835.75	359.2	52.74	... 6.8	5*n*	Σ
1863.05	359.2	52.48	...	5*n*	En
1870.05	359.3	52.49	... 6.7	5*n*	J
1879.08	360.3	52.62	...	2*n*	β
1898.84	359.3	52.56	...	2*n*	β

The faint companion was detected with the 18½-inch. The proper motion of δ *Orionis* is 0″.022 in the direction of 288°.4 (AUWERS). With this value, and the position of C from the measures of Σ, that companion, if fixed in space, should be in 1898.8, 360°.6 : 52″.3. As a wide pair this is H' V. 10 = Sh 60 = Σ 14 App 1.

[β (X)...β'...β'...β (3141)...β (*Pub. L. O.* II)...J (II)... (*Radcliffe Obsns.* Vols. 23, 31, 38, 39)...Secchi (*Cat. di 1321 Stelle Doppie*) (*First Series of Measures, Obsy. Coll. Rome*, 1855)...Engelmann (*Mess. Neunzig Doppelsternen*, 1865)...Jedrzejewicz (2329)...Glasenapp (II)...]

β 1048. Lalande 10437

R.A. 5h 26m 37s
Decl. — 1° 41′

	°	″			
1889.13	358.2	2.20	6.2...10.7	3*n*	β
1898.20	354.6	2.22	6.0...10.8	3*n*	A

Discovered with the 36-inch. A naked-eye star in *Orion;* 6 m in D.M. and HEIS; GOULD, 6½. No proper motion in *Greenwich 10-Year Catalogue.*

[β (XV)...β (2920)...β (*Pub. L. O.* II)...Aitken ( )...]

β 1049. W' V. 631

R.A. 5h 27m 3s
Decl. — 1° 48′

C and D

	°	″			
1888.91	296.1	0.76	8.7... 9.7	4*n*	β
1890.20	297.7	0.73	...	2*n*	T
1891.16	297.2	0.5 ±	...	1*n*	Sp
1895.11	291.8	0.6 ±	...	4*n*	Sp
1898.88	294.2	0.58	9.0... 9.5	1*n*	β

A and B (= Σ 734)

	°	″				
1832.93	356.4	1.78	7.0...	8.6	3*n*	Σ
1845.20	357.9	1.91	...		1*n*	Ma
1867.76	353.8	1.65	7.0...	8.5	3*n*	Δ
1872.02	355.3	1.45	8.5...	9	1*n*	Hd
1878.99	354.9	1.75	8.0...	9.5	1*n*	β
1886.13	355.6	1.82	7.0...	8.5	1*n*	W
1886.94	352.6	1.83	6.5...	8.0	1*n*	LM
1888.72	355.8	1.95	7.1...	9.2	2*n*	Lv
1888.91	355.2	1.61	7.0...	8.0	4*n*	β
1890.20	358.6	1.62	...		2*n*	T
1890.80	355.6	1.60	...		5*n*	Sp
1892.92	354.2	1.64	7.2...	8.5	2*n*	J
1895.11	354.3	1.59	...		4*n*	Sp

A and C (= H I. 119)

	°	″				
1783.76	248.4	30.20	...		1*n*	H I
1832.43	243.1	29.29	...	8.6	6*n*	Σ
1845.19	243.9	27.13	...		1*n*	Ma
1867.76	242.9	29.36	...	8.6	3*n*	Δ
1872.02	245.0	30.11	...		1*n*	Hd
1879.02	242.8	29.47	...	8.7	2*n*	β
1881.91	242.8	29.42	...		3*n*	β
1891.13	243.5	29.24	...		2*n*	Sp
1894.16	243.2	29.25	...		2*n*	Sp

The duplicity of C was discovered with the 36-inch. The change is not very pronounced. In appearance it is an interesting quadruple, but there has been no change of the Herschel and Struve companions with respect to A. All the measures of these stars are given above.

[β (XV)...β (2929)...β^1...β (*Pub. L. O.* II)...Sp (III)... Tarrant (3185,3186)...Madler (*Fixstern-Systeme* I)...Δ (II)... LM... Lv...Wilson (Cin^m)...*Annals Harvard Coll. Obsy.* XIII... Jones (*Proc. Haverford Coll. Obsy.* 1892)...]

β 1267. Lalande 10423

R.A. 5^h 27^m 22^s
Decl. + 30° 51′

	°	″				
1892.13	217.9	0.84	8.5...	8.5	3*n*	β
1894.16	216.9	0.82	...		2*n*	Sp
1896.11	215.2	0.86	...		4*n*	Sp

Discovered with the 36-inch in the course of measures of *Nova Aurigae*. The measures appear to indicate some retrograde motion. The magnitude in D.M. is 8.0.

[β (XIX)...β (3141)...β (*Pub. L. O.* II)...Sp (III)...]

β 13. W I. 676

R.A. 5^h 28^m 36^s
Decl. — 4° 34′

	°	″			
1876.08	128.8	1.38	8.0...10.0	2*n*	Δ
1879.10	131.7	1.01	8.0...10.0	1*n*	Cin
1892.00	131.6	1.10	8.3... 8.9	3*n*	β

Discovered with the 6-inch. In a low-power field with Σ 743. No sensible change.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...Δ (I)...Cin^5...]

β 1050. Bond 974

R.A. 5^h 30^m 55^s
Decl. — 5° 33′

	°	″			
1889.03	283.6	0.67	10.5...11.7	3*n*	β
1898.94	283.6	0.65	10 ...11	1*n*	A

A difficult pair of small stars in the nebula of *Orion*, 1^m 32^s *f* of *θ' Orionis*, and 5′ *s*. Discovered with the 36-inch. It is No. 974 of BOND'S catalogue of stars in the great nebula.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Aitken ( )...]

β 1240. 26 *Aurigae*

R.A. 5^h 30^m 56^s
Decl. + 30° 25′

A and B

	°	″				
1892.00	344.4	0.15	5.6...	6.0	3*n*	β
1892.84	354.2	0.22	...		3*n*	Bar
1893.22	342.9	0.15±	...		1*n*	Sp
1893.94	342.5	0.16	...		1*n*	Bar
1894.17	347.2	0.20±	...		4*n*	Sp
1896.13	338.8	0.20±	...		9*n*	Sp

AB and C (= Σ 753)

1828.61	268°.0	12″.34	5.8	8.0	3*n*	Σ
1865.52	268.0	12.39	5.7	7.8	3*n*	J
1880.95	268.3	12.17	...		3*n*	Sp
1891.95	268.3	12.25	...	8.7	4*n*	β
1895.54	268.4	12.41	...		10*n*	Sp

AB and D (= β 90)

1877.87	113°.2	31″.47	...	11.5	1*n* β
1891.97	112.7	32.33	...	11.0	3*n* β
1898.96	112.4	32.97	...	11.5	2*n* β

The close pair was discovered with the 36-inch. As the components are nearly equal in magnitude, it is a comparatively easy object with that aperture. Rapid motion would be expected in a pair of this class. It is certainly a binary system.

As a wide pair this has been known for more than a century (H' III. 64 = S 492 = Σ 753). There has been no change whatever in the position of this companion with reference to the primary since it was first measured. A few only of the measures are given above.

The fourth star, D, was noted by me with a 6-inch in 1872, but it had been previously seen by MORTON at LORD WROTTESLEY'S Observatory, though apparently overlooked by HERSCHEL and STRUVE. It was first measured in 1877. The distance in that observation, by a clerical error, was printed 25″.86 in β'. It should have been as given above. All the measures of this star are given.

The annual proper motion of 26 *Aurigae* is 0″.044 in the direction of 276°.5 (AUWERS). This movement, though small, is sufficient to show that the Σ companion is moving in space with exactly the same proper motion. Otherwise, with this motion of A, and Σ's position of C, the latter star for 1898.7 should be 265°.2 : 9″.27. The change in D corresponds to the proper motion of AB, and this star, therefore, is not a member of the system.

[β (II, XVIII)...β (*Mon. Not.* XXXIII, 437)...β'...β (3113)... β (*A. J.* 256)...β (*Pub. L. O.* II)..Sp (III)...Barnard (*A. J.* 447)...]

There is an unnecessary number of measures of the H–Σ companion, since it has been known for nearly half a century that it had no sensible motion with respect to the large star. These observations will be found as follows:

[Ma (*Fixstern-Systeme* 1) (*Dorpat Obsns.* IX, X, XI, XIII, XV) ...Dawes (*Obsns. at Bishop's Obsy.*) (*Mem. R. A. S.* XXXV)... (*Obsns. at Barclay's Obsy.* I, II)...Jacob (*Mem. R. A. S.* XVII) ...Worster and Jacob (*Madras Obsns.* Second Series)...*Radcliffe Obsns.* XXIII, XXX)...Wrottesley (*Mem. R. A. S.* XXIX) ...Secchi (*Cat. di 1721 Stelle Doppie*)...Gledhill (*Mem. R. A. S.* XLII)...OΣ (*Foulkrown Obsns.* IX)...J (I, II)...J (1036)... Duner (*Mesures Microm.* 1876)...Sp (II)...]

β 89. Lalande 10608

R.A. 5h 31m 29s
Decl. — 1° 30′

1875.68	344°.2	0″.55	7.9	8.5	3*n*	J
1878.40	356.1	0.81	7.5	9.0	2*n*	Cin
1879.59	361.6	0.73	8.0	9.2	4*n*	β
1888.52	360.1	0.88	8.0	9.3	2*n*	Lv
1889.15	362.1	0.77	...		4*n*	Sp
1891.15	360.9	0.72	...		3*n*	Sp
1898.88	357.2	0.75	8.1	9.1	4*n*	A
1898.88	361.6	0.74	8.0	10.0	1*n*	β
1898.91	361.7	0.95	8.0	10.2	2*n*	Cg

Discovered with the 6-inch. It is 1m 23s *f* ε *Orionis*, and 12′ 57″ *s*. A difficult pair with that aperture. It has no appreciable proper motion (PORTER).

[β (II)...β (*Mon. Not.* XXXIII, 437)...β³....J (I)...Cin⁵... Lv³...Lv (*Sid. Mess.* VIII, 77)...Sp (III)...Cogshall ( )....Aitken ( )...]

β 1051. Bond 1096

R.A. 5h 32m 1s
Decl. — 4° 57′

1889.09	24°.7	0″.75	10.1	10.7	3*n*	β

A difficult pair in the nebula of *Orion*; discovered with the 36-inch. It is 2m 38s *f* θ' *Orionis*, and 31′ *n*. A 7½ m star 22″.4 *p* and 2′ 34″ *n* of the new pair.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...]

β 1032. σ *Orionis*

R.A. $5^h\ 32^m\ 43^s$
Decl. $-2^\circ\ 40'$

A and B

1888.81	357°.0	0".26	4 ... 6	4*n*	β
1890.20	353.7	0.3±	...	2*n*	Sp
1890.81	351.6	0.29	4 ... 5	3*n*	β
1891.16	360.5	0.25±	...	1*n*	Sp
1891.88	349.7	0.23	...	3*n*	β
1892.22	348.7	0.25±	...	2*n*	Sp
1893.22	349.3	0.25±	...	3*n*	Sp
1096.21	346.4	0.25±	...	1*n*	Sp
1898.87	332.9	0.27	...	4*n*	A

AB and C (= Σ 762)

1831.42	236°.5	11".00	4.1...10.3	4*n*	Σ
1869.97	235.4	11.07	3.9... 9.5	4*n*	J
1888.17	237.0	11.46	...	2*n*	Hl
1888.84	237.1	11.23	...	3*n*	β
1899.12	237.4	11.28	...	3*n*	β

AB and D (= Σ 762)

1831.20	84°.5	12".86	... 7.5	3*n*	Σ
1869.97	85.1	12.76	... 6.8	4*n*	J
1888.84	83.3	12.84	...	3*n*	β
1893.62	83.7	12.96	...	5*n*	Sp
1899.12	82.8	12.77	...	3*n*	β

AB and E

1869.97	60°.9	41".64	... 6.3	4*n*	J
1899.12	60.9	41.42	...	3*n*	β

E and D

1831.20	230°.8	30".03	7.0... 7.5	3*n*	Σ
1871.34	230.9	30.10	...	3*n*	J

The close pair was discovered with the 12-inch. It is certain to be a binary, and the measures already made indicate retrograde motion. The maximum distance probably does not exceed 0".25; otherwise I would have found it before. AUWERS gives the principal star a proper motion of 0".024 in the direction of 297°.7. It is evident that both stars have the same movement.

There is no relative change in the distant stars (= H' II. 10 = Sh 63 = Σ 762), and they must therefore have the same proper motion as σ. An annual movement of even 0".02 in the time covered by the measures would be apparent if either of these companions was fixed in space. With this proper motion, and the positions of Σ for the distant companions, at this time (1899.1) they should be:

AC	228°.7	10".33
AD	88.0	14.24

[β (XIV)...β (2875,3048,3114)...β (*Pub. L. O.* II)...Sp (III) ...Aitken ( )...]

The following relate to the old companions:

[Madler (*Fixstern-Systeme* I) (*Dorpat Obsns.* XI, XIII, XV) ...Herschel (*Cape Obsns.*)...Dawes (*Mem. R. A. S.* VIII (*Obsns. at Bishop's Obsy.*)...*Radcliffe Obsns.* XXIII, XLVI... Jacob (*Mem. R. A. S.* XVI)...*An. Konigsberg Sternwarte*, Munchen XVII...*Annals Harvard Obsy.* XIII...Engelmann (*Mess. Neunzig Doppelsternen*)...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...Nobile (*Rend. Accad. Sci. Napoli*, Jan. 1875) ...Webb (*Mon. Not.* XX, 253)...Dawes (*Mon. Not.* XX, 285) ...J (II)...Cin⁵...Gaudibert (*Soc. Ast. France Bul.* 1890)... Hall (II)...Hahn (*Mikrom. Ver. des Sternhaufens* Σ 762, Leipzig, 1891)...Glasenapp (II)...Solá (3529)...]

β 321. *Leporis* 45

R.A. $5^h\ 33^m\ 59^s$
Decl. $-17^\circ\ 55'$

A and B

1877.11	142°.4	1".06	7.0... 8.0	1*n*	Cin
1877.33	144.5	0.68	6.8... 8.3	3*n*	J
1879.48	139.2	0.99	6.9... 7.3	3*n*	β
1888.92	141.2	0.76	7.1... 8.4	2*n*	Lv
1891.15	145.4	0.6±	...	2*n*	Sp
1896.20	153.0	0.55	...	1*n*	Sp
1898.16	143.1	0.81	...	1*n*	See

C and D

1877.11	358°.0	1".56	8.0... 8.5	1*n*	Cin
1877.34	357.5	1.26	9.3... 9.7	3*n*	J
1879.48	359.4	1.49	9.0... 9.8	3*n*	β
1888.94	358.8	1.40	8.5... 9.0	2*n*	Lv
1898.16	358.7	1.44	...	1*n*	See

AB and C

1876.59	136°.0	89″.46	...	9.0	2*n*	J
1879.18	136.0	88.41	...		3*n*	*β*
1893.16	135.8	89.30	6.6...	8.4	3*n*	Gl
1898.16	136.6	89.29	...		1*n*	See

AB and E

1876.59	6°.2	76″.20	7.0...	8.0	2*n*	J
1893.16	6.3	76.23	6.6...	7.5	2*n*	Gl

AB and F

1876.59	298°.5	126″.46	...	8.5	2*n*	J

AB and G

1878.17	48°.7	60″.3	...10		1*n*	*β*

AB and H

1878.17	310°.4	41″.79	...13		1*n*	*β*
1898.16	306.2	40.96	...		1*n*	See

The five principal stars of this group were observed by HERSCHEL (*Cape Observations*), and entered as H 3780, with the description "Quintuple, 6th and 7th classes, magnitudes 7, 7, 8, 8, 8." With the 6-inch I found that two of these stars were close doubles, and noted two more faint stars in the group. The four bright stars, A, E, C, and F, are, respectively, 10726, 10727, 10728, and 10725 of LALANDE. The group is just visible to the naked eye as a 6 m star.

The measures give no certain evidence of motion in the close pairs.

[*β* (VI)...*β* (2062)...β^3...β^1...J (II)...Cin⁴...Lv¹...Knott (*Observatory* IV, 184,212)...Sp (III)...Glasenapp (II)... See ( )...]

β 1007. 126 *Tauri*

R.A. 5ʰ 34ᵐ 22ˢ
Decl. + 16° 28′

1881.86	266°.2	0″.27	6.0...	6.2	2*n*	*β*
1887.16	249.5	0.3 ±	...		3*n*	Sp
1888.07	241.7	0.2 ±	...		2*n*	Sp
1889.10	239.3	0.3 ±	...		5*n*	Sp
1890.78	Single with 12-in, 36-inch				1*n*	*β*
1891.79	Elongation doubtful, 36 inch				1*n*	*β*
1892.06	Perhaps elongation in 330°				1*n*	*β*
1894.16	243°.6	0″.22 ±	...		2*n*	Sp
1896.15	230.8	0.20 ±	...		3*n*	Sp
1897.13	226.9	0.20 ±	...		2*n*	Sp
1897.81	245.1	0.36	...		1*n*	*β*
1898.20	227.2	0.20	...		1*n*	Sp
1899.17	244.3	0.18	...		1*n*	A

Discovered with the 12-inch on Mt. Hamilton in 1881. It was single or too close for the 36-inch 1890–92. The measures since then show but little change in the angle, but a whole revolution may be covered by the observations. The components are nearly equal, and therefore some of the measures may require a correction of 180°. In my measure with the 40-inch in 1897 it was noted: "The distance is less than 0″.3; the smaller star is *p*." In the first set of measures in 1881 with the 12-inch it was stated: "The measured distances are decidedly too large." The distance is probably always less than 0″.25. There is little doubt of its being a binary of short period.

The proper motion is small, 0″.013 in the direction of 173°.7 (AUWERS).

[*β* (XIII)...β^3...*β* (3048,3114)...*β* (*Pub. L. O.* II)...Sp (III) ...Aitken ( )...]

β 322. O. Arg. S. 4178

R.A. 5ʰ 34ᵐ 40ˢ
Decl. — 25° 13′

1877.11	104°.2	2″.23	8.0...	9.5	1*n*	Cin
1898.14	103.4	2.76	...		1*n*	See
1898.83	103.0	2.87	8.0...	9.0	1*n*	Bd

Discovered with the 6-inch.

[*β* (VI)...*β* (2062)...Cin⁴...See ( )...Boothroyd ( )...]

β 14. Lalande 10696

R.A. 5ʰ 34ᵐ 48ˢ
Decl. + 29° 47′

1874.17	194°.8	5″.78	...		1*n*	OΣ
1875.43	194.7	5.71	7.4...10.5		4*n*	J
1891.90	194.5	5.79	7.9...10.2		2*n*	*β*

Discovered with the 6-inch. Unchanged.

[*β* (I)...*β* (*Mon. Not.* XXXIII, 351)...*β* (3114)...*β* (*Pub. L. O.* II)...OΣ (*Poulkowa Obsvt.* X)...J (I)...]

β 1052. Lalande 10776

R.A. $5^h\ 35^m\ 30^s$
Decl. $-\ 2°\ 57'$

1889.14	189.1	0.66	7.2 ... 8.2	3*n*	β
1890.13	191.1	0.47	...	3*n*	Sp
1892.00	192.6	0.48	...	6*n*	Sp
1898.19	188.6	0.70	7.2 ... 8.5	2*n*	A

Discovered with the 36-inch. Probably without change. In GOULD 6.7 m; in S.D. 7.5.

[β (xv)...β (2029)...β (*Pub. L. O.* II)...Sp (III)...Aitken ( )...]

β 752. D.M. (47°) 1193

R.A. $5^h\ 37^m\ 19^s$
Decl. $+\ 47°\ 51'$

This 7½ m star was suspected to be a very close pair, 120°: 0".5, with the 6-inch on Mt. Hamilton in 1879. It was examined (1890.66) with the 36-inch, and it was certainly single then with the highest powers. There are no other observations of it, negative or otherwise. It is possible that the apparent elongation was an illusion, but it should be examined further.

[β (XI)...β^6...β (3048)...β (*Pub. L. O.* I, II)...]

β 91. Lalande 10913

R.A. $5^h\ 40^m\ 29^s$
Decl. $+\ 20°\ 54'$

1875.34	82.0	1.57	7.5 ... 10.0	3*n*	J
1891.93	80.9	1.75	8.1 ... 10.0	3*n*	β

Discovered with the 6-inch. Probably without change.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β (3113)...β (*Pub. L. O.* II)...J (I)...]

β 559. D.M. (0°) 1177

R.A. $5^h\ 40^m\ 36^s$
Decl. $+\ 0°\ 2'$

A and B

1878.12	85.3	1.74	9.0 ... 11.5	4*n*	β
1891.93	84.2	1.96	9.3 ... 11.4	2*n*	β
1898.73	86.4	2.10	9.7 ... 12.0	1*n*	β

A and C

1879.13	201.8	50.72	... 9.5	4*n*	β
1891.92	201.9	50.34	... 9.2	3*n*	β
1898.73	201.4	50.35	... 9.8	1*n*	β

This is in the nebula, MESSIER 78. The wide stars had been remarked by H. The close pair was discovered with the 18½-inch. There is no evidence of motion. All the measures of AC are given.

[β (x)...β^2...β^3... β (3114)...β (*Pub. L. O.* II)...]

β 892. D.M. (17°) 1006

R.A. $5^h\ 40^m\ 40^s$
Decl. $+\ 17°\ 41'$

1879.09	272.8	1.19	8.8 ... 13	2*n*	β
1891.89	276.2	1.15	9.0 ... 10.4	2*n*	β

Discovered with the 18½-inch. It is 12^s *f* 130 *Tauri*.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...]

β 192. τ *Aurigae*

R.A. $5^h\ 40^m\ 52^s$
Decl. $+\ 39°\ 8'$

A and B

1877.82	350.0	38.93	5	... 12	1*n*	β
1892.03	352.0	39.29		... 11.9	2*n*	β
1898.75	352.0	39.28		... 12.2	2*n*	β

A and C (= H^4 V. 21)

1877.82	32.9	47.85	... 12.0	1*n*	β
1892.03	33.3	47.96	... 11.1	2*n*	β
1898.75	34.0	48.52	... 11.5	2*n*	β

The nearest companion to τ *Aurigae* was noted with the 6-inch. A more distant star was recorded by H^4. All the measures of this star are given above. The principal star has a proper motion of 0".043 in the direction of 239°.4 (AUWERS). The interval covered by the measures is too short to say whether or not this small movement affects the positions of the companion stars.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3141)...β (*Pub. L. O.* II)...]

β 92. W. V. 1309

R.A. $5^h\ 40^m\ 57^s$
Decl. $+21^\circ\ 4'$

	°	″			
1875.45	170.2	8.87	9.3...11.0	2*n*	J
1890.15	171.7	8.59	...	3*n*	T
1892.03	169.9	9.24	8.6... 9.6	2*n*	β
1892.16	170.3	9.12	...	2*n*	T

Discovered with the 6-inch. Relatively fixed.

[β (11)...β (*Mon. Not.* XXXIII, 437)...β (3141)...β (*Pub. L. O.* II)...J (1)...Tarrant (3186)...]

β 561. Lalande 10969

R.A. $5^h\ 41^m\ 18^s$
Decl. $+12^\circ\ 22'$

	°	″			
1878.09	4.0	19.70	7 ...13	1*n*	β
1892.00	3.4	19.47	7 ...12.2	3*n*	β

Noted with the 18½-inch in looking for H 5465.

[β (X)...β¹...β (3114)...β (*Pub. L. O.* II)...]

β 560. Lalande 10958

R.A. $5^h\ 41^m\ 37^s$
Decl. $+29^\circ\ 41'$

	°	″			
1877.88	208.2	0.94	8.0... 8.0	1*n*	β
1889.66	178.2	0.6±	...	2*n*	Sp
1891.15	174.0	0.58	...	4*n*	Sp
1892.10	172.4	0.60	8.0... 8.5	4*n*	β
1895.06	155.3	0.52	...	1*n*	Lew
1898.12	167.5	...	...	1*n*	Bow
1898.59	163.3	0.69	...	2*n*	Lew
1898.88	165.8	0.75	...	2*n*	Hu
1899.00	166.6	1.02	8.0... 8.6	1*n*	β

Discovered with the 18½-inch. A binary in rapid motion. It should be carefully measured each year, as it is likely to have a short period.

[β (X)...β¹...β (3141)...β (*Pub. L. O.* II)...Sp (III)...Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsrs.* 1895)...Lewis and Bowyer ( )...Hussey ( )...]

β 93. W. V. 1332

R.A. $5^h\ 41^m\ 44^s$
Decl. $+20^\circ\ 59'$

A and B

	°	′			
1891.85	121.7	60.03	8.3...	2*n*	β
1898.85	121.7	60.07	8.2...	2*n*	β

B and C

	°	″			
1891.85	167.0	5.71	9.1... 9.2	2*n*	β
1898.92	162.3	5.46	9.5...11.0	1*n*	β

B and D

	°	″			
1891.85	323.6	9.43	...11.2	2*n*	β
1898.92	326.2	9.74	...11.3	1*n*	β

The distant triple companion was noted with the 6-inch. It is not likely to have any special interest.

[β (11)...β (*Mon. Not.* XXXIII, 437)...β (3114)...β (*Pub. L. O.* II)...]

β 15. Lalande 11005

R.A. $5^h\ 41^m\ 45^s$
Decl. $-2^\circ\ 20'$

	°	″			
1875.60	174.3	2.07	7.8...12.0	2*n*	J
1878.12	177.9	1.67	8.0...10.5	1*n*	Cin
1886.89	179.8	2.08	8.1...10.2	2*n*	LM
1898.84	178.7	2.05	7.5...11.0	1*n*	Cg

Discovered with the 6-inch. Apparently without change.

[β (1)...β (*Mon. Not.* XXXIII, 351)...J (1)...Cin^s...LM ...Cogshall ( )...]

β 405. W. V. 1045

R.A. $5^h\ 42^m\ 22^s$
Decl. $-13^\circ\ 34'$

	°	″			
1877.95	125.1	14.50	8.5...11.0	1*n*	β
1892.04	126.8	14.45	8.3...11.6	2*n*	β
1899.11	126.7	14.13	8.5...11.5	2*n*	β

Noted with the 6-inch. Without change.

[β (VII)...β (2103,3141)...β¹...β (*Pub. L. O.* II)...]

β 406. W^s V. 1068

R.A. 5^h 43^m 1^s
Decl. — 13° 28′

1877.95	243°.1	12″.01	9.0...12.0	1*n*	β
1892.00	242.3	11.39	8.7...11.3	3*n*	β
1899.11	244.4	11.33	8.7...12.0	2*n*	β

Discovered with the 6 inch. In the field with Σ 801 *rej.*

[β (VII)...β'...β (2103,3141)...β (*Pub. L. O.* II)...]

β 94. *Leporis* 61

R.A. 5^h 44^m 9^s
Decl. — 14° 31′

1876.16	179°.4	2″.73	6.0... 9.4	4*n*	J
1878.10	180.3	2.39	6.0... 8.5	1*n*	Cin
1881.14	182.5	2.72	7.0... 9.0	1*n*	β
1888.08	178.8	2.82	6.0... 8.4	3*n*	Lv
1888.49	179.7	2.61	6.0... 9.5	2*n*	T
1892.99	178.6	2.48	6.0... 8.4	2*n*	J
1898.84	180.1	2.56	6.5... 9.0	1*n*	Cg

Discovered with the 6-inch. Evidently without change. This star is Lalande 11086.

In 1846 JACOB found a pair, the rough place of which reduced would give for 1880, R.A. 6^h 5^m: Decl. — 14° 35′ (*Mem. R. A. S.* XVII). He states that he subsequently looked for it several times, and could not find it. From a careful search I am certain there is no such pair in or near his place. There is no doubt now of its identity with β 94, JACOB having made an error of about 20^m in his R.A. This is confirmed by his description of the pair, 184°.0 : 1″.8 ± : 6½ ... 9.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β'...J (I)...Cin^s... Lv^s...Tarrant (2091)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Cogshall ( )...]

β 1188. Lalande 11084

R.A. 5^h 44^m 33^s
Decl. — 1° 28′

A and B

1890.84	106°.0	1″.23	7.9...10.3	3*n*	β
1893.22	105.5	1.05	...	1*n*	Sp
1898.77	104.5	1.02	7.7...11.2	2*n*	β
1898.88	103.1	1.43	8.0...10.0	1*n*	A

A and C (= Σ 809)

1831.16	101°.2	25″.70	7.7... 8.8	3*n*	Σ
1847.23	99.6	25.49	...	1*n*	Ma
1863.18	98.9	24.90	...	2*n*	En
1868.56	99.6	25.25	7.9... 9.0	4*n*	J
1879.02	98.3	25.22	7.7... 8.3	2*n*	β
1890.85	98.3	25.32	... 8.7	3*n*	β
1898.77	97.8	24.98	... 8.4	2*n*	β
1898.88	98.2	25.00	... 9.0	1*n*	A

The principal star of Σ 809 was found to be double with the 36-inch.

There is no material change in the Σ companion. All the measures of this are given.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...β^m...Sp (III)... Aitken ( )...Madler (*Fixstern-Systeme* II)...Engelmann (*Mess. Neunzig Doppelsternen*)...J (II)...]

β 1053. *Aurigae* 146

R.A. 5^h 45^m 18^s
Decl. + 37° 19′

1889.92	233°.2	0″.43	7.5... 9.5	1*n*	β

Discovered with the 36 inch. Lalande 11066. In Lalande 6½ m, and 6.8 in D.M.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...]

β 1054. 136 *Tauri*

R.A. 5^h 45^m 47^s
Decl. + 27° 35′

1889.08	232°.2	15″.00	6 ...12	3*n*	β
1898.94	232.7	15.01	6 ...13.1	2*n*	β

Discovered with the 36-inch. The proper motion of this star is 0″.021 in the direction of 172°.8 (AUWERS).

[β (XV)...β (2929)... β (*Pub. L. O.* II)...]

β 95. Lalande 11128

R.A. $5^h\ 46^m\ 9^s$
Decl. $-\ 7°\ 20'$

1878.16	298.2	13.67	8.0...12.0	1*n*	β
1892.00	296.1	13.89	8.2...11.0	2*n*	β

Discovered with the 18½-inch; *nf* 55 *Orionis*. Probably fixed.

[β (II).. β (*Mem. Not.* XXXIII, 437)...β (3114)...β (*Pub. L. O.* II)...]

β 563. Lalande 11156

R.A. $5^h\ 47^m\ 41^s$
Decl. $+\ 15°\ 29'$

1878.06	183.9	7.42	7.8...11.0	1*n*	β
1886.18	184.5	6.50	...	1*n*	HΣ
1892.00	185.2	6.52	8.1...10.8	3*n*	β
1898.77	183.3	6.81	8.0...11.0	3*n*	β

Discovered with the 18½-inch. Probably fixed.

[β (x)...β...β (3114)...β (*Pub. L. O.* II)...HΣ ( )...]

β 1190. W I V. 1269

R.A. $5^h\ 51^m\ 17^s$
Decl. $+\ 0°\ 1'$

A and B

1890.85	340.1	1.41	7.4...10.8	3*n*	β
1898.86	337.7	1.60	7.5...10.2	2*n*	A
1898.88	341.4	1.40	7.2...10.7	2*n*	β

A and C

1890.85	95.5	6.65	...12.5	3*n*	β
1898.86	95.8	6.20	...12.5	2*n*	A
1898.88	94.7	6.36	...11.7	2*n*	β

Discovered with the 36-inch. The distant star C is noted in the Harvard Zones, where it is called 17 m, and distance estimated 8".

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken ( )...]

β 1189. Schj. 1985

R.A. $5^h\ 51^m\ 18^s$
Decl. $+\ 0°\ 23'$

A and B

1890.90	269.5	0.20	8.1... 9.1	3*n*	β
1897.12	133.1?	0.2±	"uncertain"	1*n*	Sp

AB and C

1890.85	194.5	58.11	... 8	2*n*	β
1898.88	194.5	58.02	8.2... 8.4	1*n*	β

Discovered with the 36-inch. The magnitudes of A and C in D.M. are 9.0 and 9.2. D.M. (0°) 1230,1229.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Sp (III)...]

β 1055. *Aurigae* 161

R.A. $5^h\ 51^m\ 32^s$
Decl. $+\ 44°\ 35'$

A and B

1888.92	332.9	1.61	6.7...11.5	3*n*	β

A and C (= H I V. 91)

1783.49	315.1	30.05	...	1*n*	HI
1888.92	329.7	33.35	... 9.2	3*n*	β

The close companion was discovered with the 36-inch. The Herschel companion has been wholly neglected for more than a century. The above are all the measures. This star is B.A.C. 1899. The proper motion is given by KUSTNER as 0".057 in the direction of 238°.6. It is pretty certain that A and B are moving together. With this proper motion and the position of C for 1888, if the small star was fixed its position at the time of HERSCHEL'S measure should have been 320°:33".8.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...]

β 564. D.M. (—1°) 1088

R.A. 5h 54m 59s
Decl. — 1° 34′

1877.95	90°±	1″±	9.0...11.0		β
1892.04	70.9	1.29	9.0...10.5	2n	β
1899.02	73.0	1.47	8.7...10.3	1n	β

Discovered with the 18½-inch. Further measures are needed.

[β (x1...β1...β (3141)...β (*Pub. L. O.* 11)...]

β 1056. μ *Orionis*

R.A. 5h 55m 47s
Decl. + 9° 39′

1889.11	272°.0	16″.80	4 ...14	3n	β
1890.86	272.7	17.11	...14.2	3n	β
1898.08	273.8	17.25	...14	1n	A

Discovered with the 36-inch. The large star has a proper motion of 0″.031 in the direction of 49°.8 (Auwers). It is probably only an optical pair.

[β (xv)...β (2929, 3048)...β (*Pub. L. O.* 11)...Aitken ( )...]

β 16. 3 *Monocerotis*

R.A. 5h 56m 12s
Decl. — 10° 36′

1872.14	356°.1	1″.80	5½ ...10	1n	K
1875.59	354.8	1.62	6.0... 9.7	2n	J
1877.97	352.2	2.12	5.5... 8.5	1n	Cin
1878.17	354.0	1.66	5.3... 8.3	2n	Cin
1888.99	354.0	1.69	6.0... 9.5	2n	T
1889.02	353.9	1.88	5.2... 9.2	4n	Lv
1898.83	351.5	1.82	6.0...10.0	1n	Cg
1898.88	356.1	1.68	6.0...10.0	1n	β

Discovered with the 6-inch. The measures show no relative motion. This star is involved in a large, faint nebula (Dreyer 2142). The proper motion, according to Auwers, is 0″.036 in the direction of 313°.3. Taking this value, and the position of the companion in 1875 from the measures of J, the small star, if fixed in space, should be 23°.9 : 1″.14 (1898.8) It is evident from the measures that no such relative change has occurred, and that the components, having the same proper motion, probably form a physical system.

[β (1)...β (*Mon. Not.* xxxiii, 351)...Knott (*Mem. R. A. S.* xliii)...J (1)...Cin4...Cin5...Tarrant (2991)...Lv1...Cogshall ( )...]

β 893. B.A.C. 1935

R.A. 5h 56m 49s
Decl. + 37° 58′

1878.90	128°.0	17″.60	6.2...12.5	2n	β
1892.07	130.5	17.95	6.2...12.5	2n	β
1898.79	127.4	17.75	6.5...11.5	1n	β

Discovered with the 18½-inch. This is a naked-eye star near 40 *Aurigae*.

[β (xiii)...β1...β (3141)...β (*Pub. L. O.* 11)...]

β 1241. 3 *Geminorum*

R.A. 6h 2m 27s
Decl. + 23° 8′

A and B

1891.84	344°.7	0″.53	5.9...10.0	3n	β
1894.53	331.2	0.48±	...	3n	Sp

A and C

1891.85	63°.3	18″.36	...14.5	1n	β
1899.05	60.5	18.60	...14.0	1n	β

Discovered with the 36-inch. It is a difficult pair of the 85 *Pegasi* class. The proper motion from the *Berlin A. G. Catalogue* is very small, 0″.0024 in the direction of 145°.4.

[β (xviii)...β (3113)...β (*Pub. L. O.* 11)...Sp (iii)...]

β 17. 4 *Monocerotis*

R.A. 6h 2m 48s
Decl. — 11° 8′

A and B

1872.14	178°.6	3″.38	6.5...10.5	1n	Kn
1875.90	178.0	3.16	6.8...10.5	3n	J

	°	′			
1878.10	180.6	2.69	6.5...10.0	1*n*	Cin
1888.98	178.1	3.37	...	2*n*	T
1892.02	180.4	3.21	6.0...10.4	3*n*	β
1898.17	181.4	3.01	6.0...10.2	2*n*	A

A and C

	°	′			
1872.14	244.1	10±	...11.5	1*n*	Kn
1876.78	244.5	8.95	...11.5	1*n*	J
1892.02	246.8	8.77	...10.8	3*n*	β
1898.17	249.1	9.32	...11.5	2*n*	A

The nearest companion was discovered with the 6-inch, and in measuring that KNOTT detected the third star C. AUWERS gives the proper motion of the principal star 0″.029 in the direction of 84°.2. With this value, and the relation of AB from the measures of J in 1875, the smaller component, if fixed, should be, for 1898.17, 189°.4 : 3″.27. The measures show no such change in the angle, and point to a common proper motion, so far as A and B are concerned. The observations are not sufficient to decide as to C.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...Knott (*Mem. R. A. S.* XLIII)...Cin[5]...Tarrant (2991)...Aitken ( )...]

β 1058. 4 *Geminorum*

R.A. 6ʰ 3ᵐ 13ˢ
Decl. + 23° 1′

	°	′			
1889.13	284.3	0.41	7.2... 7.5	2*n*	β
1890.88	284.0	0.25±	...	8*n*	Sp
1891.01	281.3	0.28	6.3... 6.4	3*n*	β
1891.84	283.1	0.30	6.5... 6.6	3*n*	β

Discovered with the 36-inch. There is an error of 180° in the angle as originally printed. The proper motion of 4 *Geminorum* in AUWERS is 0″.014 in the direction of 270°. It is certain that this pair will prove to be a binary system. Late measures are wanting.

[β (XV)...β (2929,3048,3114)...β (*Pub. L. O.* II)...Sp (III)...]

β 565. Lalande 11741

R.A. 6ʰ 3ᵐ 41ˢ
Decl. — 14° 3′

	°	′			
1878.21	100.4	1.02	8 ...12	1*n*	β
1892.07	99.9	1.13	8.1... 9.1	3*n*	β

Discovered with the 18½-inch. Apparently unchanged. In L and W[2] 7½ m; D.M. 8.2.

[β (X)...β[2]...β (3141)...β (*Pub. L. O.* II)...]

β 1242. S.D. (6°) 1431

R.A. 6ʰ 3ᵐ 42ˢ
Decl. — 6° 18′

A and B

	°	′			
1891.87	124.5	0.48	8.6... 8.8	3*n*	β

AB and C (= H 2298)

	°	′			
1830	90±	35±	8.9...10	1*n*	H
1891.87	92.9	43.87	...10.7	3*n*	β

The close pair was discovered with the 36-inch while examining the nebula No. 2182 of *Dreyer's Catalogue*. The wide pair, H 2298, is found in *Herschel's Fifth Catalogue of Double Stars*, in which he says: "The larger star has a strong nebulous burr. It is my father's IV. 38." In the 36-inch this is a large faint nebula, with the double centrally placed in it. All the measures of C are given above.

[β (XVIII)...β (*Mon. Not.* LII, 455)...β (3113)...β (*Pub. L. O.* II, pp. 178, 225)...]

β 1017. S.D. (2°) 1510

R.A. 6ʰ 6ᵐ 28ˢ
Decl. — 2° 56

	°	′			
1882	180±	0.8±	8.7... 8.8		β
1892.05	161.1	0.65	8.5... 8.8	3*n*	β
1898.16	159.2	0.67	...	4*n*	D

Discovered with the 18½-inch.

[β (XIII)...β[3] (app.)...β (3141)...β (*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 1008. η *Geminorum*

R.A. 6h 7m 38s
Decl. + 22° 32′

1882.05	301°.4	0″.96	3 ... 8.8	5*n*	β
1883.28	300.2	0.83	...10	4*n*	Hl
1886.34	289.3	0.89	... 9	3*n*	Ho
1887.17	291.3	1.05	...	5*n*	Sp
1888.15	291.7	0.97	...	5*n*	Sp
1889.07	289.7	1.01	...	4*n*	Sp
1889.14	294.8	1.03	..10.5	3*n*	β
1890.93	296.1	1.08	...10.7	3*n*	β
1893.22	291.9	0.99	...	5*n*	Sp
1894.22	289.7	0.99	...	2*n*	Sp
1896.22	289.6	1.05	...	2*n*	Sp
1897.17	291.5	1.24	...	1*n*	Sp

Discovered with the 12-inch on Mt. Hamilton in 1881. The measures show slow retrograde motion. AUWERS gives the proper motion of this star 0″.069 in the direction of 267°.5, and obviously this is common to both components.

In 1852 GILLISS observed a double or peculiar occultation of this star (A.N. 813), which he explains as the temporary eclipse of the star by a projecting lunar mountain. TATLOCK (*Sid Mess.*, IV, 18) has shown that on another occasion the same observer saw this star occulted.

[β (XIII)...β¹...β (2930,3048)...Hough (2978)...Hall (II)... Sp (III)...]

β 566. *Monocerotis* 21

R.A. 6h 8m 41s
Decl. − 4° 32′

1878.03	219°.7	1″.43	8.5...12.5	1*n*	β
1892.07	209.9	1.87	6.5...12.5	3*n*	β

Discovered with the 18½-inch. This star is 6m in L and S.D. Lalande 11916.

[β (X)...β¹...β (3141)...β (*Pub. L. O.* II)...]

β 323. Lalande 11915

R.A. 6h 8m 44s
Decl. − 1° 31′

1876.17	93°.1	2″.17	8.0... 9.0	2*n*	Hl
1876.28	96.3	2.39	8.5...10.2	2*n*	J
1878.05	93°.5	2″.16	7.4... 9.0	2*n*	Cin
1888.18	96.3	2.13	...	2*n*	Hl
1889.07	96.9	2.26	8.0... 9.6	3*n*	Lv

Discovered with the 6-inch. Without change.

[β (VI)...β (2062)...Δ (1)...Cin⁵...Lv¹...Hl (I, II)...]

β 193. W¹ VI. 208

R.A. 6h 9m 9s
Decl. + 4° 0′

A and B

1892.04	90°.2	17″.88	8.0...11.0	2*n*	β
1898.84	91.3	17.83	8.0...12.0	1*n*	β

A and C

1898.84	231°.1	58″.55	...10.3	1*n*	β

Discovered with the 6-inch.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3141)...β (*Pub. L. O.* II)...]

β 894. D.M. (19°) 1285

R.A. 6h 9m 27s
Decl. + 19° 3′

1881.14	138°.0	5″.14	8.2...12.5	2*n*	β
1898.15	133.8	5.24	8 ...12	4*n*	D

Discovered with the 18½-inch. This star from the *Berlin A. G. Catalogue* has a proper motion of 0″.089 in the direction of 37°.2. At the date of the last measure, in 1898, the companion if fixed should have been 152°.9 : 5″.79. It is therefore certain that the two stars are moving together.

[β (XIII)...β¹...Doolittle (*Pub. Flower Obsy.* I)...]

β 567. *Monocerotis* 23

R.A. 6h 9m 31s
Decl. − 4° 53′

1879.08	249°.5	3″.83	6.8...11.0	4*n*	β
1892.00	246.8	3.97	7.1...10.9	3*n*	β

1898.10	242°.4	4".26	6.0...11.0	2*n*	D
1898.86	245.2	4.21	6.7...10.2	2*n*	β

Discovered with the 18½-inch. Probably unchanged. In LALANDE, HEIS, and ARGELANDER 6 m. Lalande 11949.

[β (x)...β^{1}...β (3114)...β (*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

β 1018. Lalande 11965

R.A. 6h 10m 7s
Decl. − 2° 50′

1882	60°±	5"±	8.5...12.0		β
1892.06	54.7	6.02	8.5...11.7	3*n*	β
1899.02	53.6	5.92	9.0...11.5	1*n*	β

Discovered with the 18½-inch. Probably fixed.

[β (XIII)...β^{3} (app.)...β (3114)...β (*Pub. L. O.* II)...]

β 96. 75 *Orionis*

R.A. 6h 10m 29s
Decl. + 9° 59′

C and D

1877.93	226°.5	4".74	9.0...11.5	1*n*	β
1892.12	227.0	5.10	9.0...10.7	2*n*	β
1898.92	224.3	4.79	9.8...12.0	1*n*	β

A and C

1892.12	159°.5	119".90	6 ...		2*n*	β
1898.79	159.2	119.32	...		1*n*	β

A and B

1892.12	255°.5	62".88	...10.2	2*n*	β
1898.79	256.0	62.83	...	1*n*	β

The faint double companion was noted with the 6-inch. AUWERS gives the proper motion of A 0".060 in 191°.3.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β^{2}...β (3141)...β (*Pub. L. O.* II)...]

β 18. Lalande 12006

R.A. 6h 11m 7s
Decl. − 12° 0′

1876.00	271°.9	1".79	7.3...	9.0	3*n*	J
1877.97	273.5	1.54	7.5...	9.0	1*n*	Cin
1885.14	276.9	1.77	7.0...	9.5	1*n*	W
1886.52	275.9	1.68	8.0...	9.0	1*n*	LM
1892.93	273.5	1.21	8.0...	9.0	1*n*	J

Discovered with the 6-inch. Apparently fixed.

[β (I)...β (*Mon. Not.* XXXIII, 351)...*d* (I)...Cin^{4}...Wilson (Cin^{m})...Jones (*Proc. Haverford Coll. Obsy.* 1892)...]

β 1019. S.D. (3°) 1373

R.A. 6h 11m 26s
Decl. − 3° 0′

1882	280°±	1"±	8.0...	9.5		β
1892.06	274.2	0.81	8.0...	9.6	3*n*	β
1898.88	277.6	0.80	8.3...	9.7	1*n*	β

Discovered with the 18½-inch.

[β (XIII)...β^{3} (app.)...β (3141)...β (*Pub. L. O.* II)...]

β 895. W^{s} VI. 287

R.A. 6h 12m 23s
Decl. + 28° 29′

A and B

1873.9	Elongation suspected in 230° with 6-inch					β
1875.9	Appeared round with 18½-inch					β
1879.00	Elongated in 120°, 18½-inch					β
1879.22	133.3	0".27	7.5...	7.5	1*n*	β
1887.17	143.5	0.25±	...		3*n*	Sp
1888.94	150.9	0.2 ±	...		5*n*	Sp
1891.18	144.6	0.22	8.2...	8.3	3*n*	β
1891.78	146.0	0.21	8.1...	8.3	3*n*	β
1898.24	185.8	0.35	...		1*n*	L

AB and C (= Σ 888)

1831.22	246°.2	2".70	7.5...	9.2	3*n*	Σ
1844.26	247.9	2.45	...		1*n*	Ma
1857.16	250.8	2.77	...		1*n*	Se
1869.83	249.8	2.95	7.2...	9.0	4*n*	J
1879.22	250.3	2.83	...	9.5	1*n*	β
1888.94	252.9	2.69	...		2*n*	Sp
1891.22	250.2	2.87	...		2*n*	β

1898.28	250.0	2.97	...	3*n*	D
1898.59	251.8	2.73	...	2*n*	L

The duplicity of the principal star of Σ 888 was suspected with the 6-inch, and verified five years later with the 18½-inch. Rapid motion would be expected in a pair of this class, and it may prove to be a binary of short period. The measures since 1888 do not show very rapid change in the angle, but the distance at this time is probably about maximum, and one half or a whole revolution may have been described between 1879 and 1887. Only the largest apertures will show any difference of magnitude in the components. In 1828 HERSCHEL (*Seventh Catalogue, Mem. R.A.S.*, XXXVIII) noted, "the large star suspected to be a close double." This remark seems to have attracted no attention; at all events, the close pair was missed by Σ and other observers who measured C. All the measures of this star are given above. There is evidently no change.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...Sp (III)... Lewis (*Mon. Not.* LIX, 400)...Madler (*Fixstern-Systeme* 1) ...Secchi (*Cat. 1321 Stelle Doppie*, 1859)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 1059. μ *Geminorum*

R.A. 6h 15m 42s
Decl. + 22° 34′

B and C

1889.10	266.7	0.80	9.8...10.7	3*n*	β
1899.12	270.8	0.68	10.0...11.0	1*n*	A

A and BC

1889.10	141.0	122.49	3 ...	3*n*	β
1899.08	141.3	121.71	...	2*n*	β

The duplicity of this distant companion to μ *Geminorum* was discovered with the 36-inch. There are many faint stars less distant from A, one of which was measured by me, 76°.6 : 72″.66 (1880.01) 2*n*. AUWERS gives the proper motion of the large star as 0″.116 in the direction of 153°.8 (*Fundamental Catalogue*). With this movement the minimum distance of the double companion of 26″.7 will be reached in a little more than one thousand years.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...β^3...Aitken ( )...]

β 1020. W[4] VI. 387

R.A. 6h 15m 46s
Decl. + 28° 49′

1891.22	158.5	1.27	8.2...10.0	2*n*	β
1898.12	159.5	1.28	8.0...10.7	2*n*	A

Discovered with the 18½-inch.

[β (XIII)...β^3 (app.)...β (3114)...β (*Pub. L. O.* II)...Aitken ( )...]

β 97. Lalande 12260

R.A. 6h 18m 29s
Decl. — 1° 21′

1876.00	257.8	1.15	7.2... 9.2	3*n*	J
1877.97	260.6	1.18	6.5... 8.5	1*n*	Cin
1878.16	81.1	1.09	7.5... 8.5	1*n*	Cin
1889.14	260.9	0.93	7.2... 8.9	2*n*	Lv
1898.19	260.7	1.20	7.0... 8.0	3*n*	D

Discovered with the 6-inch. Without change.

[β (II)...β (*Mon. Not.* XXXIII, 437)...J (I)...Cin[4]...Cin[5]... Lv[2]...Doolittle (*Pub. Flower Obsy.* 1)...]

β 568. *Canis Majoris* 33

R.A. 6h 18m 36s
Decl. — 19° 43′

1878.16	157.8	0.67	7.0... 9.0	1*n*	Cin
1878.21	155.1	0.78	7.0... 7.3	1*n*	β
1889.07	148.3	0.63	7.0... 7.8	3*n*	Lv
1891.88	154.2	0.86	7 ... 8	1*n*	Col
1892.93	156.1	1.07	7.0... 8.0	1*n*	J
1898.24	158.8	0.58	...	1*n*	See

Discovered with the 18½-inch. Probably unchanged. The distance in the second measure, by an error in reducing, was printed 1″.35. It should be as given above. Lalande 12288.

[β (X)...β^2...Cin[3]...Lv[1]...Collins and Jones (*Proc. Haverford Coll. Obsy.*, 1891, 1892)...See ( )...]

β 1191. Lalande 12262

R.A. $6^h\ 19^m\ 8^s$
Decl. $+18°\ 50'$

1890.93	161°.5	1".33	7.0...13.8	3*n*	β

Discovered with the 36-inch. The *Berlin A. G. Catalogue* gives the proper motion of this star 0".205 in the direction of 222°.2. If this is substantially correct, another measure will show whether the components are moving together. If the companion is fixed in space, its position for 1898.9 would be 91°.8 : 1".51.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...]

β 569. Lalande 12315

R.A. $6^h\ 19^m\ 37^s$
Decl. $-10°\ 52'$

1877.99	120°.7	1".84	8.2...10.5	1*n*	β
1878.62	118.8	1.54	8.0...10.2	2*n*	Cin
1886.89	115.2	1.99	8.0... 9.7	2*n*	L.M
1898.10	115.5	2.07	8.0...10.0	3*n*	D

Discovered with the 18½-inch. Change uncertain.

[β (X)...β'...Cin^5...L.M...Doolittle (*Pub. Flower Obsy.* I)...]

β 1192. ν *Geminorum*

R.A. $6^h\ 21^m\ 50^s$
Decl. $+20°\ 17'$

B and C

1890.88	346°.2	0".15	8.7... 8.8	3*n*	β
1899.12	346.4	0.20	9.0... 9.5	1*n*	A

A and BC (= OΣ (app.) 77)

1876.02	329°.1	112".54	4.2... 8.0	3*n*	J
1890.86	329.3	112.69	...	3*n*	β
1895.53	329.5	112.87	4.5...7.4	3*n*	F
1899.08	329.6	112.71	...	2*n*	β

The duplicity of the distant companion was discovered with the 36-inch. This star is Lalande 12358. The principal star has a proper motion of 0".0315 in the direction of 259°.0 (AUWERS). All the measures of OΣ (app.) 77 are given above.

The following positions are derived from meridian observations:

1800	329°.7	111".20	Lalande
1875	329.4	112.64	A. G. C.

The large telescope shows a number of faint stars nearer the primary than BC. The nearest is the only one seen with any difficulty.

Aa	1890.88	358°.0	22".65	...15	3*n*	β
Ab	1890.87	13.3	53.90	...13.8	2*n*	β
Ac	1890.87	254.6	56.76	...12.5	2*n*	β
Ad	1890.87	11.6	92.13	...13	2*n*	β

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...J (1)...Franz (3464)...Aitken ( )...]

β 570. 11 *Monocerotis*

R.A. $6^h\ 23^m\ 0^s$
Decl. $-6°\ 57'$

A and D

1878.02	56°.1	25".79	5	...12.5	3*n*	β
1898.90	55.2	25.63		...13.0	2*n*	β

A and B (= Σ 919)

1831.23	130°.0	7".25	5.0...	5.5	3*n*	Σ
1854.20	131.2	7.33	...		5*n*	J
1878.38	131.2	7.23	5.7...	5.7	5*n*	Sp
1898.96	133.4	7.44	...		1*n*	β

B and C

1831.23	101°.7	2".46	...	6.0	3*n*	Σ
1854.20	101.6	2.53	...		5*n*	J
1878.38	104.9	2.76	...	6.1	5*n*	Sp
1898.96	108.4	2.95	...		1*n*	β

The distant companion was noted with the 18½-inch. The principal star, according to AUWERS, has a proper motion of 0".076 in the direction of 296°.4, and obviously the two Σ companions are moving with it, as there has been no relative change

in the last half century. A few only of the measures are given. The triple is H I. 10 = H I II. 17 = Sh 71 = Σ 919.

[β (x)...β^1...Madler (*Fixstern-Systeme* 1) (*Dorpat Obsns.* x, xi, xiii, xv)...Worster and Jacob (*Madras Obsns.* first series)...Iacob (*Mem. R. A. S.* xvii)...Secchi (*Catalogo di 1321 Stelle Doppie*) (*Atti dell' Accad. Pontif. de Nouvi Lincei*, Anno vii)...*Obsns. at Barclay's Obsy.* 1...Wrottesley (*Mem. R. A. S.* xxix)...*Radcliffe Obsns.* xxiii ...Powell (*Mem. R. A. S.* xxv)...Herschel (*5th Catalogue Mem. R. A. S.* vi)...*J* (1015,1256)...*J* (1, 11)...*J* (*Accad. Sci. Mem.*)...Gledhill (*Mem. R. A. S.* xlii)...Duner (*Mesures Microm* Lund, 1876)...Nobile (*Rend. della Accad. Sci.*, Napoli, Nov. 1875)...Plummer (*Oxford Obsns*, No. 1) ...Cin^5...Je (2346)...*Harvard Obsns.* xiii...Hall (1, 11) ...Seabroke (*Mem. R. A. S.* l)...LM...Tarrant (2991) ...Hayn (3051)...Knorre (3300,3518)...Glasenapp (iii) ...Bryant (*Mon. Not.* lix, 400)...Sola (3563)...]

β 753. λ *Canis Majoris*

R.A. 6^h 23^m 43^s
Decl. — 32° 30′

1879.79	40°±	1.″2 ±	5 ... 8			β
1892.14	47.2	1.29	5.8... 7.7	3*n*		β
1893.14	37.3	1.16	6 ... 8	2*n*		Sel
1897.12	38.2	1.36	...	3*n*		A
1898.19	43.1	1.14	...	1*n*		See

Discovered with the 6-inch at Mt. Hamilton in 1879. The *Second Washington Catalogue* gives the proper motion, 0″.088 in the direction of 270°.0. The components are evidently moving together.

[β (xi)...β^2...β (3141)...β (*Pub. L. O.* 1, 11)...Sellors (3240) ...Aitken (3465)...See ( )...]

β 896. Lalande 12414

R.A. 6^h 23^m 48^s
Decl. + 32° 15′

A and B

1879.00	199°.3	0.″89	7.0...10.0	1*n*		β

A and C

1879.56	210°.8	18.″44	...13.0	2*n*		β
1899.05	210.0	18.18	...13.0	1*n*		β

Discovered with the 18½-inch. In looking over my old observing books with the 6-inch recently I find that the close pair was suspected with that instrument three years before its independent discovery with the 18½-inch.

[β (xiii)...β^3...]

β 1021. W^3 VI. 648

R.A. 6^h 24^m 8^s
Decl. + 28° 28′

1882	120°±	0.″8 ±	8.0... 9.0			β
1892.16	86.0	0.68	8.1... 9.4	2*n*		I.v
1898.24	77.0	0.66	...	1*n*		L

Discovered with the 18½-inch. There may be some angular motion.

[β (xiii)...β^3 (app.)...I.v (*A. J.* 278) (*Proc. Haverford Coll. Obsy*, 1892)...Lewis (*Mon. Not.* lix, 400)...]

β 98. Lalande 12564

R.A. 6^h 26^m 40^s
Decl. — 5° 15′

1876.09	140°.8	1.″05	8.3... 8.3	3*n*		J
1877.97	135.9	...	8.0... 8.3	2*n*		Cin
1878.12	135.5	...	8.0... 8.5	1*n*		Cin
1898.14	142.6	0.88	8 ... 8+	3*n*		D

Discovered with the 6-inch. Without change.

[β (11)...β (*Mon. Not.* xxxiii, 437)...*J* (1)...Cin^4...Cin^5... Doolittle (*Pub. Flower Obsy.* 1)...]

β 194. D.M. (38°) 1537

R.A. 6^h 28^m 4^s
Decl. + 38° 5′

1874.25	283°.5	1.″±	8.0... 8.5	1*n*		β
1875.43	285.0	0.91	8.0... 8.5	4*n*		J
1880.55	283.6	0.9±	8.0... 8.5	3*n*		Sp
1883.90	285.7	1.17	8.2... 8.6	7*n*		En

Discovered with the 6-inch. No indication of change.

[β (iv)...β (*Mon. Not.* xxxiv, 382)...*J* (1)...Sp (11)... Engelmann (2678)...]

β 754. Lacaille 2350

R.A. $6^h\ 30^m\ 22^s$
Decl. $-33°\ 55'$

1879.79	20°±	0".5±	6.5... 7.0		β
1892.14	22.8	...	...	1*n*	Lv
1892.18	36.5	0.78	8.0... 8.2	2*n*	β
1897.77	16.2	0.92	6.2... 7.5	1*n*	See

Discovered with the 6-inch on Mt. Hamilton in 1879. Further measures are necessary to show whether or not there is any motion. There is a star 11 m, 40° : 25". The principal star in Lac. 5½ m, Gould 7.0.

[β (XI)...β^9...β (3141)...β (*Pub. L. O.* I, II)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...See (3495)...]

β 755. *Argus* 34

R.A. $6^h\ 31^m\ 14^s$
Decl. $-36°\ 41'$

A and B

1879.79	250°±	1"±	6.0... 7.5		β
1887.24	253.1	0.77	6 ... 7	2*n*	Pol
1891.11	252.7	0.91	6 ... 7	1*n*	Sel
1897.17	260.6	1.09	6.2... 9.8	1*n*	See

AB and C (= H 3875)

1837.9	295°±	20"±	6 ...13	2*n*	H^2
1887.25	301.0	21.22	...11	1*n*	Pol
1891.11	300.4	20.87	...	1*n*	Sel
1897.17	301.8	21.83	...12.9	1*n*	See

The duplicity of the principal star of H 3875 was discovered with the 6-inch at Mt. Hamilton in 1879. Further observations will be necessary to show the nature of the relation. All the measures of the Herschel companion are given above. A naked-eye star in *Argo*. Lacaille 2359.

[β (XI)...β^9...Herschel (*Cape Obsns.*)...Russell (*Mon. Not.* XLVII, 473)...Pollock (*Mem. R. A. S.* L) (*Pub. Sydney Obsy.* 1891)...Sellors (3154)...See (3495)...]

β 571. W I Vl. 956

R.A. $6^h\ 33^m\ 2^s$
Decl. $+13°\ 5'$

1877.95	316°.2	2".73	6.0...12.0	1*n*	β
1886.22	307.7	2.88	...	1*n*	HΣ
1892.10	317°.9	3".00	6.9...11.2	3*n*	β
1899.08	322.4	2.49	7.0...13.0	2*n*	β

Discovered with the 18½-inch. In Heis 6–7 m; D.M. 7.0. It is wanting in many of the star catalogues where a star of this brightness should be found.

[β (x)...β^1...β (3141)...β (*Pub. L. O.* II)...HΣ( )...]

β 19. Lalande 12936

R.A. $6^h\ 36^m\ 36^s$
Decl. $-15°\ 53'$

1874.14	169°.4	4".07	7.2... 9.5	1*n*	Kn
1876.26	165.0	3.52	6.7... 9.0	3*n*	J
1877.12	164.5	3.66	7.0... 9.0	2*n*	Cin
1885.65	168.7	3.58	7.5... 9.7	2*n*	W
1887.95	165.2	3.54	6.8... 9.0	2*n*	T
1888.12	166.6	3.70	7.8... 9.4	3*n*	Lv
1888.86	167.0	3.65	6.5... 9.0	2*n*	T
1898.16	165.2	3.92	...	1*n*	See

Discovered with the 6-inch. Apparently fixed.

[β (I)...β (*Mon. Not.* XXXIII, 351)...Knott (*Mem. R. A. S.* XLIII)...J (I)...Cin^4...Wilson (Cin^{10})...Lv^1...Tarrant (2899,2991)...See ( )...]

β 195. O. Arg. S. 5539

R.A. $6^h\ 37^m\ 26^s$
Decl. $-23°\ 7'$

A and B

1877.13	217°.6	6".05	7.0...11.0	1*n*	Cin
1892.18	215.2	5.71	7.1...11.1	4*n*	Lv
1898.23	212.9	5.97	...	1*n*	See
1898.84	216.9	5.77	7.5...10.5	1*n*	β

A and C

1892.15	178°.4	35".04	...12.0	1*n*	Lv
1898.23	177.0	34.27	...	1*n*	See
1898.84	178.6	34.71	...11.3	1*n*	β

Discovered with the 6-inch. There is no material change.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Cin^4...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...See ( )...]

β 756

R.A. $6^h\ 41^m$
Decl. $+39^\circ\ 35'$

This 8 or 8½ m star was suspected with the 6-inch on Mt. Hamilton in 1879 to be a very close pair. I could find no double in or near this place with the 36-inch, 1890.78.

[β (XI)...β^3...β (3048)...β (*Pub. L. O.* I, II)...]

β 20. Lalande 13170

R.A. $6^h\ 43^m\ 25^s$
Decl. $-16^\circ\ 4'$

1876.42	29.8	3.20	7.7...11.1	4*n*	J
1878.12	29.3	2.95	8.0...10.5	1*n*	Cin
1880.11	34.6	2.99	7.8...10.8	4*n*	β
1886.13	30.1	3.70	8.0...11.0	1*n*	LM
1886.16	30.6	2.96	8.0...11.0	1*n*	W
1888.54	34.5	3.12	8.0...10.6	3*n*	Lv
1898.22	31.3	3.44	...	1*n*	See
1899.09	32.7	3.12	8.0...10.0	1*n*	β

The middle of three stars *nf Sirius*; discovered with the 6-inch. The measures do not show any motion.

[β (I)...β (*Mon. Not.* XXXIII, 351)...δ (I)...β^3...Cin^5... Lv^1...LM...Wilson (Cin^{16})...See ( )...]

β 1193. 36 *Geminorum*

R.A. $6^h\ 44^m\ 21^s$
Decl. $+21^\circ\ 54'$

1890.90	355.0	10.81	5.7...14.5	3*n*	β
1899.02	354.7	10.46	...14.0	1*n*	β

Discovered with the 36-inch. The *Berlin A. G. Catalogue* gives the proper motion of this star 0".043 in the direction of 208°.8. There is a 13 m star, 14°.4 : 34".0.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...]

β 897. *Monocerotis* 97

R.A. $6^h\ 44^m\ 42^s$
Decl. $-0^\circ\ 23'$

1879.14	30.9	5.60	6.5...12.0	3*n*	β
1892.00	32.0	6.00	6.2...11.4	3*n*	β
1898.84	31.8	5.74	6.0...12.5	1*n*	β

Discovered with the 18½-inch. The principal star (Lalande 13198) has a considerable proper motion:

Stumpe	0".182	in 170°.5
Glasgow 2d	0.225	in 180.0
Porter	0.162	in 183.7

The measures show that this is common to both components.

[β (XIII)... β^3...β (3114)...β (*Pub. L. O.* II)...]

β 324. Lacaille 2362

R.A. $6^h\ 44^m\ 45^s$
Decl. $-23^\circ\ 56'$

A and B

1877.11	202.5	1.88	7.0... 8.0	2*n*	Cin
1889.04	203.3	1.71	7.1... 8.4	3*n*	Lv
1892.93	199.0	1.74	7.0... 8.2	1*n*	J
1894.13	208.3	2.±	7 ... 9	1*n*	Sel
1898.14	203.3	2.60	...	1*n*	See
1898.14	203.3	1.93	7 ... 8	3*n*	D

AB and C (= S 537)

1825.16	281.9	30.30	7 ...11	3*n*	South
1898.14	281.1	30.68	...	1*n*	See
1898.14	281.8	30.63	... 9	1*n*	D

AB and D

1898.14	2.8	28.26	...	1*n*	See
1898.14	2.4	30.27	...13	3*n*	D

The duplicity of the larger star of SOUTH's wide pair was discovered with the 6-inch. No change is apparent in any of the components.

[β (VI)...β (2062)...Cin^4... Lv^1...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Sellors (3303)...See ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 898. O. Arg. S. 5753

R.A. $6^h\ 45^m\ 0^s$
Decl. $-15°\ 53'$

A and B

	°	″			
1879.75	356.2	2.95	7.8...11.3	5*n*	β
1886.11	349.8	3.23	8 ...11	1*n*	LM
1892.00	357.5	3.23	8.0... 9.5	3*n*	β
1898.22	354.8	3.40	...	1*n*	See
1899.02	353.6	3.01	8.0...10.5	1*n*	β

C and D

	°	″			
1879.52	271.7	1.54	9.8...10.6	3*n*	β
1892.00	270.3	1.91	9.1... 9.3	3*n*	β
1898.22	266.8	2.11	...	1*n*	See
1899.02	268.8	1.79	9.0... 9.2	1*n*	β

A and C

	°	″			
1879.69	283.1	96.50	...	2*n*	β
1892.00	282.1	96.77	...	3*n*	β
1898.22	282.1	96.49	...	1*n*	See
1898.84	282.5	97.26	...	1*n*	β

A quadruple in the vicinity of *Sirius;* discovered with the 6-inch. Probably without change.

[β (XIII)...β^D...β (3114)...β (*Pub. L. O.* II)...LM...See ( )...]

β 325. O. Arg. S. 5814

R.A. $6^h\ 46^m\ 59^s$
Decl. $-26°\ 26'$

	°	″			
1877.11	32.1	2.05	8.0 ... 9.0	1*n*	Cin
1884.09	37.0	2.06	9.0 ...10.0	1*n*	W
1897.84	37.2	1.81	7.5 ... 9.6	1*n*	See
1898.10	30.3	1.79	8+... 9+	3*n*	D

Discovered with the 6-inch; the *sf* of a wide pair. Probably fixed. The magnitude in Cord. D.M. is 7.7.

[β (VI)...β (2062)...Cin^4...Wilson (Cin^m)...See (3495)... Doolittle (*Pub. Flower Obsy.* I)...]

326. Lalande 13404

R.A. $6^h\ 49^m\ 57^s$
Decl. $+2°\ 28'$

	°	″			
1876.19	63.0	1.23	8.0... 9.0	2*n*	Hl
1876.83	62.8	1.25	8.0... 9.5	2*n*	J
1882.21	67.6	1.20	8.0... 9.5	2*n*	Sp
1886.22	58.2	1.47	...	2*n*	HΣ
1888.20	65.8	1.04	...	2*n*	Hl
1888.83	64.5	1.13	8.0... 9.2	4*n*	Lv
1893.20	60.5	1.08	8.0... 9.2	1*n*	J
1898.18	56.4	1.33	...	1*n*	Br

Discovered with the 6-inch. No material change.

[β (VI)...β (2062)...*A* (1)...Sp (II)...Lv^1...Hall (I, II)... OΣ (*Poulkowa Obsns.* X)...HΣ ( )...Jones (*A. J.* 312) ...Brown ( )...]

β 899. W° VI. 1526

R.A. $6^h\ 52^m\ 9^s$
Decl. $+18°\ 53'$

A and B

	°	″			
1879.14	261.4	0.68	9.0... 9.0	1*n*	β
1889.78	263.9	0.5±	...	5*n*	Sp
1892.13	268.0	0.58	8.7... 9.3	2*n*	β
1896.11	265.1	0.81	...	1*n*	Lew

AB and C

	°	″			
1879.14	174.2	24.07	...10	2*n*	β
1892.13	175.5	24.33	...10	2*n*	β
1899.08	176.0	24.10	... 9.2	1*n*	β

AB and D

	°	″			
1879.14	48.1	40.46	... 9.0	2*n*	β
1892.13	47.8	40.46	... 9.0	2*n*	β
1899.08	48.1	40.69	... 8.7	1*n*	β

Discovered with the 18½-inch. Change in AB is probable. D is W° VI. 1531.

[β (XIII)...β^D...β (3141)...β (*Pub. L. O.* II)...Sp (III)... Lewis (*Mon. Not.* LIX, 400)...]

β 327. Lalande 13492

R.A. $6^h\ 52^m\ 28^s$
Decl. $-\ 2^\circ\ 52'$

A and B

1876.83	100°.8	0".96	7.5...	8.0	2*n*	J
1878.12	96.8	...	8.0...	8.5	1*n*	Cin
1881.05	96.1	0.75	7.5...	7.5	1*n*	β
1888.10	96.1	0.75	8.0...	8.2	2*n*	Lv
1888.22	95.5	0.84	7.5...	8.0	4*n*	T
1892.08	95.8	0.79	8.2...	8.2	3*n*	β
1893.45	97.7	0.64	...		4*n*	Sp
1898.20	99.6	0.63	...		1*n*	Sp
1899.09	93.6	0.59	8.0...		1*n*	β

AB and C

1876.83	102°.6	13".22	...11.5	2*n*	J
1878.12	99.4	...	...11.0	1*n*	Cin
1880.63	100.2	13.21	...11.2	2*n*	β
1888.22	97.8	13.72	...11.5	4*n*	T
1892.10	100.0	13.10	...11.6	2*n*	β
1899.09	98.9	13.25	...11.0	1*n*	β

Discovered with the 6-inch. No material change.

[β (VI)...β (2062,3141)...β (*Pub. L. O.* II)...β^3...Cin^5... Lv^3...Tarrant (2991)...Sp (III)...]

β 1060. Lalande 13491

R.A. $6^h\ 52^m\ 38^s$
Decl. $+\ 3^\circ\ 46'$

1889.15	58°.3	3".01	7.0...12.0	2*n*	β
1899.02	59.3	3.11	6.8...13.5	1*n*	β

Discovered with the 36-inch.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...]

β 1022. W^3 VI. 1557

R.A. $6^h\ 53^m\ 15^s$
Decl. $+\ 27^\circ\ 26'$

A and B

1883.19	160°±	1".±	8.5...	8.5		β
1899.02	133.8	0.48	8.5...	8.5	1*n*	β

AB and C

1899.02	196°.3	31".35	...12.5	1*n*	β

Discovered with the 18½-inch. There must be change in both angle and distance of the close pair.

[β (XIII)...β^3 (app.)...]

β 100. W^3 VI. 1620

R.A. $6^h\ 54^m\ 14^s$
Decl. $+\ 12^\circ\ 34'$

1875.36	258°.1	3".27	7.0...10.8	3*n*	J
1880.63	262.0	3.14	7.5...10.0	2*n*	β
1888.64	258.8	3.17	8.0...10.4	2*n*	Lv
1892.13	256.0	2.92	7.5...11.0	1*n*	Col

Discovered with the 6-inch. Fixed.

[β (II)...β (*Mem. Not.* XXXIII, 437)...β^3...J (I)...Lv^1... Collins (*Proc. Haverford Coll. Obsy.* 1892) (*A. J.* 278)...]

β 572. Lalande 13623

R.A. $6^h\ 55^m\ 24^s$
Decl. $-\ 20^\circ\ 28'$

1879.39	143°.9	5".07	7.2...11.0	3*n*	β
1892.12	142.6	5.27	6.9...11.0	3*n*	β
1897.80	143.6	5.92	6 ...10.7	1*n*	See
1899.09	142.4	5.13	7.5...10.2	2*n*	β

Discovered with the 18½-inch. Probably unchanged. Many small stars in the field.

[β (X)...β^1...β^2...β (3141)...β (*Pub. L. O.* II)...See (3495)...]

β 573. Lalande 13642

R.A. $6^h\ 56^m\ 11^s$
Decl. $-\ 10^\circ\ 42'$

1878.17	244°.8	...	8.0...	8.7	2*n*	Cin
1878.21	246.9	0.82	7.5...	8.0	1*n*	J
1879.13	248.6	0.75	8.0...	8.2	1*n*	β
1899.19	256.3	0.74	...		2*n*	β

Discovered with the 18½-inch. This star is 7.0 m in Radcliffe and S.D.

[β (X)...β^2...β^3...J (I)...Cin^5...]

β 900. Lalande 13688

R.A. $6^h\ 58^m\ 33^s$
Decl. $+21°\ 11'$

1880.20	272°6	1".58	8.2...11.7	2*n*	β
1892.21	273.0	1.70	8.0...11.5	3*n*	β

Discovered with the 18½-inch; 40′ *nf* ζ *Geminorum*. Without material change.

[β (XIII)...β^3...β (3141)...β (*Pub. L. O.* II)...]

β 328. *Canis Majoris* 139

R.A. $7^h\ 1^m\ 3^s$
Decl. $-11°\ 7'$

A and B

1875.70	128°.4	0".3	6.3... 7.5	4*n*	J
1878.17	127.8	...	6.0... 8.7	2*n*	Cin
1879.13	117.8	0.48	7.0... 8.5	1*n*	β
1880.44	122.3	0.51	6.2... 7.5	4*n*	Sp
1887.18	116.1	0.42	...	2*n*	Sp
1891.15	116.4	0.45±	...	2*n*	Sp
1892.11	118.0	0.51	6.3... 7.6	4*n*	β
1892.23	115.8	0.5±	...	1*n*	Sp
1893.23	119.2	0.5±	...	2*n*	Sp
1899.26	132.3	0.43	6.5... 8.0	1*n*	β

AB and C (= Σ 1026 *rej.*)

1879.13	349°.9	17".85	... 9.0	1*n*	β
1892.04	348.9	17.45	...10.4	3*n*	β
1899.26	350.3	17.40	...	1*n*	β

The large star of this wide pair was found to be a close double with the 6-inch. Motion is uncertain. This is a naked-eye star in *Canis Major*, 6 m in Argelander, Heis, and *Pos. Med.* Lalande 13811.

[β (VI)...β (2062,3114)...β^3...β (*Pub. L. O.* II)...J (I)... Cin^5...Sp (II, II app., III)...]

β 574. Lalande 13821

R.A. $7^h\ 1^m\ 18^s$
Decl. $-11°\ 9'$

1878.04	306°.7	1".76	8.0...12	1*n*	β
1892.04	311.3	2.26	8.1...11.4	3*n*	β
1898.88	302.3	2.28	8.0...12.5	1*n*	β

Discovered with the 18½-inch.

[β (X)...β^3...β (3114)...β (*Pub. L. O.* II)...]

β 1009. τ *Geminorum*

R.A. $7^h\ 3^m\ 30^s$
Decl. $+30°\ 26'$

1882.01	178°.2	1".87	5 ...11.5	2*n*	β
1890.96	177.6	1.75	...13.2	4*n*	β

This fine and difficult pair was discovered at Mt. Hamilton with the 12-inch in 1881. AUWERS gives the proper motion, 0".064 in the direction of 222°.1. The measures are sufficient to show from the common proper motion that this is a physical pair. If the small star was fixed in space its position angle would be diminished 13° in the interval 1882–1890.

[β (XIII)...β^3...β (3048)...β (*Pub. L. O.* II)...]

β 329. *Canis Majoris* 146

R.A. $7^h\ 4^m\ 9^s$
Decl. $-16°\ 2'$

1880.67	97°.6	29".52	6.4...11.7	2*n*	β
1892.12	96.8	29.84	6.2...11.5	3*n*	β
1898.16	96.5	30.02	...	1*n*	See
1898.80	97.3	29.78	6.2...11.0	2*n*	β

Distant companion noted with 6-inch. A naked-eye star (Lalande 13928); Heis 6 m; S.D. 7.2; Cord. 6.6. See notes a nearer star, 14.8 m, 110° : 6".5, which I could not see on the occasion of the last measures with the 40-inch.

[β (VI)...β (2062,3141)...β^3...β (*Pub. L. O.* II)...See ( )...]

β 1279. S.D. (3°) 1773

R.A. $7^h\ 4^m\ 26^s$
Decl. $-3°\ 54'$

1899.23	10°.4	1".02	9.0... 9.3	1*n*	β

This was noted with the 18½-inch on December 16, 1878, but forgotten subsequently, and not measured or included in my catalogues of that time. A recent examination of my old observing book led to its recovery with the 40-inch. This instrument shows a 13 m star, 349°.8 : 14".2.

β 196. W^I VII. 142

R.A. $7^h\ 6^m\ 27^s$
Decl. $-5°\ 14'$

1876.83	186°.7	3".52	10.0...11.0	1*n*	J
1879.22	189.9	...	8.5...10.0	1*n*	Cin
1880.22	189.7	3.33	9.5...11.0	1*n*	β
1882.12	191.1	2.92	9.0...11.0	1*n*	W
1899.09	189.8	3.26	9.0...10.0	1*n*	β

Discovered with the 6-inch. The *f* one of three stars in the field.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (I)...Cin^3...Wilson (Cin^m)...]

β 197. Lalande 14026

R.A. $7^h\ 7^m\ 0^s$
Decl. $-6°\ 57'$

1876.86	147°.0	2".28	7.7...10.2	2*n*	J
1879.22	148.2	1.92	8.0... 9.5	1*n*	Cin
1886.94	144.8	2.21	8.0... 9.3	1*n*	LM
1888.10	147.8	2.17	8.1... 9.4	3*n*	Lv

Discovered with the 6-inch. Without change.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (I)...Cin^3...LM...Lv^4...]

β 1023. D.M. (26°) 1498

R.A. $7^h\ 7^m\ 45^s$
Decl. $+26°\ 5'$

1882	310°±	0".3±	8.5... 8.5		β
1891.23	294.0	0.25	8.4... 8.5	3*n*	β
1898.27	294.6	0.38	8.3... 8.6	1*n*	A

This star was suspected with the 18½-inch to be a close pair in 1882, and subsequently verified and measured with the 36-inch.

[β (XIII)...β^1 (app.)...β (3114)...β (*Pub. L. O.* II)...Aitken ( )...]

β 757. *Argus* 101

R.A. $7^h\ 8^m\ 10^s$
Decl. $-36°\ 21'$

1879.79	60°±	1".5±	6.0... 7.5	1*n*	β
1881.18	65.8	2.21	...	1*n*	Pt
1887.23	67°.7	2".57	6.5... 8.0	2*n*	Pol
1893.15	62.6	2.66	7 ... 9	2*n*	Sel
1897.20	69.2	3.06	6.3...11.8	2*n*	See

Discovered with the 6-inch on Mt. Hamilton in 1879. This is a naked-eye star in *Argo*. Lacaille 2628. There would appear to be some change, but this needs confirmation. There is a wide difference in the magnitudes assigned to the smaller star.

[β (XI)...β^n...Pritchett (*Pub. Morrison Obsy.* No. 1)...Russell (*Mon. Not.* XLVII, 473)...Pollock (*Pub. Sydney Obsy.* 1891) (*Mem. R. A. S.* L)...Sellors (3240)...See (3495)...]

β 1268. 24 *Monocerotis*

R.A. $7^h\ 9^m\ 11^s$
Decl. $+0°\ 3'$

1892.21	313°.2	3".81	6.0...11.8	4*n*	β
1898.94	310.6	3.90	6.0...13.0	2*n*	A
1899.11	309.9	3.85	...	2*n*	Hu

This is one of the rejected stars (OΣ 169) of the Poulkowa Catalogue. In the edition of 1850 it was given as "oblong?" the direction of the suspected elongation being roughly measured on two occasions 199° and 204°. MADLER has two observations (*Dorpat Observations* XI, XIII), 26°.4 : 0".5 (1843.28) and 22°.2 : 0".35 (1846.24). Subsequently DEMBOWSKI (*Measures*, Vol. I. 228) thought it might be elongated in 148°, but very uncertain. In 1873 I had a faint suspicion of a slight elongation in 310°, but it was very doubtful in 1874. It was finally rejected as single by OTTO STRUVE, and is probably not a close pair. It was certainly round in 1892 with all powers on the 36-inch. In the course of this examination I found the faint companion given above. It is not probable that this has anything to do with the early observations previously mentioned. The faintness of this star is a sufficient explanation of the failures to see it with other telescopes.

AUWERS gives for the proper motion of this star, 0".031 in the direction of 284°.9. The measures do not cover a sufficient time to show with certainty whether the small star shares in this movement.

[β (XIX)...β (3141)...β (*Pub. L. O.* II)...Aitken ( )...Hussey ( )...]

β 575. *Canis Majoris* 156

R.A. $7^h\ 9^m\ 21^s$
Decl. $-15°\ 16'$

A and B

1878.18	199°.2	0".69	8.0...	8.0	2*n*	β
1878.17	195.3	...	7.8...	8.2	3*n*	Cin
1889.15	199.9	0.70	8.0...	8.0	1*n*	Lv
1898.29	220.8	0.34	...		1*n*	See
1899.19	216.0	0.64	...		1*n*	A

AB and C (= Σ 1057)

1831.20	1°.9	15".28	7.3...	9.8	3*n*	Σ
1845.20	1.9	16.10	...		1*n*	Ma
1867.99	1.5	15.50	7.0...	9.8	3*n*	J
1878.10	2.1	15.87	...		2*n*	β
1898.29	2.4	15.74	...		1*n*	See

The duplicity of the principal star of Σ 1057 was discovered with the 18½-inch.

There is no sensible change in the distant star, C. All the measures are given. Lalande 14114.

[β (x)...β^1...Cin^5...Lv^1...See ( )...Madler (*Fixstern-Systeme* 1)...J (II)...Aitken ( )...]

β 330. D.M. (—0°) 1680

R.A. $7^h\ 13^m\ 27^s$
Decl. $-0°\ 41'$

1876.87	218°.0	1".28	8.7...10.5		2*n*	J
1878.12	211.7	1.22	8.5... 9.0		1*n*	Cin
1886.84	213.5	1.25	8.5... 9.0		1*n*	LM
1888.42	215.6	1.23	8.0... 9.5		2*n*	Lv

Discovered with the 6-inch. Probably without change.

[β (VI)...β (2062)...J (I)...Cin^5...Lv^1...LM...]

β 901. 65 *Aurigae*

R.A. $7^h\ 14^m\ 1^s$
Decl. $+36°\ 59'$

A and B

1879.31	7°.9	10".56	5.8...12.3		3*n*	β
1881.29	8.5	11.06	5.0...11.5		1*n*	OΣ
1888.77	9°.3	11".16	...		4*n*	HΣ
1891.18	9.1	11.14	...11.5		3*n*	β
1898.08	7.5	10.90	6.0...12.2		2*n*	β

A and C

1879.51	26°.8	36".05	...12.7		2*n*	β
1898.08	30.3	37.76	...12.7		2*n*	β

Discovered with the 18½-inch. AUWERS assigns to this star a proper motion of 0".097 in the direction of 264°.7. With the position of B in 1879, and this annual movement of A, the companion, if fixed in space, should be 17°.1 : 11".12 for 1898. It is therefore very probable that it is moving with the principal star, while the more distant companion is fixed.

[β (XIII)...β^1...β (3114)...β (*Pub. L. O.* II)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...]

β 577. Piazzi VII. 53

R.A. $7^h\ 14^m\ 21^s$
Decl. $+0°\ 38'$

AB and C

1892.19	100°.0	12".75	...13.5		2*n*	β
1895.19	106.1	14.15	...		1*n*	Lew
1896.25	103.5	13.77	...13.2		1*n*	Lew
1899.08	97.9	12.42	...13.3		3*n*	β

AB and D

1878.21	9°.9	14".54	...13		1*n*	β
1892.19	10.6	15.31	...13		2*n*	β
1897.27	10.7	15.17	...		1*n*	A
1899.09	10.8	15.25	...13		1*n*	β

AB and E

1892.18	278°.0	53".62	...10.8		3*n*	β
1897.27	278.2	54.08	...		1*n*	A

A and B (= Σ 1074)

1831.54	115°.4	0".48	7.8...	8.2	3*n*	Σ
1869.90	139.4	0.62	...		3*n*	OΣ
1882.89	141.5	0.64	7.7...	8.1	6*n*	En
1888.73	139.6	0.82	7.8...	8.0	3*n*	Lv
1892.18	142.7	0.55	8.1...	8.3	3*n*	β
1895.19	137.4	0.58	...		2*n*	Lew
1896.25	133.8	0.68	...		1*n*	Lew
1897.29	139.7	0.86	8 ...	8+	4*n*	A

The distant star, D, was noted with the 18½-inch, and the fainter and nearer star, C, added with the 36-inch. The close pair is probably in slow motion, although there has been but little change in the last twenty years. Only a few of the measures of this are given. The complete observations will be found in the references given below.

[β (x)...β^1...β (3141)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429) (3465)...Lewis (*Mon. Not.* LIV, 314; LVI, 359; LIX, 400) (*Greenwich Obsns.* 1895) (*Observatory* XIX, 118) ...Lewis ( )...Madler (*Dorpat Obsns.* XI, XIII, XV) (*Fixstern-Systeme* I)...OΣ (*Poulkowa Obsns.* IX)...Herschel (*Mem. R. A. S.* XXXVIII)...Wilson and Seabroke (*Mem. R. A. S.* XLII, XLVI, L)...Gledhill (*Mem. R. A. S.* XLII)...*Annals Harvard Obsy.* XIII...Flammarion (*Etoiles Doubles et Multiples*)...Pritchett (*Pub. Morrison Obsy.* I) ...J (1474)...J (II)...Sp (II, II app.)...Doberck (2307) ...Engelmann (2678)...Hussey (*A. J.* 427)...Lv[1]... Bigourdan (*Bull. Ast.* XVIII)...]

β 331. Cord. (— 24°) 5211

R.A. 7h 15m 2s
Decl. — 24° 12′

1877.13	115.9	2.04	8.2... 9.0	2*n*	Cin
1889.15	114.7	1.93	8.2... 8.9	2*n*	Lv
1894.14	115.4	1.75	8 ... 9	1*n*	Sel

Discovered with the 6-inch. It is *n* and a little *f* 29 *Canis Majoris*. Probably without change.

[β (VI)...β (2062)...Cin[4]...Lv[3]...Sellors (3303)...]

β 1024. D.M. (29°) 1520

R.A. 7h 15m 33s
Decl. + 29° 32′

1882	110±	1±	9.0...11		β
1892.26	103.2	1.40	9.0...11.5	1*n*	β

Discovered with the 18½-inch. Further measures are needed.

[β (XIII)...β^1 (app.)...β (3141)...β (*Pub. L. O.* II)...]

β 758. *Lyncis* 51

R.A. 7h 19m 55s
Decl. + 48° 26′

1883.75	94.2	16.92	6.2...10.2	6*n*	En
1892.14	93.1	16.56	6.0...11.1	3*n*	β
1898 79	91.4	16.58	6.7...11.0	1*n*	β

Discovered with the 6-inch. The magnitude in D.M. is 6.0. Unchanged. Lalande 14402.

[β (XI)...β^2...β (3141)...β (*Pub. L. O.* II)...Engelmann (2678)...]

β 199. Lalande 14480

R.A. 7h 19m 57s
Decl. — 20° 56′

1870.12	19.4	1.72	7.5... 8.5	1*n*	Hd
1877.15	20.3	1.90	7.2... 8.2	2*n*	Cin
1889.12	21.6	1.84	7.6... 8.2	4*n*	Lv
1892.10	23.2	1.63	...	1*n*	Lv
1893.19	23.1	1.74	7 ... 8	2*n*	Sel
1896.03	24.7	...	...	3*n*	Do
1898.15	20.7	1.71	8 ... 9	1*n*	Ho

AB and C (= Ho 522)

1898.15	120.2	6.10	...13	1*n*	Ho

Discovered with the 6-inch. Probably fixed. The faint star discovered by HOUGH with the 18½-inch.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Cin[4]...Lv[3]...*Annals Harvard Obsy.* XIII...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Sellors (3240)...Doberck (3378)... Hough (3557)...]

β 198. Lalande 14503

R.A. 7h 20m 38s
Decl. — 20° 43′

1870.12	211.9	5.72	8 ... 9.5	1*n*	Hd
1877.12	214.2	5.97	8.0...10.5	2*n*	Cin
1898.19	212.9	5.71	...	1*n*	See
1898.26	213.6	5.70	8.0...10.8	3*n*	A

Discovered with the 6-inch. The larger star is red. Found independently at Cambridge. Without change. The 4″ pair of 8½ m stars 40° *p* and 4′ *s* is H 3964.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...*Annals Harvard Obsy.* XIII...See ( )...Aitken ( )...]

β 21. η *Canis Minoris*

R.A. $7^h\ 21^m\ 35^s$
Decl. $+\ 7°\ 11'$

1875.39	27°.4	4".09	5.5...11.3	3*n*	J
1877.23	22.7	3.79	6 ...10.5	1*n*	OΣ
1886.28	23.6	4.01	...	1*n*	HΣ
1891.96	25.8	3.99	5.7...11.2	3*n*	β
1898.12	24.3	4.33	6 ...11	2*n*	A
1898.25	28.2	4.04	...	2*n*	L

Discovered with the 6-inch. Probably without change. The proper motion of the principal star is 0".022 in the direction of 216°.7 (AUWERS). If the small star was fixed in space, the movement would increase the distance 0".5 in the time covered by the measures.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...J (1)...OΣ (*Poulkowa Obsns.* X)...Lewis (*Mon. Not.* LIX, 400]...Aitken ( )...HΣ ( )...]

β 578. Lalande 14545

R.A. $7^h\ 21^m\ 47^s$
Decl. $-\ 17°\ 37'$

1878.17	52°.4	"...	6.0...12.0	2*n*	Cin
1878.20	53.6	2.44	6.5...11.8	1*n*	β
1878.22	50.6	2.51	7.5...10.5	1*n*	J
1886.16	48.7	2.33	7.7...10.7	2*n*	W
1898.21	46.8	2.29	...	1*n*	See
1898.26	46.4	2.26	6.3...10.9	3*n*	A

Discovered with the 18½-inch. Very little, if any, change. The distance in my measure of 1878 is erroneously given in β^1 as 1".72. This is a naked-eye star in *Argo;* S.D. 6.0 m.

[β (x)...β^1...J (1)...Cin^s...Wilson (Cin^m)...See ( )... Aitken ( )...]

β 332. Piazzi VII. 116

R.A. $7^h\ 22^m\ 13^s$
Decl. $-\ 11°\ 19'$

A and B

1875.52	166°.3	0".80	6.3... 8.2	3*n*	J
1878.19	168.2	0.90	6.4... 8.2	2*n*	Cin
1880.65	169.1	1.07	6.3... 8.2	7*n*	Sp
1887.15	165.8	0.89	6.3... 8.2	6*n*	T
1887.18	165°.9	0".86	...	2*n*	Sp
1892.04	168.7	0.85	6.8... 8.1	3*n*	β

AB and D

1878.10	157°.2	23".41	... 9.8	2*n*	β
1892.10	157.8	23.32	...11.0	2*n*	β
1899.05	156.8	23.08	...11.0	1*n*	β

AB and E

1878.16	41°.4	31".06	...12.5	1*n*	β
1892.10	42.8	32.21	...11.7	2*n*	β
1899.05	43.0	32.28	...12	1*n*	β

AB and C (= Σ 1097)

1832.15	312°.1	20".20	6.5... 8.7	2*n*	Σ
1847.23	313.3	20.01	...	1*n*	Ma
1868.63	312.8	20.00	6.0... 8.9	4*n*	J
1878.16	313.5	20.21	...	1*n*	β
1880.21	312.7	20.02	... 8.9	4*n*	Sp
1887.15	314.5	20.66	... 8.9	6*n*	T
1892.04	312.7	19.88	... 9.0	3*n*	β
1899.05	313.4	19.84	...10.0	1*n*	β

The duplicity of the principal star of Σ 1097 was discovered with the 6-inch. It was suspected by J when measuring the Σ star in 1865. Thus far there is no certain change in the close pair. The small star D is mentioned by H in his *Second Catalogue.* All the measures of the small stars and the Σ companion are given above. The latter is certainly fixed. The 18½-inch shows a faint star about 12" from C in the direction of 305°.

The principal star (B.A.C. 2470 = Lalande 14551) is a naked-eye star; ARGELANDER and HEIS 6 m, and placed in *Monoceros.* This star is variable 6.1 to 6.8 in about 14 days; discovered by ESPIN in 1883 (*Mon. Not.* XLIII, 432) (*Observatory* XI, 192).

[β (VI)...β (2062,3141)...β^1...β (*Am. Jour. Sci.* April 1875) ...β (*Pub. L. O.* II)...J (II)...Sp (II, II app.)...Cin^s... Tarrant (2809)...Madler (*Fixstern-Systeme* II)...Herschel (*Mem. R. A. S.* III, IX)...*Radcliffe Obsns.* XXIII...]

β 1194. 65 *Geminorum*

R.A. $7^h\ 22^m\ 21^s$
Decl. $+\ 28°\ 10'$

1890.88	289°.5	13".91	5.5...14.0	3*n*	β
1898.90	288.2	13.33	5.0...14.2	3*n*	A
1899.02	288.8	13.23	...13.5	1*n*	β

Discovered with the 36-inch. The proper motion, from AUWERS, is 0".034 in the direction of 238°.3.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken ( )...]

β 22. W⁸ VII. 689

R.A. 7ʰ 25ᵐ 30ˢ
Decl. + 33° 7'

1875.32	149°.5	6".48	8.0...11.0	4*n*	Δ
1880.68	151.7	6.14	8.2...10.4	4*n*	β
1890.91	150.4	6.42	8.3...10.0	3*n*	β

Discovered with the 6-inch. Fixed.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3048)...β (*Pub. L. O.* II)...]

β 579. W⁸ VII. 726

R.A. 7ʰ 26ᵐ 40ˢ
Decl. + 33° 23'

A and B

1878.24	219°.1	0".84	7.2...11.5	1*n*	β
1886.31	219.6	1.07	...	1*n*	HΣ
1890.90	213.9	0.90	7.9...10.0	3*n*	β
1898.11	214.2	1.12	...	1*n*	D
1898.24	230.0	1.07	...	1*n*	I.

A and C (= OΣ 173 *rej.*)

1843.27	234°.1	18".86	...	1*n*	Ma
1869.76	233.6	18.23	...12.0	1*n*	Δ
1880.15	234.0	18.94	...10.9	2*n*	β
1886.31	233.0	19.11	...	1*n*	HΣ
1898.11	233.1	18.52	...	2*n*	D
1898.24	231.3	16.72	...	1*n*	I.
1899.08	234.6	18.94	...11.5	1*n*	β

A and D

1867.90	347°.3	43".09	... 9.0	3*n*	Δ
1880.15	349.7	43.06	... 8.5	1*n*	β
1886.31	347.7	43.41	...	1*n*	HΣ
1898.11	347.7	43.44	...	2*n*	D
1899.08	348.7	43.80	...10.0	1*n*	β

The duplicity of the principal star of OΣ 173 *rej.* was suspected with the 6-inch in 1875, and verified subsequently with the 18½-inch. The OΣ pair was rejected in the second edition of the *Poulkowa Catalogue* by reason of the distance of the companions. All the measures of these stars are given.

[β (x)...β¹...β³...β (3048)...β (*Pub. L. O.* II)...Δ (I, p. 157)...Doolittle (*Pub. Flower Obsy.* I)...Lewis (*Mon. Not.* LIX, 400)...Madler (*Dorpat Obsvt.* XI)...]

β 200. 70 *Geminorum*

R.A. 7ʰ 30ᵐ 40ˢ
Decl. + 35° 19'

C and D

1876.02	241°.8	1".49	10.0...11.0	2*n*	Δ
1880.11	241.8	1.42	9.0...10.0	3*n*	β
1892.06	242.2	1.74	9.3...10.1	3*n*	β
1898.96	244.2	1.82	9.5...11.5	1*n*	β

C and E

1880.09	206°.6	17".20	...13.0	1*n*	β
1892.10	203.3	17.48	...13.5	2*n*	β
1898.96	207.2	17.74	...13.0	1*n*	β

A and B (= H⁸ VI. 70)

1876.78	190°.0	98".43	...11.0	1*n*	Δ
1892.04	190.0	98.94	...10.2	2*n*	β
1898.79	190.6	99.23	...10.5	2*n*	β

A and C

1876.02	98°.7	162".02	5.0...	2*n*	Δ
1880.15	100.7	160.47	...	2*n*	β
1892.04	98.5	161.46	...	2*n*	β
1898.79	98.8	160.66	... 9.7	2*n*	β

The distant stars, B and C, were noted by H⁸, and given without measures. The duplicity of C was discovered with the 6-inch. The above are all the measures of the several companions. AUWERS gives the proper motion of A 0".029 in the direction of 35°.5.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β¹...β (3114)...β (*Pub. L. O.* II)...Δ (I)...]

β 201. Lalande 11915

R.A. 7ʰ 33ᵐ 42ˢ
Decl. − 20° 0'

1876.41	330°.6	2".89	8.0... 8.5	3*n*	Δ
1878.05	329.0	2.82	7.4... 8.0	2*n*	Cin
1880.16	330.8	2.79	7.0... 8.0	1*n*	Cin

1883.14	330°.7	3".21	8.0...	8.3	2*n*	W
1886.20	331.0	2.80	7.0...	8.0	1*n*	LM
1889.02	331.1	2.84	7.8...	8.1	3*n*	Lv
1898.10	332.9	2.78	7 ...	8	2*n*	Sc
1898.16	332.6	3.46	...		1*n*	See

Discovered with the 6-inch. Evidently fixed.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Δ (1)...Cin^{1}...Cin^{6}...Wilson (Cin^{m})...LM...Lv^{1}...Scott (*Mem. Not.* LIX, 427)...See ( )...]

β 1061. κ *Argus*

R.A. 7^{h} 33^{m} 54^{s}
Decl. — 26° 32'

B and C

1889.12	229°.3	6".46		...13.8	3*n*	β
1898.27	228.6	6.25		...	1*n*	See
1898.27	228.0	6.87	4	...14.5	2*n*	A

A and B (= H^{1} III. 27)

1826.5	315°.8	8".76	6½...	6½		Dunlop
1836.67	317.8	10.41	5 ...	5	3*n*	H^{1}
1878.20	318.4	9.96	5.0...	5.0	1*n*	Cin
1882.10	318.2	10.13	4.3...	4.7	2*n*	Wilson
1889.12	318.5	9.98	4.1...	4.1	3*n*	β
1898.27	318.1	9.72	4+...	4+	2*n*	A

The minute star was discovered with the 36-inch. The bright star has no sensible proper motion.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...See ( )...Aitken ( )...]

The bright stars which make H^{1} III.27 appear to be relatively fixed. Some of the measures are given. All will be found in the following:

[Dunlop (*Mem. R. A. S.* III)...Herschel (*Cape Obsns.*)...Powell (*Mem. R. A. S.* XXV)...Jacob (*Mem. R. A. S.* XVII)...Worster and Jacob (*Madras Obsns.* 2d Series)...Secchi (*Catalogo di 1321 Stelle Doppie*) (*Atti dell Accad. Pont. de Nuovi Lincei*, Anno VII)...*Radcliffe Obsns.* XXIII...Cin^{5}...Wilson (Cin^{m})...]

β 580. β *Geminorum* (Pollux)

R.A. 7^{h} 37^{m} 58^{s}
Decl. + 28° 19'

C and D

1878.10	128°.0	1".40	10	...12.5	2*n*	β
1889.14	130.9	1.14	9.5...	12.5	1*n*	β
1892.14	130°.6	1".14	10	...11.8	3*n*	β
1898.89	131.2	1.27	10.0...	13.0	1*n*	A
1899.02	140.7	1.02	9.7...	11.5	1*n*	β

A and B

1880.22	275°.3	41".39	2	...13.5	1*n*	β
1892.14	277.9	34.10		...14.3	3*n*	β
1898.88	280.0	30.22		...15.0	2*n*	A
1898.96	278.1	30.88		...15.0	1*n*	β

A and C (= H^{1} VI. 42 = S 559)

1781.90	65°.5	116".75		...	1*n*	H^{1}
1825.10	66.4	132.3±		...20	2*n*	S
1878.73	71.0	174.61		...	2*n*	β
1884.27	71.1	176.98		...11.2	1*n*	HΣ
1898.81	71.7	187.57		...10.7	1*n*	β
1898.87	71.8	187.72		...10.0	1*n*	A

A and E

1877.08	90°.4	205".5		...12.5	1*n*	Flm
1879.24	90.0	206.30		... 9.5	1*n*	β
1898.81	90.0	218.54		...11.0	1*n*	β
1898.87	90.0	219.10		...10.0	1*n*	A

A and F (= Σ 5 App. II)

1781.90	74°.1	160".70		...	1*n*	H^{1}
1825.10	72.7	198.47		...15	2*n*	S
1836.26	73.9	203.84	2.0...	11.0	3*n*	Σ
1850.71	74.4	213.28		...10.5	2*n*	OΣ
1867.52	75.1	223.41		...10.5	4*n*	$\lrcorner$
1879.24	75.3	229.24		...11.0	1*n*	β
1884.21	75.6	233.15		...	2*n*	HΣ
1898.81	76.3	242.87		...10.5	1*n*	β
1898.87	75.8	242.57		...10.0	1*n*	A

C and F

1851.88	89°.8	57".40		...	3*n*	OΣ
1884.16	89.5	57.98		...	1*n*	HΣ
1898.96	89.4	58.01		...	1*n*	β

C and E

1898.96	145°.2	71".12		...	1*n*	β

The duplicity of Herschel's distant companion to *Pollux* was discovered with the 18½-inch. The nearest star, B, was found with the same instrument. The measures show no sensible motion in CD. β

Geminorum has a proper motion of 0".637 in the direction of 266°.0 (AUWERS). The change in the position of the faint star, B, is due to this movement of A. With this proper motion and the measures of 1892, the minimum distance of 7".0 will occur about 1945. It will then be a very difficult object, and beyond the reach of most telescopes. It is not easily seen now with any aperture.

The change in the distant stars, C, E, and F, corresponds to the proper motion of A.

[β (x)...β^1...β^2...β (2930,3141)...β (*Pub. L. O.* II)... Aitken ( )...]

The following, in addition to the catalogues of H[1], South and Σ, relate to the distant stars:

[J (II)...Flammarion (*Etoiles Doubles et Multiples*)...OΣ (*Poulkowa Obsns.* X, p. 77)...]

β 1062. 82 *Geminorum*

R.A. 7h 41m 23s
Decl. + 23° 26′

1889.10	32°.3	4".06	6.0...13.5	3*n*	β
1898.96	35.8	3.82	...13.5	1*n*	β

Discovered with the 36-inch. The principal star (*Berlin A.G. Catalogue*) has a proper motion of 0".030 in the direction of 299°.8. The interval is too short to show whether the companion has the same movement.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...]

β 1063. ξ *Argus*

R.A. 7h 44m 15s
Decl. — 24° 34′

1889.12	188°.7	4".63	4.0...13.8	3*n*	β
1898.24	223.8	4.87	...	2*n*	See
1898.27	189.8	4.92	4.2...14.0	2*n*	A

Discovered with the 36-inch. The principal star has a small proper motion, 0".029 in the direction of 326°.3 (AUWERS). So far there is no change in the companion.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...See ( )...Aitken ( )...]

β 1195. Lalande 15331

R.A. 7h 45m 35s
Decl. — 9° 6′

1891.00	81°.4	0".46	7.3...	7.6	3*n*	β
1898.06	81.6	0.46	7.7...	7.7	2*n*	A

Discovered with the 36-inch.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken ( )...]

β 101. 9 *Argus*

R.A. 7h 46m 13s
Decl. — 13° 35′

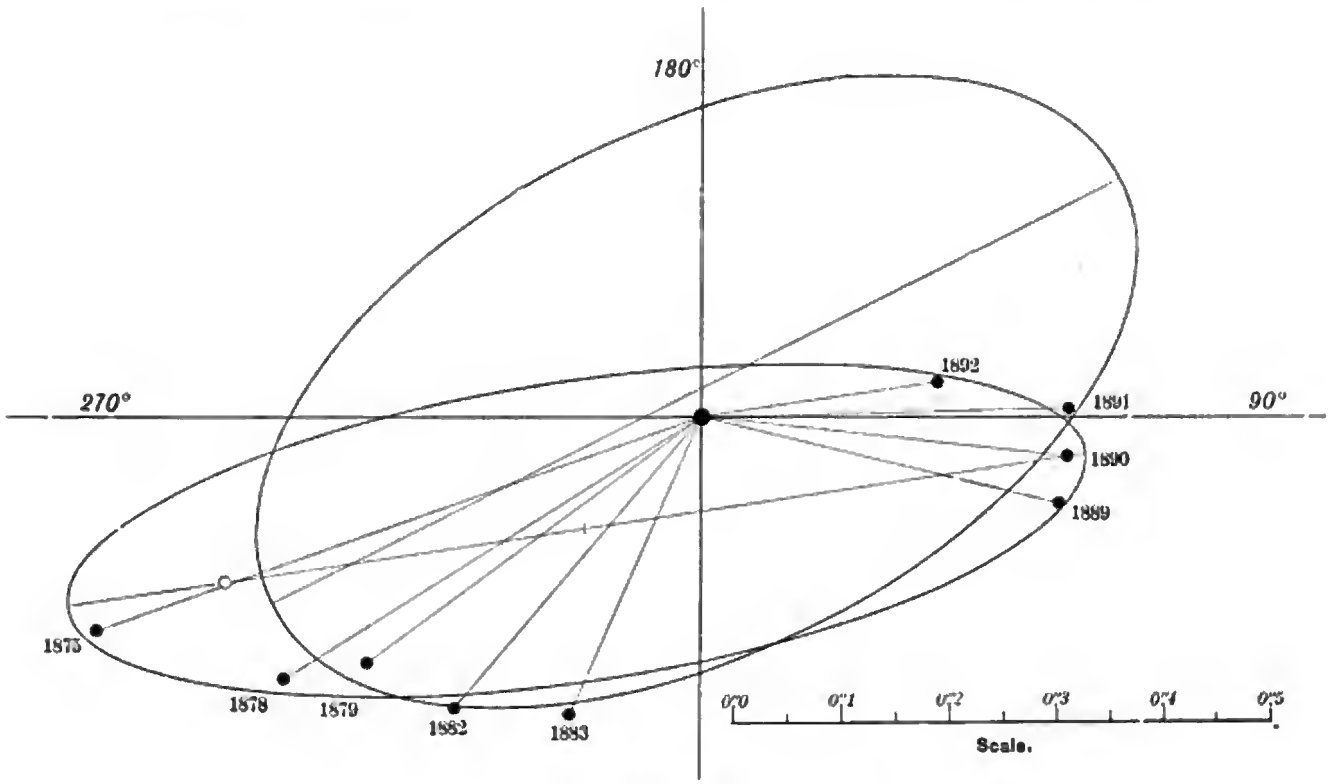
1875.24	289°.7	0".58	5.6...	6.7	2*n*	J
1878.47	302.6	0.45	5.5...	6.7	4*n*	Cin
1878.52	301.8	0.46	5.2...	6.5	2*n*	β
1879.68	306.2	0.38	5.0...	7.0	2*n*	Hl
1882.21	319.7	0.35	6.0...	7.0	4*n*	Sp
1883.11	336.2	0.3±	...		1*n*	β
1888.26	356.1	0.29	...		5*n*	Sp
1889.08	76.4	0.34	5.7...	6.3	4*n*	β
1890.19	83.0	0.4±	...		2*n*	Sp
1890.26	84.6	0.31	...		4*n*	β
1890.96	88.3	0.36	5.8...	6.3	3*n*	β
1891.15	94.7	0.3±	...		1*n*	Sp
1892.05	98.7	0.22	...		3*n*	β
1892.26	165.2	0.25	...		2*n*	Sp
1893.24	158.0	0.23	...		8*n*	Sp
1894.06	282.0	0.43	...		6*n*	Bar
1894.24	286.6	0.35	...		2*n*	Com
1894.25	280.2	0.44	...		6*n*	Sp
1894.84	287.2	0.63	...		4*n*	Bar
1895.21	285.2	0.42	...		2*n*	Com
1895.22	285.4	0.58	...		5*n*	Bar
1895.24	282.4	0.51	...		5*n*	Sp
1895.30	283.8	0.58	...		3*n*	See
1896.21	288.1	0.53	...		1*n*	Sp
1896.24	287.0	0.49	...		3*n*	Com
1896.86	292.1	0.54	...		3*n*	Ait
1897.38	290.4	0.69	5.7...	6.3	4*n*	Doo
1897.81	288.8	0.64	...		1*n*	β
1897.85	292.7	0.62	...		3*n*	Ait
1897.95	292.9	0.61	...		3*n*	Hussey
1898.13	294.3	0.67	...		2*n*	Hussey
1898.18	292.5	0 62	...		2*n*	Brown
1898.23	292.3	0.63	...		2*n*	Doo
1898.28	289.4	0.61	6.5...	6.5	3*n*	Ait
1899.19	293.0	0.60	...		2*n*	Ait

Discovered with the 6-inch. One of the most interesting of the rapid binaries from its short period, and the proper motion of the system.

Four orbits have been found for this pair, using the measures to the dates given:

1892	Glasenapp	40.54 years	*Mon. Not.* LII. 546
1892	Burnham	23.3 years	Pub. L.O. II. 239
1892	Glasenapp	23.33 years	*Mon. Not.* LIV. 318
1895	See	22.00 years	A. N. 3297

be substantially correct by the measures of BARNARD in 1894 (*Ast. and A.-P.* XIII. 290) and subsequent observations. GLASENAPP'S second orbit is from this apparent ellipse, and of course gives the same elements. So far this ellipse appears to satisfy the observations as well as could be desired, and any improvement in the period and other elements can only come when a considerable portion of the second revolution has taken place, particularly on the following side where the angular



9 Argus. β 101.

The first three are based upon the same measures, but GLASENAPP allowed an error much too great in the distance given in my measures in 1892. I called attention to this (*Astronomy and Astro-Physics*, XII. 494), and gave another orbit, which satisfied this as well as the prior measures, and predicted a change in the position-angle of more than 180° in the two years following the measures of 1892, thus completing nearly one entire revolution since the first measures. This orbit was shown to

change is rapid. These orbits are shown in the accompanying diagram, reproduced from *Publications of the Lick Observatory*, Vol. II:

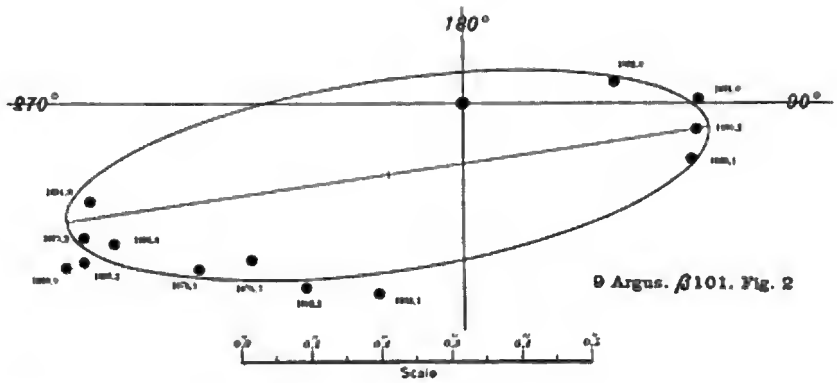
This system has a considerable proper motion:

Auwers	0".351	in 195°.4
Porter	0.343	in 193.5

It was evident at the beginning, before it was measured at all, that this was a binary, as otherwise

the proper motion of one star in two or three years would make it a very easy pair, and one which could not have been overlooked by prior observers.

In Fig. 2 the same ellipse, which is given in the previous diagram, is shown, with the addition of some of the recent positions. It will be seen that so far the orbit I found in 1892 satisfactorily represents the recent measures.



9 Argus. β101. Fig. 2

[β (II)...β (*Mon. Not.* XXXIII, 437)...β^1...β^3 (2930,2970, 3048,3114)...β (*Ast. & A.-P.* XII, 494; XIII, 200)...J (II)...III (I)...III (*Wash. Obsrvt.* 1879, 1880)...Cin^5... Sp (II, II app., III)...Glasenapp (*Mon. Not.* LII, 546; LIV, 318)...Gore (*Mon. Not.* XLVII, 61)...Everett (*Mon. Not.* LVI, 464)...Comstock (*Ast. & A.-P.* XIII, 518) (*Pub. Washburn Obsy.* X)...See (*Evolution of the Stellar Systems* I) (*A. J.* 349, 378)...See (3297,3314)...Aitken (3465) (*A. J.* 429)...Hussey (*A. J.* 427)...Doolittle (*A. J.* 416) ...Aitken ( )...Hussey ( )...Doolittle (*Pub. Flower Obsy.* I)...Barnard (*A. J.* 447)...Brown ( )...]

β 902. Lalande 15575

R.A. $7^h\ 52^m\ 22^s$
Decl. $-10°\ 34'$

1879.18	247.1	1.33	8.0...11.0	1*n*	β
1879.27	244.3	1.18	8.0...11.0	1*n*	Cin
1892.20	243.7	1.17	8.0...11.3	3*n*	Lv

Discovered with the 18½-inch. Further measures are needed.

[β (XIII)...β^3...Cin^5...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.*, 1892)...]

β 23. D.M. (3°) 1876

R.A. $7^h\ 56^m\ 14^s$
Decl. $+\ 3°\ 26'$

1875.54	177.0	2.81	8.2...12.0	2*n*	J
1891.97	181.9	2.62	8.0...10.8	3*n*	β
1898.12	178.0	2.48	8..0..11.5	2*n*	A

Discovered with the 6-inch. Probably unchanged. A faint pair in the field *n p*.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...J (I)...Aitken ( )...]

β 333. *Argus* 269

R.A. $7^h\ 56^m\ 7^s$
Decl. $-22°\ 0'$

A and B

1877.19	43.1	2.03	7.0... 9.5	1*n*	Cin
1879.09	45.4	1.44	7.0...10.2	4*n*	Cin
1885.66	43.6	1.70	7.7...10.0	1*n*	W
1893.22	39.4	1.45	7 ... 9	2*n*	Sel
1897.83	45.8	2.02	7 ... 8.8	1*n*	See
1898.23	36.7	1.62	7 ...10	1*n*	D

A and C

1885.66	73.5	42.15	7.7... 7.7	2*n*	W
1898.23	72.3	42.39	...	2*n*	D

Discovered with the 6-inch. Apparently without change. Lalande 15720. C is Lalande 15721. The magnitudes are discordant; L 8½; S.D. 8.4; Cin.Z. 7.7.

[β (VI)...β (2062)...Cin^4...Cin^5...Wilson (Cin^{29})...Sellors (3240)...See (3495)...Doolittle (*Pub. Flower Obsy.* I)...]

β 202. O. Arg. S. 7850

R.A. $7^h\ 56^m\ 59^s$
Decl. $-26°\ 53'$

A and B

1876.09	164.8	8.18	7.5... 9.0	1*n*	β
1878.16	160.4	7.74	7.0... 9.7	2*n*	Cin
1883.11	164.4	...	7.5...10.0	1*n*	W
1892.10	160.7	7.77	7.2...10.0	3*n*	β
1892.19	160.3	7.62	7.3...10.4	3*n*	Lv
1897.85	160.8	7.39	6 ...11.5	1*n*	See
1899.09	161.2	7.60	8.0...11.0	1*n*	β

A and C

1897.85	77.1	19.37	...13.6	1*n*	See

A and D

1897.85	239.2	29.43	...12	1*n*	See

Discovered with the 6-inch. Probably fixed.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3114)...β (*Pub. L. O.* II)...Cin³...Cin⁴...Cin⁵...Wilson(Cin⁶)...Lv(*Proc. Haverford Coll. Obsy.*, 1892)(*A. J.* 278)...See (3495)...]

β 203. O. Arg. S. 7874

R.A. $7^h\ 57^m\ 41^s$
Decl. $-27°\ 13'$

1876.11	242.5	7.15	7.7... 8.5	7*n*	Cin
1879.09	243.8	6.94	7.0... 8.5	1*n*	Cin
1883.11	245.2	7.15	7.0... 9.0	1*n*	W
1898.14	242.2	7.41	...	1*n*	See

Discovered with the 6-inch. No sensible change. A 9 m star 64″ distant in 73°.7.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Cin³...Cin⁵...Wilson (Cin⁶)...See ( )...]

β 581. Lalande 15743

R.A. $7^h\ 57^m\ 43^s$
Decl. $+12°\ 38'$

A and B

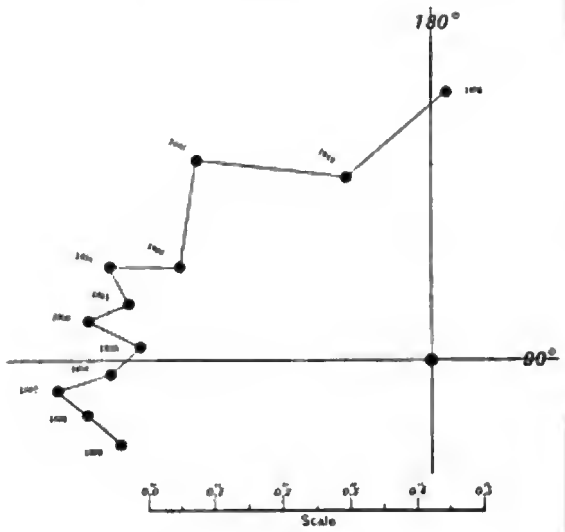
1878.15	176.9	0.40	8.0... 8.0	2*n*	β
1878.22	180.3	0.40	8.7... 8.7	1*n*	J
1883.37	205.2	0.30	...	5*n*	En
1886.26	229.6	0.46	...	2*n*	HΣ
1889.23	249.8	0.4±	...	4*n*	Sp
1890.21	253.7	0.5±	...	4*n*	Sp
1891.97	259.4	0.46	8.5... 8.6	4*n*	β
1893.24	263.2	0.51	...	9*n*	Sp
1893.31	273.1	0.84	...	1*n*	Lew
1893.93	266.0	0.55	...	1*n*	Bar
1894.17	262.3	0.50	...	4*n*	HΣ
1894.27	266.8	0.47	...	4*n*	Sp
1895.22	267.9	0.43	...	3*n*	Sp
1895.24	266.8	0.50	...	1*n*	HΣ
1895.28	278.3	0.45	...	1*n*	Lew
1895.28	271.9	0.34	...	3*n*	Com
1896.18	272.8	0.59	...	3*n*	Lew
1896.24	272.9	0.37	...	3*n*	Com
1896.94	274.9	0.56	...	3*n*	A
1897.81	275.5	0.56	...	1*n*	β
1898.16	271.0	0.35	...	1*n*	Bow
1898.18	282.0	0.59	...	3*n*	Br
1898.25	281.4	0.49	...	1*n*	Lew
1898.27	278.0	0.45	...	1*n*	Sp
1899.16	285.1	0.48	8.0... 8.0	2*n*	A

AB and C

1878.13	185.3	4.76	...10.5	3*n*	β
1878.22	184.3	4.76	...11.0	1*n*	J
1886.25	189.5	4.36	...	1*n*	HΣ
1891.97	192.7	4.60	...11.5	4*n*	β
1892.13	190.5	...	...11.0	1*n*	Col
1894.17	191.6	4.58	...	4*n*	HΣ
1895.24	192.3	4.60	...	1*n*	HΣ
1895.28	199.3	4.82	...	1*n*	Lew
1896.18	197.0	5.13	...	3*n*	Lew
1896.94	196.7	4.42	...11+	2*n*	A
1897.81	193.3	4.50	...	1*n*	β
1898.18	195.9	4.55	...	1*n*	Br
1898.25	201.7	4.89	...	1*n*	Lew
1899.02	192.5	4.83	...	1*n*	β
1899.16	194.1	4.73	...11.0	2*n*	A

This most interesting triple system was discovered with the 18½-inch. The close pair is in rapid direct angular motion, with no sensible change in the distance. The third star, C, is also moving in the same direction more slowly. This system bears a close resemblance, in all respects, to ζ *Cancri*, except as to the magnitudes of the com-

ponents. The principal positions of the close pair are shown in the following diagram:



β 581

The proper motion of this star, if any, is not large. PORTER finds, from an examination of the meridian observations, that an annual proper motion of 0″.12 in the direction of 180° would best represent them, but from the lack of observations this value is not certain. Whatever the movement may be, it is evidently common to the three components.

[β (x)...β^2...β (*Mon. Not.* LII, 438)...β (3114)...β (*Pub. L. O.* II)...Δ (1)...Engelmann (2678)...Sp (III)...Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Comstock (*Pub. Washburn Obsy.* X)...Lewis (*Mon. Not.* LIV, 315; LVI, 359; LIX, 400) (*Greenwich Obsns.* 1895) ...Aitken (3465)...Lewis ( )...Barnard (*A. J.* 447)... Brown ( )...HΣ ( )...Aitken ( )...]

β 582. D.M. (12°) 1760

R.A. 7h 58m 6s
Decl. + 12° 25′

B and C

1878.09	59°.8	3″.76	...12	2*n*	β
1879.28	59.1	3.60	...11	1*n*	Cin
1891.99	57.6	3.93	...11.5	3*n*	β
1896.14	58.0	4.39	...	1*n*	Lew
1899.02	55.1	3.59	...12.0	1*n*	β

A and B (= Σ 1179)

1829.73	205°.2	17″.91	8.5... 8.5	2*n*	Σ
1847.20	204.3	18.38	...	1*n*	Ma
1863.13	205.0	20.71	...	1*n*	En
1864.90	204.6	19.16	8.9... 8.9	5*n*	Δ
1878.09	204.5	19.75	...	2*n*	β
1879.28	204.8	19.86	8.0... 8.0	1*n*	Cin
1880.18	203.5	19.52	...	2*n*	Pt
1881.18	203.8	19.73	...	1*n*	Big
1891.99	204.2	19.93	8.7... 8.7	3*n*	β
1896.14	204.8	20.43	...	1*n*	Lew
1899.02	203.9	20.26	8.3... 8.3	1*n*	β

The small companion to B of Σ 1179 was discovered with the 18½-inch. The change in AB is due to proper motion, probably of the brighter component. This movement appears to be about 0″.03 in a direction nearly opposite B. All the measures of these stars are given above.

[β (x)...β^2...β (3114)...β (*Ast. & A. J.* XIII, 17)...β (*Pub. L. O.* II)...Cin5...Lewis (*Mon. Not.* LIX, 400)...Madler (*Fixstern-Systeme* II)...Engelmann (*Mess. Neunzig Doppelsternen*)...Bigourdan (*Paris Obsns.* 1883)...Pritchett (*Pub. Morrison Obsy.* I)...]

β 903. Lalande 15768

R.A. 7h 58m 9s
Decl. — 1° 31′

1879.27	28°.2	1″.48	8.5... 9.5	1*n*	Cin
1879.60	33.7	1.47	7.8... 9.3	5*n*	β
1892.11	32.8	1.54	8.2... 9.0	3*n*	β

Discovered with the 18½-inch. Unchanged.

[β (XIII)...β^2...β (3114)...β (*Pub. L. O.* II)...Cin5...]

β 334. Lalande 15933

R.A. 8h 2m 3s
Decl. — 21° 42′

1877.14	352°.4	2″.38	8.0... 8.7	2*n*	Cin
1880.18	354.2	...	...	1*n*	Cin
1894.23	352.3	2.55	8 ... 9	1*n*	Sel
1897.83	352.5	2.90	7.1... 8.1	1*n*	See

Discovered with the 6-inch.. Apparently fixed.

[β (VI)...β (2062)...Cin4...Cin5...Sellors (3303)...See (3496)...]

β 583. Lalande 15959

R.A. 8h 3m 18s
Decl. − 6° 21′

1878.10	68°.5	1″.82	8.5... 8.7	1*n*	β
1878.16	68.4	1.76	9.0... 9.7	2*n*	Cin
1878.26	67.5	1.71	9.5...10.0	1*n*	J
1892.11	69.5	1.70	8.9... 9.1	3*n*	β

Discovered with the 18½-inch. Without change.

[β (x)...β...β (3114)...β (*Pub. L. O.* II)...J (1)...Cin²...]

β 1064. 19 *Argus*

R.A. 8h 5m 39s
Decl. − 12° 34′

A and B

1889.08	244°.9	1″.84	6 ...12.5	4*n*	β
1898.31	246.0	2.88	6 ...12	1*n*	A
1899.26	244.2	2.31	6 ...13.5	1*n*	β

A and C

1898.29	298°.6	33″.20	...14.5	2*n*	A

A and D (= H² IV. 26 = Sh 91)

1826.65	256°.0	70″.17	4 ...10	2*n*	Sh
1889.08	255.8	70.67	6 ... 9	3*n*	β
1898.27	256.1	71.85	6 ... 9	1*n*	A
1898.96	256.0	71.44	...	1*n*	β

The close star was discovered with the 36-inch. All the measures of the distant star, D, are given. The large star has a proper motion, according to AUWERS, of 0″.050 in the direction of 295°.9. The faint star C was first noted by AITKEN. There is also a 11.5 m star, 277°.3 : 65″.7.

[β (xv)...β (2929)...β (*Pub. L. O.* II)...Aitken ( )...]

β 204. Lalande 16074

R.A. 8h 7m 2s
Decl. + 10° 45′

1875.89	302°.1	1″.06	7.1...10.1	4*n*	J
1877.25	305.0	0.95	7.0... 9.5	1*n*	OΣ
1879.13	304.1	0.99	7.5... 9.0	1*n*	β
1886.21	298.4	1.40	...	1*n*	HΣ
1889.11	304.2	1.01	7.8... 9.4	1*n*	Lv
1892.25	303.8	0.87	...	3*n*	Sp
1893.24	301.7	0.84	...	3*n*	Sp

Discovered with the 6-inch. There does not appear to be any motion.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β²...OΣ (*Poulkowa Obsrs.* X)...J (1)...Lv²...Sp (III)...HΣ ( )...]

β 1243. B.A.C. 2759

R.A. 8h 7m 19s
Decl. + 18° 2′

A and B

1891.23	344°.7	1″.40	7.1...13	2*n*	β
1894.15	343.2	1.38	...	2*n*	Bar
1898.29	348.4	1.40	...	1*n*	β

A and C (= H¹ VI. 78)

1898.31	301°.7	64″.60	... 9.3	2*n*	β

Discovered with the 36-inch. It is 2m *f* and 104″ *n* of ζ *Cancri*, and is the star which I suggested (*Mon. Not.* April 1891) would be suitable to compare with C of ζ *Cancri* to determine whether the latter has any variable motion due to the presence of an invisible star. In measuring this difference of declination the very minute companion given above was detected. So far the measures show no certain change. The *Berlin A. G. Catalogue* gives the principal star a small proper motion, 0″.033 in the direction of 334°.6.

The distant star C, making H¹ VI.78, was not measured by HERSCHEL, being merely noted as Class VI. All the measures of this star are given.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II, pp 66, 225)...Barnard (*A. J.* 447)...]

β 1244. D.M. (2°) 1904

R.A. 8h 7m 31s
Decl. + 2° 21′

1891.23	50°.3	0″.74	7.9... 8.1	3*n*	β
1892.88	51.1	0.70	8.0... 8.0	1*n*	J
1893.22	49.6	0.70	...	2*n*	Sp
1894.25	48.0	0.73	...	3*n*	Sp
1896.27	40.1	0.65	...	1*n*	Lew
1897.29	46 9	0.82	...	4*n*	A

Discovered with the 36-inch. The measures do not show any sensible motion.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Aitken (3465)...Lewis (*Mon. Not.* LIX, 400)...Sp (III)...]

β 904. S.D. (5°) 2435

R.A. 8h 7m 52s
Decl. − 5° 23′

1880.16	81°.3	3″.12	8.4 . . . 10.0	4*n*	β
1892.18	80.2	3.18	8.0 . . . 11.0	4*n*	Lv.C

Discovered with the 18½-inch. One of the brighter stars of the large cluster, DREYER 2548.

[β (XIII) . . . β¹ . . . Lv and Collins (*Proc. Haverford Coll. Obsy.* 1892) (*A. J.* 278) . . .]

β 1196. D.M. (60°) 1127

R.A. 8h 8m 55s
Decl. + 59° 57′

1890.97	62°.0	0″.45	8.5 . . . 10.5	2*n*	β
1899.17	55.2	0.29	8.5 . . . 10.0	1*n*	A

This is 63s *f* a 6 m star, and 40″ *n*. Discovered with the 36-inch. In D.M. 9.2 m.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . . Aitken ( ) . . .]

β 1065. β *Cancri*

R.A. 8h 10m 0s
Decl. + 9° 33′

1889.11	294°.7	29″.14	3.5 . . . 14	3*n*	β
1898.27	293.6	29.38	3.5 . . . 13.8	2*n*	A
1898.94	294.8	28.99	. . . 13.6	3*n*	β

The faint companion was detected with the 36-inch. AUWERS gives 0″.074 in the direction of 237°.2 as the proper motion of β *Cancri* The companion seems to be moving with it, but further measures are necessary to make this certain.

[β (XV) . . . β (2929) . . . β (*Pub. L. O.* II) . . . Aitken ( ) . . .]

β 454. O. Arg. S. 8280

R.A. 8h 10m 12s
Decl. − 30° 30′

1877.30	18°.6	2″±	8.0 . . . 10.0	1*n*	β
1892.20	16.3	2.41	8.1 . . . 9.4	3*n*	β
1892.26	16.6	2.49	7 8 . . . 9.8	2*n*	Lv
1898.27	16.0	2.49	. . .	1*n*	See

Discovered with the 6-inch. No evidence of motion. SEE measures a 14 m star 287°.5 : 19″.12 (1898.27) 1*n*.

[β (IX) . . . β (*Mon. Not.* XXXVIII, 78) . . . β (3141) . . . β (*Pub. L. O.* II) . . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.*, 1892) . . . See ( ) . . .]

β 905. O. Arg. S. 8288

R.A. 8h 10m 59s
Decl. − 15° 57′

1879.72	12°.2	3″.75	7.8 . . . 10.4	4*n*	β
1883.86	13.7	3.75	8.2 . . . 10.4	2*n*	W
1888.57	11.0	4.06	8.1 . . . 10.4	2*n*	Lv
1893.20	12.1	3.76	8.0 . . . 10.0	1*n*	I
1898.19	14.5	3.94	. . .	1*n*	See
1898.26	12.2	3.92	8.0 . . . 10.5	3*n*	A

Discovered with the 18½-inch. Relatively fixed.

[β (XIII) . . . β¹ . . . Wilson (Cin^ti) . . . Lv¹ . . . Jones (*A. J.* 312) . . . See ( ) . . . Aitken ( ) . . .]

β 102. Lalande 16234

R.A. 8h 11m 0s
Decl. − 8° 39′

1875.41	121°.5	3″.08	7.0 . . . 10.5	3*n*	J
1892.08	120.8	3.30	7.4 . . . 10.0	3*n*	β

Discovered with the 6-inch. The change, if any, is insignificant.

[β (II) . . . β (*Mon. Not.* XXXIII, 437) . . . β (3141) . . . β (*Pub. L. O.* II) . . . J (1) . . .]

β 906. Lalande 16259

R.A. 8h 11m 23s
Decl. − 15° 52′

1879.97	187°.1	3″.45	8.2 . . . 10.8	4*n*	β
1884.12	189.1	3.27	8.7 . . . 11.2	1*n*	W
1898.26	188.1	3.42	. . .	1*n*	See
1898.26	187.4	3.42	8.3 . . . 11.2	3*n*	A

Discovered with the 18½-inch. Fixed. Near β 905.

[β (XIII) . . . β¹ . . . Wilson (Cin^ti) . . . See ( ) . . . Aitken ( ) . . .

β 576. Lalande 16300

R.A. $8^h\ 13^m\ 59^s$
Decl. $+34°\ 19'$

1878.05	143°.1	1".48	7 ...13	1*n*	β
1899.02	147.9	1.37	7 ...13	1*n*	β

Discovered with the 18½-inch. By a clerical mistake, the place of this star was given in β (x) with an error of 1^h in R.A and 1° in Decl., as appears from the record made at the time of discovery. The correct place is given above.

[β (x1...β'...]

β 907. S.D. (12°) 2462

R.A. $8^h\ 14^m\ 4^s$
Decl. $-12°\ 27'$

1879.74	57°.8	0".82	8.5...10.7	2*n*	β
1892.18	55.2	0.88	8.7... 9.7	3*n*	β
1899.26	52.1	0.82	9.0... 9.4	1*n*	β

This close pair of small stars is 11° *p* and 99° *n* of a 7m star. Discovered with the 18½-inch.

[β (xiii)...β'...β (3141)...]

β 1066. Lalande 16489

R.A. $8^h\ 18^m\ 31^s$
Decl. $+9°\ 49'$

1889.12	187°.7	2".25	6.8...13.2	3*n*	β
1898.96	185.5	2.28	7.0...13.0	1*n*	β

Discovered with the 36-inch. The magnitude in D.M. is 7.6.

[β (xv)...β (2929)...β (*Pub. L. O.* 11)...]

β 1067. o *Ursae Majoris*

R.A. $8^h\ 20^m\ 17^s$
Decl. $+61°\ 7'$

1889.22	191°.4	7".01	3½..15.2	3*n*	β
1892.12		Not seen with 36-inch		2*n*	β
1895.09	194.4	7.15	...	2*n*	Bar
1899.17	192.3	7.15	...15.5	1*n*	A

Discovered with the 36-inch. The large star has a proper motion of 0".176 in the direction of 229°.8 (AUWERS). There is no doubt of this being a physical system, as the small star is moving exactly with the other. If it was fixed in space, the position-angle would decrease 11° and the distance 1".27 in the interval between 1889 and 1899. It is evident from the measures that there has been no sensible change.

ENGELHARDT (*Obsns. Ast.*, II, III) measures two distant stars in the field:

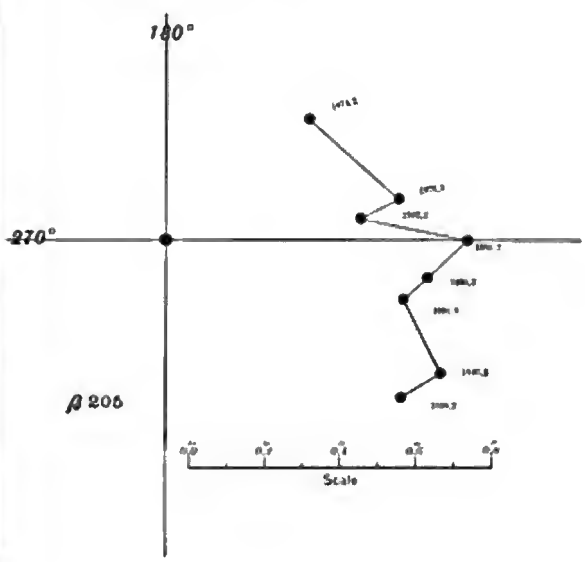
1888.30	152°.5	143".70	2*n*
1894.27	152.1	144.05	2*n*
1888.30	208.0	177.23	2*n*
1894.27	208.0	175.95	2*n*

[β (xv)...β (2029,3141)...β (*Pub. L. O.* 11)...Barnard (*A. J.* 447)...Aitken ( )...]

β 205. O. Arg. S. 8685

R.A. $8^h\ 27^m\ 54^s$
Decl. $-24°\ 12'$

1874.19	310°±	0".5+	7 ... 7		β
1877.11	280.9	1.00	7.0... 7.2	1*n*	Cin
1878.53	100.3	0.63	6.9... 7.3	1*n*	Cin
1882.21	276.6	0.52	7.0... 7.0	3*n*	Sp
1886.17	270.1	0.80	8.5... 7.7	2*n*	W
1889.16	257.0	0.74	7.0... 7.2	1*n*	Lv



1890.28	261.9	0.70	7.5 ... 7.5	2*n*	β
1891.87	256.2	0.65	7.2 ... 7.5	3*n*	β
1893.20	252.6	0.3±	7 ... 7	1*n*	Sel
1897.23	244.4	0.81	...	3*n*	Ait
1898.16	242.5	0.75	...	1*n*	See
1898.25	236.5	0.75	7.7 ... 7.8	3*n*	Ait

Discovered with the 6-inch. The change in angle is a little more than 2° per year, with perhaps a small increase in the distance, but the meaures are not very accordant. The Cordoba magnitude is 6.4. Lacaille 3377. See measures a 14.5 m star, 354°.5 : 26″.44 (1898.16) 1*n*.

The principal positions are shown in the accompanying diagram.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3048,3114)...β (*Pub. L. O.* II)...Cin⁴...Cin⁵...Wilson (Cin^m)...Sp (II)...Lv¹...Sellors (3240)...Aitken (3465)...See ( )... Aitken ( )...]

β 206. Cord. G. C. 11565

R.A. 8ʰ 30ᵐ 17ˢ
Decl. — 24° 42′

1874.19	278.6	1.5±	8.0 ... 9.0	1*n*	β
1877.11	281.7	1.99	8.0 ... 8.7	2*n*	Cin
1880.27	279.5	1.62	...	1*n*	Pt
1886.21	285.2	...	8 ... 9	1*n*	LM
1889.09	280.3	1.76	8.0 ... 8.4	3*n*	Lv
1898.19	280.2	1.93	...	1*n*	See

Discovered with the 6-inch. Probably unchanged.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Cin⁴...LM...Lv¹... Pritchett (*Pub. Morrison Obsy.* I)...See ( )...]

β 584. Piazzi VIII. 124

R.A. 8ʰ 33ᵐ 3ˢ
Decl. + 19° 58′

A and B

1878.05	291.0	1.61	8.0 ... 12.0	2*n*	β
1892.05	292.4	1.26	8.0 ... 11.7	3*n*	β

A and C (= S 571)

1825.13	157.0	45.04	7½ ... 8	2*n*	S
1875.07	156.3	45.12	7.0 ... 7.3	3*n*	J
1876.49	156.3	44.70	...	3*n*	Sch
1892.05	156.2	44.80	... 7.9	3*n*	β
1899.07	156.7	45.04	...	2*n*	β

A and D

1825.13	241.0	92.26	... 6	2*n*	S
1875.07	241.2	92.76	... 6.3	3*n*	J
1876.04	241.4	92.26	...	2*n*	Sch
1899.07	241.6	92.85	...	2*n*	β

D and C

1875.07	87.9	99.72	...	3*n*	J
1876.05	87.8	99.69	...	3*n*	Sch

The close attendant to this wide triple in *Praesepe* was discovered with the 18½-inch. The bright stars make S 571 = OΣ (App.) 95. Each of the three bright stars has a slightly different proper motion, according to RECHENBERG (A. N. 3482). He gives the movement of A as 0″.114 in the direction of 262°.4. It is evident, if this star has any such annual change, that B is moving with it, as otherwise the change in A from 1878 to 1892 would amount to 1″.6.

[β (X)...β¹...β (3114)...β (*Pub. L. O.* II)...J (I, p. 252)... *Radcliffe Obsns.* XXIII...Schur (2255)...]

β 207. Lalande 17091

R.A. 8ʰ 33ᵐ 16ˢ
Decl. — 19° 19′

1876.08	103.6	4.32	6.5 ... 10.5	3*n*	J
1877.10	106.1	4.54	6.7 ... 9.2	2*n*	Cin
1880.71	102.2	4.18	7.1 ... 9.5	2*n*	β
1888.65	102.8	4.06	7.0 ... 10.2	2*n*	Lv
1893.20	101.6	4.34	7.2 ... 10.5	2*n*	J
1898.21	101.6	4.47	...	1*n*	See

Discovered with the 6-inch. Without change. The larger star is red.

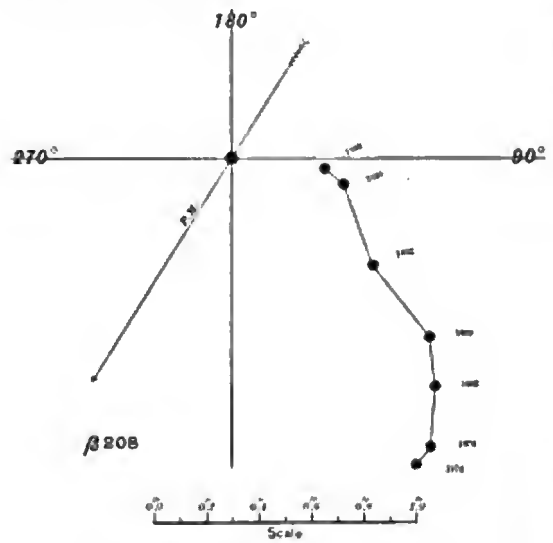
[β (IV)...β (*Mon. Not.* XXXIV, 382)...β³...J (I)...Cin⁴... Lv¹...Jones (*A. J.* 312)...See ( )...]

β 208. Lalande 17103

R.A. 8h 33m 53s
Decl. — 22° 16′

	°	″				
1874.19	30.4	1.4±	6.0...	9.0	1*n*	β
1877.13	31.7	1.71	6.0...	9.0	1*n*	Cin
1878.43	33.9	1.37	6.0...	8.0	5*n*	Cin
1882.21	40.9	1.21	6.0...	9.0	3*n*	Sp
1886.18	43.2	1.27	6.0...	8.0	1*n*	W
1889.15	47.5	1.06	7.0...	8.0	2*n*	β
1892.11	52.3	0.70	6.8...	8.1	3*n*	β
1894.26	47.6	0.57	...		1*n*	Com
1895.32	55.5	0.6±	...		1*n*	Com
1897.83	74.7	0.39	6.2...	6.4	1*n*	See
1898.29	76.2	0.45	6.5...	8.2	2*n*	A
1899.19	83.2	0.36	6.5...	8.0	1*n*	A

Discovered with the 6-inch. It appears to be a most interesting system from the rapid relative change and from the large proper motion. PORTER gives this movement in space as 0″.483 in the direction of 328°.3. Rapid motion in angle may be expected with the close approach of the two components. The principal positions are shown in the accompanying diagram.



This is a naked-eye star in *Argo;* Cord. G. C. 5.6 m.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (2930,3141)...β (*Pub. L. O.* II)...β (*Ast. & A. P.* XI, 464)...Sp (II)...Cin^{4}... Cin^{5}...Wilson (Cin^{m})...Comstock (*Pub. Washburn Obsy.* X)...See ( )...Aitken ( )...]

β 585. *Cancri* 109

R.A. 8h 34m 20s
Decl. + 20° 54′

	°	″				
1878.10	106.4	0.40	7.5...	9.0	1*n*	β
1886.25	109.4	0.56	...		2*n*	HΣ
1889.72	110.3	0.46	...		6*n*	Sp
1893.72	110.3	0.43	...		2*n*	Sp

Discovered with the 18½-inch. One of the outlying stars of *Praesepe.* B.A.C. 2927. Magnitude in D.M. 7.0.

[β (x)...β^{v}...Sp (III)...HΣ ( )...]

β 209. W • VIII. 849

R.A. 8h 35m 24s
Decl. + 39° 14′

	°	″				
1875.77	355.4	1.56	8.4...	8.7	4*n*	J
1878.75	357.0	1.57	8.0...	8.7	4*n*	Sp
1881.28	357.7	1.43	...		1*n*	Pt

Discovered with the 6-inch. Later measures are needed, but so far there is no evidence of change.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (I)...Sp (II)... Pritchett (*Pub. Morrison Obsy.* I)...]

β 586. *Monocerotis* 237

R.A. 8h 41m 49s
Decl. — 16° 37′

	°	″				
1878.15	53.2	0.75	6.5...	9.0	1*n*	β
1878.20	55.6	...	6.8...	9.3	3*n*	Cin
1878.26	45.7	0.54	6.5...	8.5	1*n*	J
1887.75	55.4	0.66	...		3*n*	Sp
1898.19	56.8	0.63	...		1*n*	See

Discovered with the 18½-inch. Probably unchanged. In *Hydra,* according to GOULD, 6.7 m. Lalande 17355.

[β (x)...β^{v}...J (I)...Cin^{5}...Sp (III)...See ( )...]

β 335. Lalande 17341

R.A. 8h 41m 58s
Decl. + 3° 4′

1875.99	268.3	2.72	7.2...10.5	2n	J
1879.26	268.7	3.09	7.2... 9.5	2n	OΣ
1886.30	269.2	2.77	...	2n	HΣ
1892.06	270.1	2.58	7.3...10.7	3n	β
1899.09	265.8	2.74	7.0...10.0	1n	β

Discovered with the 6-inch. The *p* of three stars in the field. Without relative motion.

[β (VI)...β (2062,3141)...β (*Pub. L. O.* II)...Δ (1)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...]

β 1068. Lalande 17381

R.A. 8h 43m 2s
Decl. + 9° 19′

A and B

1889.19	189.9	0.45	7.7... 8.8	3n	β
1890.24	190.1	0.4±	...	1n	Sp
1893.25	190.3	0.25±	...	2n	Sp
1894.25	188.9	0.25±	...	2n	Sp

AB and C

1889.14	313.0	17.80	...12.8	2n	β
1899.02	313.4	17.85	...13.0	1n	β

Discovered with the 36-inch. The observations indicate some change in distance.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Sp (III)...]

β 1069. Lalande 17416

R.A. 8h 43m 41s
Decl. − 10° 34′

1889.09	60.8	2.13	6.6...11.0	3n	β
1899.19	60.2	2.42	7.0...11.5	1n	A

Discovered with the 36-inch.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Aitken ( )...]

β 587. 15 *Hydrae*

R.A. 8h 45m 41s
Decl. − 6° 44′

A and B

1878.19	159.9	0.45	6.0... 9.0	2n	β
1878.37	163.6	0.37	6.0... 8.0	1n	Cin
1879.18	157.7	0.47	5.7... 7.2	2n	β
1892.10	151.9	0.59	6.3... 8.2	3n	β
1893.85	149.2	0.55	...	5n	Sp
1897.25	143.4	0.93	6+... 9+	3n	A

AB and C (= H I. 120)

1783.03	340±	43.03	...	1n	H I
1878.14	356.8	45.75	...	1n	β
1892.06	357.3	45.35	...10.6	2n	β
1899.02	358.2	45.45	... 9.2	1n	β

AB and D

1878.14	53.2	49.99	...	1n	β
1892.06	53.2	50.24	...11.2	2n	β
1899.02	53.0	50.76	... 9.3	1n	β

The duplicity of the principal star was discovered with the 18½-inch. There is no question as to its being a binary. The measures show retrograde motion, and the components have the same proper motion. AUWERS gives this as 0″.069 in the direction of 270°.0.

All the measures of the distant stars, C and D, noted by HERSCHEL, are given above.

[β (X)...β1...β3...β (3141)...β (*Pub. L. O.* II)...Cin5... Aitken (3405)...Sp (III)...]

β 407. W I. VIII. 1159

R.A. 8h 45m 50s
Decl. − 6° 20′

1877.87	165.4	6.09	7.7...10.0	1n	J
1879.09	164.5	5.52	8.0...11.0	1n	Cin
1879.52	164.5	5.94	7.9...10.4	3n	β
1890.20	161.4	6.01	...	2n	T
1899.09	164.8	5.78	8.2...10.5	1n	β

Discovered with the 6-inch. Evidently unchanged.

[β (VII)...β (2103)...β3...Δ (1)...Cin5...Tarrant (3186)...

β 24. Lalande 17586

R.A. 8h 48m 24s
Decl. — 8° 18′

1875.15	171.9	1.03	7.9 ... 9.0	3n	J
1878.19	177.3	1.12	7.8 ... 9.0	1n	β
1878.88	175.0	1.08	7.3 ... 8.3	3n	Cin
1886.84	173.5	1.26	...	1n	LM
1888.91	173.8	1.19	7.5 ... 8.4	4n	Lv
1890.22	170.5	1.23	...	3n	T
1892.13	174.7	1.02	7.5 ... 8.0	1n	Col
1892.93	172.2	0.95	7.5 ... 8.0	1n	J
1893.22	177.4	1.06	8.0 ... 8.7	2n	J

Discovered with the 6-inch. No evidence of motion.

[β (I)...β (*Mon. Not.* XXXIII, 351)...J (1)...Cin5...LM...Lv1...Tarrant (3186)...Jones and Collins (*Proc. Haverford Coll. Obsy.* 1892) (*A. J.* 212, 278)...]

β 408. Radcliffe 2231

R.A. 8h 48m 58s
Decl. + 63° 53′

1877.80	344.0	2.94	7.8 ... 10.3	3n	J
1879.35	346.7	2.94	7.0 ... 9.5	1n	OΣ
1883.64	345.7	3.50	7.3 ... 10.2	5n	En
1886.35	342.3	3.01	...	2n	HΣ
1898.15	340.6	3.34	7+ ... 10	4n	D

Discovered with the 6-inch. Probably no change.

[β (VII)...β (2103)...J (1)...Engelmann (2678)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 103. Lalande 17611

R.A. 8h 49m 2s
Decl. — 7° 22′

1875.08	73.9	2.90	8.0 ... 11.2	2n	J
1879.52	73.9	2.86	7.9 ... 10.8	3n	β
1880.76	73.7	2.71	...	1n	Pt
1885.14	69.7	2.77	8.5 ... 10.7	1n	W
1898.20	71.0	3.11	8 ... 10	3n	D

Discovered with the 6-inch. So far relatively fixed.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β3...J (1)...Wilson (Cinm)...Pritchett (*Pub. Morrison Obsy.* 1)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 210. Lalande 17696

R.A. 8h 51m 18s
Decl. — 16° 58′

1875.48	181.6	2.40	7.0 ... 7.4	3n	J
1876.12	183.2	2.80	7.7 ... 7.8	6n	Cin
1878.18	181.6	2.62	7.5 ... 7.5	1n	Cin
1879.25	181.0	2.54	6.5 ... 6.5	2n	Cin
1882.21	183.1	2.62	7.0 ... 7.4	2n	Sp
1882.45	181.3	2.64	7.3 ... 7.6	3n	W
1886.85	183.3	2.76	7.0 ... 7.0	3n	LM
1893.20	183.0	2.66	6.8 ... 6.8	2n	J
1893.22	182.6	2.67	7 ... 7	1n	Sel
1898.09	183.5	2.56	6½ ... 6½	3n	Sc
1898.16	183.5	2.96	...	1n	See

Discovered with the 6-inch. Evidently fixed.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (1)...Cin3...Cin5 Cin6...Wilson (Cinm)...LM...Sp (II)...Jones (*A. J.* 312)...Sellors (3240)...Scott (*Mon. Not.* LIX, 427)...See ( )...]

β 409. Lalande 17812

R.A. 8h 54m 55s
Decl. — 8° 43′

1878.26	184.3	9.65	8.0 ... 10.5	1n	J
1879.52	184.7	9.77	7.8 ... 10.6	3n	β
1880.24	184.6	9.68	...	1n	Pt
1884.01	185.6	9.94	7.5 ... 9.9	5n	En
1899.07	184.1	9.66	7.7 ... 11.0	1n	β

Discovered with the 6-inch. There is no indication of any change.

[β (VII)...β (2103)...β3...J (1)...Pritchett (*Pub. Morrison Obsy.* 1)...Engelmann (2678)...]

β 211. *Hydrae* 68

R.A. 8h 55m 44s
Decl. + 3° 9′

1875.27	257.7	1.11	7.5 ... 10.0	2n	J
1877.25	254.4	1.08	7.5 ... 9.5	1n	OΣ
1879.27	261.9	1.08	7.0 ... 9.0	1n	Cin
1886.30	260.0	1.46	...	2n	HΣ
1888.51	262.0	1.05	7.1 ... 9.1	2n	Lv
1890.20	262.5	1.12	...	2n	T
1892.25	264.3	1.02	...	2n	Sp
1893.26	261.2	0.99	...	4n	Sp

Discovered with the 6-inch. It is probably unchanged. Lalande 17831. In the field with Σ 1302.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (1)...Cin5...Lv1...OΣ (*Poulkowa Obsns.* X)...Tarrant (3186)...Sp (III)...HΣ ( )...]

β 410. B.A.C. 3127

R.A. $9^h\ 4^m\ 30^s$
Decl. $-25°\ 19'$

	°	″			
1877.11	160.5	1.78	7.5... 9.0	2*n*	Cin
1892.24	160.9	1.63	7.3... 9.2	3*n*	Lv
1892.24	161.2	1.67	7.6... 8.6	3*n*	β
1898.16	163.7	2.13	...	1*n*	See

Discovered with the 6-inch. Unchanged. In Cord. G. C. 7.0 m.

[β (VII)...β (2103.3141)...β (*Pub. L. O.* II)...Cin⁴...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...See ( )...]

β 104. Lalande 18134

R.A. $9^h\ 5^m\ 19^s$
Decl. $+0°\ 47'$

	°	″			
1875.15	107.7	3.30	7.0...11.8	3*n*	J
1877.25	111.6	2.95	7.0...10.0	1*n*	OΣ
1880.29	110.1	2.85	...	1*n*	Pt
1886.31	106.8	3.35	...	1*n*	HΣ
1892.13	106.8	2.88	7.0...11.0	3*n*	β
1899.09	104.5	2.79	7.0...10.7	1*n*	β

Discovered with the 6-inch. Probably fixed.

[β (II)...β (*Mem. Not.* XXXIII, 437)...β (3141)...β (*Pub. L. O.* II)...Δ (1)...OΣ (*Poulkowa Obsvt.* X)...Pritchett (*Pub. Morrison Obsy.* I)...HΣ ( )...]

β 336. Lalande 18173

R.A. $9^h\ 6^m\ 11^s$
Decl. $-16°\ 19'$

	°	″			
1876.17	238.2	1.93	8.7... 9.5	2*n*	J
1878.05	239.9	1.82	8.2... 9.2	2*n*	Cin
1898.20	236.3	1.92	8 ... 9	3*n*	D
1898.24	236.7	1.85	...	1*n*	See

Discovered with the 6-inch. No relative motion.

[β (VI)...β (2062)...Δ (1)...Cin⁴...Cin⁵...Doolittle (*Pub. Flower Obsy.* I)...See ( )...]

β 908. S.D. (7°) 2763

R.A. $9^h\ 8^m\ 25^s$
Decl. $-7°\ 47'$

B and C

	°	″			
1880.29	234.6	0.82	9.2...11.0	3*n*	β
1892.21	230.7	0.74	9.2...10.6	2*n*	β

A and BC

	°	″			
1880.25	184.6	60.56	9.0... 9.1	2*n*	β
1892.21	184.5	60.58	8.6...	2*n*	β
1899.11	184.3	60.88	8.5... 8.7	2*n*	β

Discovered with the 18½-inch. B is S.D. (7°) 2762. There is a 12.5 m star in the direction of 222° from A.

[β (XIII)...β³...β (3141)...β (*Pub. L. O.* II)...]

β 455. Lalande 18231

R.A. $9^h\ 8^m\ 34^s$
Decl. $+4°\ 43'$

	°	″			
1877.30	65.2	1.94	9.5...10.5	2*n*	Hl
1888.95	70.3	1.93	8.2...10.2	3*n*	Lv
1898.20	69.5	1.81	8+...	3*n*	D

Discovered with the 6-inch. Change uncertain. Magnitude in L, 7½; D.M. 8.1.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...Hall (I) (2147)...Lv¹...Doolittle (*Pub. Flower Obsy.* I)...]

β 212. *Hydrae* 95

R.A $9^h\ 10^m\ 11^s$
Decl. $-7°\ 51'$

	°	″			
1875.61	230.5	1.48	7.5... 8.2	2*n*	J
1878.23	225.8	1.36	7.2... 7.7	4*n*	Cin
1880.50	228.9	1.26	7.9... 8.2	4*n*	β
1880.55	223.9	1.51	7.5... 8.5	3*n*	Sp
1885.23	225.6	1.47	8.0... 8.5	1*n*	W
1887.01	223.8	1.59	7.3... 8.0	1*n*	LM
1888.56	225.4	1.35	7.7... 7.9	3*n*	Lv
1890.20	227.4	1.34	7.5...10.0	3*n*	T

Discovered with the 6-inch. The change, if any, is very slow. Lalande 18296.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Δ (1)...β³...Cin⁵...Wilson (Cin⁵⁶)...LM...Lv¹...Sp (II)...Tarrant (3180)...]

β 588. *Hydrae* 96

R.A. $9^h\ 10^m\ 30^s$
Decl. $+\ 1°\ 14'$

1878.19	123°.2	2".38	6 5 . . . 11.0	2*n*	β
1892.05	125.1	2.45	7.1 . . . 11.2	3*n*	β
1886.31	124.1	2.72	. . .	2*n*	HΣ
1899.09	129.4	2.43	7.0 . . . 10.2	2*n*	β

Discovered with the 18½-inch. No sensible motion. Lalande 18302. In HEIS 6–7 m; D.M. 6.8.

[β (x) . . . β^1 . . . β (3141) . . . β (*Pub. L. O.* II) . . . HΣ ( ) . . .]

β 337. Lalande 18502

R.A. $9^h\ 16^m\ 54^s$
Decl. $-\ 17°\ 23'$

1876.17	320°.8	7".70	7.0 . . . 11.0	2*n*	J
1877.13	322.3	8.00	7.2 . . . 10.0	2*n*	Cin
1892.19	326.8	7.83	7.0 . . . 10.2	3*n*	Lv
1898.29	325.5	8.16	. . .	1*n*	See

Discovered with the 6-inch. Unchanged.

[β (VI) . . . β (2002) . . . J (I) . . . Cin^4 . . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) . . . See ( ) . . .]

β 338. Lalande 18518

R.A. $9^h\ 17^m\ 15^s$
Decl. $-\ 14°\ 59'$

1876.17	274°.3	6".65	8.2 . . . 10.0	2*n*	J
1877.12	274.3	7.14	8.5 . . . 9.5	2*n*	Cin
1893.24	274.2	7.24	9.0 . . . 10.5	2*n*	J
1893.64	276.3	6.97	8.3 . . . 10.2	3*n*	W
1898.16	273.5	7.41	. . .	1*n*	See
1899.09	274.2	6.78	8.3 . . . 10.5	2*n*	β

Discovered with the 6-inch. Without change.

[β (VI) . . . β (2062) . . . J (I) . . . Cin^4 . . . Jones (*A. J.* 312) . . . Wilson ( ) . . . See ( ) . . .]

β 105. κ *Leonis*

R.A. $9^h\ 17^m\ 40^s$
Decl. $+\ 26°\ 42'$

1876.20	203°.8	3".05	4.9 . . . 10.7	5*n*	J
1877.75	208.8	3.22	5.2 . . . 9.2	2*n*	OΣ
1878.33	203°.8	2".88	5 . . . 11	2*n*	Hl
1879.06	202.4	2.89	4.5 . . . 10.5	1*n*	β
1881.30	205.0	3.00	. . .	1*n*	Pt
1883.47	205.1	3.36	5.1 . . . 10.2	8*n*	En
1886.23	202.2	3.37	. . .	3*n*	HΣ
1889.13	203.9	2.79	4.5 . . . 10.9	3*n*	β
1898.27	205.3	2.96	4 . . . 11.3	3*n*	A

Discovered with the 6 inch. A fine pair even with a small aperture. The measures thus far show no relative change. AUWERS gives the proper motion, 0".057 in the direction of 231°.7. With this value, and the position of B in 1876, as found by J, the relation at the date of the last measure in 1898 should be, 187° : 2".0; so it is obvious that the companion has the same proper motion.

ENGELMANN suspected a star 11 m distant 10" in the direction of 65°. The 36-inch does not show any other companion.

[β (II) . . . β (*Mon. Not.* XXXIII, 437) . . . β^1 . . . β (2930) . . . β (*Pub. L. O.* II) . . . J (I) . . . OΣ (*Foulkowa Obsns.* X) . . . Hall (I) . . . Pritchett (*Pub. Morrison Obsy.* I) . . . Burton (*Copernicus* I, p. 54) . . . Engelmann (2678) . . . Aitken ( ) . . . HΣ ( ) . . .]

β 1070. D.M. (26°) 1940

R.A. $9^h\ 18^m\ 8^s$
Decl. $+\ 26°\ 47'$

1889.13	71°.8	0".50	9.1 . . . 10.2	3*n*	β
1898.43	74.6	0.34	10 . . . 10	1*n*	A

This close pair of small stars, discovered with the 36-inch, is 27^s *f* and 4".8 *n* of κ *Leonis* (β 105). The magnitude in D.M. is 8.8.

[β (XV) . . . β (2929) . . . β (*Pub. L. O.* II) . . . Aitken (. . .

β 589. Lalande 18585

R.A. $9^h\ 20^m\ 15^s$
Decl. $+\ 7°\ 3'$

1878.08	219°.1	2".30	7.5 . . . 12.5	1*n*	β
1886.31	213.3	3.10	. . .	2*n*	HΣ
1892.06	218.9	3.13	7.5 . . . 11.2	3*n*	β

Discovered with the 18½-inch.

[β (x) . . . β^1 . . . β (3141) (*Pub. L. O.* II) . . . HΣ ( ) . . .]

β 590. 29 *Hydrae*

R.A. 9h 21m 22s
Decl. — 8° 42′

1878.16	176°.9	10″.10	7.5...11.7	2*n*	Cin
1878.17	176.8	10.80	6.7...11.7	2*n*	β
1891.27	176.0	10.95	6.0...11.0	2*n*	β
1899.00	174.7	10.52	6.5...12.7	2*n*	β

Discovered with the 18½-inch. Relatively fixed. The principal star has a proper motion of 0″.068 in the direction of 268°.3 (AUWERS), which seems to belong to the companion, as otherwise its angle should have diminished 8° in the interval covered by the measures.

[β (x)...β¹...β (3114)...Cin¹...]

β 213. Lalande 18648

R.A. 9h 22m 25s
Decl. — 7° 34′

1875.76	177°.2	1″.60	8.0...10.5	2*n*	J
1879.19	176.8	1.34	8.0...10.0	2*n*	Cin
1892.09	179.5	1.62	8.0... 9.4	3*n*	β

Discovered with the 6-inch. Unchanged. This pair is 34½′ *n* of α *Hydrae*.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3141)...β (*Pub. L. O.* II)...J (I)...Cin¹...]

β 591. W¹ IX. 477

R.A. 9h 23m 33s
Decl. — 2° 36′

1878.11	35°.8	0″.73	7.7... 8.5	2*n*	β
1878.21	31.9	0.73	8.0... 9.0	1*n*	J
1884.03	39.8	0.67	7.5... 8.5	5*n*	En
1886.21	44.8	0.60	7.3... 8.0	2*n*	T
1890.26	31.8	0.66	...	4*n*	Sp
1892.08	35.4	0.72	8.0... 8.7	3*n*	β
1892.57	34.8	0.74	...	6*n*	Sp

Discovered with the 18½-inch. Without change.

[β (x)...β¹...β (3141)...β (*Pub. L. O.* II)...J (I)...Tarrant (2866)...Engelmann (2742)...Sp (III)...]

β 1071. θ *Ursae Majoris*

R.A. 9h 24m 49s
Decl. + 52° 13′

1889.23	74°.9	5″.09	3 ...13.7	3*n*	β
1890.38	79.1	4.87	...13.5	3*n*	β
1892.05	75.3	5.15	...14.2	3*n*	β
1898.27	76.4	5.22	...14.0	1*n*	β
1898.34	87.1	5.00	...	1*n*	L
1898.49	78.4	5.06	...14	2*n*	A

Very minute companion discovered with the 36-inch. It was obvious from the measures made with that instrument, in connection with the large proper motion of the principal star, that the two constituted a physical system. AUWERS (*Fundamental Catalogue*) gives this proper motion, 1″.101 in the direction of 240°.2. The measures to this time show no sensible relative motion. If the small star was fixed in space, the distance at the date of the last measure would be 15″.1 and the angle 65°.

[β (XV)...β (2929,3048,3141)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...]

β 339. Lalande 18737

R.A. 9h 25m 17s
Decl. — 15° 13′

1876.17	215°.8	1″.28	8.8... 9.6	2*n*	J
1878.53	215.1	1.32	8.5... 9.3	1*n*	Cin
1885.23	220.2	1.50	8.5... 9.5	1*n*	W
1888.23	219.3	1.31	9.0...10.2	1*n*	Lv
1898.31	218.0	1.35	...	1*n*	See

Discovered with the 6-inch. No sensible change.

[β (VI)...β (2062)...Cin¹...Wilson (Cin^m)...J (I)...Lv¹...See ( )...]

β 909. Lalande 18714

R.A. 9h 25m 25s
Decl. + 22° 23′

1879.48	91°.5	5″.66	7.2...12.0	3*n*	β
1892.17	91.1	5.94	7.3...12.0	3*n*	β

Discovered with the 18½-inch. There is no change.

[β (XIII)...β¹...β (3141)...β (*Pub. L. O.* II)...]

β 910. Lalande 18800

R.A. $9^h\ 27^m\ 10^s$
Decl. $-13°\ 28'$

1879.87	304°.9	6".84	7.7 . . . 10.2	3*n*	β
1882.15	304.7	6.96	7.0 . . . 9.5	1*n*	W
1892.06	305.9	6.68	7.3 . . . 10.7	3*n*	β
1893.22	305.0	6.33	7.4 . . . 10.4	2*n*	J

Discovered with the 18½-inch. Probably fixed.

[β (XIII) . . . β^3 . . . β (3141) . . . β (*Pub. L. O.* II) . . . Wilson (Cin^{99}) . . . Jones (*A. J.* 312) . . .]

β 214. Lalande 19064

R.A. $9^h\ 35^m\ 52^s$
Decl. $-17°\ 56'$

1875.28	261°.1	3".09	7.2 . . . 11.0	2*n*	J
1877.11	259.2	2.92	7.5 . . . 9.8	2*n*	Cin
1886.29	261.3	3.21	8.0 . . . 10.5	1*n*	L.M
1898.16	258.7	3.54	. . .	1*n*	See
1898.25	256.5	3.21	7.6 . . . 11.0	3*n*	A

Discovered with the 6-inch. The motion, if any, is slow.

[β (IV) . . . β (*Mon. Not.* XXXIV, 382) . . . J (1) . . . Cin^4 . . . L.M . . . See ( ) . . . Aitken ( ) . . .]

β 215. Lacaille 4058

R.A. $9^h\ 48^m\ 41^s$
Decl. $-27°\ 26'$

1877.11	337°.5	1".75	7.5 . . . 9.0	1*n*	Cin
1884.21	345.2	1.88	7.5 . . . 9.5	2*n*	W
1893.32	341.5	1.52	7 . . . 11	1*n*	Sel
1894.21	345.0	1.90	7.5 . . . 9.8	2*n*	W
1898.25	339.7	1.97	7.5 . . . 11.0	3*n*	A
1898.28	346.0	1.71	. . .	1*n*	See

Discovered with the 6-inch. There is no evidence of motion.

[β (IV) . . . β (*Mon. Not.* XXXIV, 382) . . . Cin^4 . . . Wilson (Cin^{99}) . . . Sellors (3240) . . . Wilson ( ) . . . Aitken ( ) . . . See ( ) . . .]

β 592. O. Arg. S. 10209

R.A. $9^h\ 49^m\ 16^s$
Decl. $-15°\ 38'$

1878.22	191°.8	9".80	6.5 . . . 12.5	2*n*	β
1879.27	191.7	9.57	7.5 . . . 12.0	1*n*	Cin
1879.82	191.6	9.86	6.6 . . . 11.7	3*n*	β
1883.17	191.2	. . .	6.0 . . . 13.0	1*n*	W
1898.28	193.0	9.95	. . .	1*n*	See

Discovered with the 18½-inch. Fixed.

[β (X) . . . β^3 . . . β^3 . . . Cin^5 . . . Wilson (Cin^{99}) . . . See ( ) . . .]

β 216. Lacaille 4074

R.A. $9^h\ 51^m\ 20^s$
Decl. $-25°\ 59'$

1877.20	161°.2	3".08	6.0 . . . 11.2	2*n*	Cin
1879.27	161.1	2.57	7.0 . . . 12.0	1*n*	Cin
1894.23	164.2	2.97	7.0 . . . 11.5	1*n*	W
1898.16	162.2	4.00	. . .	1*n*	See
1899.02	160.2	3.37	6.5 . . . 10.0	1*n*	β

Discovered with the 6-inch. Probably fixed.

[β (IV) . . . β (*Mon. Not.* XXXIV, 382) . . . Cin^4 . . . Cin^5 . . . Wilson ( ) . . . See ( ) . . .]

β 1072. Lalande 19689

R.A. $9^h\ 58^m\ 20^s$
Decl. $-17°\ 31'$

A and B

1889.13	42°.6	10".90	6.9 . . . 12.3	3*n*	β
1898.34	43.5	11.16	. . .	1*n*	See
1899.04	43.9	10.94	. . . 13.2	2*n*	β

A and C (= Sh 110)

1823.34	272°.7	21".50	7.0 . . . 7.5	1*n*	Sh
1889.13	273.2	21.23	6.9 . . . 7.1	3*n*	β
1898.34	273.0	21.45	. . .	1*n*	See
1899.04	273.8	20.84	7.0 . . . 7.2	2*n*	β

The faint companion to the principal star of H^4 N.25 (= Sh 110) was added with the 36-inch. All the measures of AC are given above. These stars appear to be fixed. They are Cord. G. C. 13722 and 13721.

[β (XV) . . . β (2929) . . . β (*Pub. L. O.* II) . . . See ( ) . . .]

β 217. Cord. G. C. 13789

R.A. 10h 1m 17s
Decl. — 24° 18′

	°	″			
1868.17	276.0	1.66	...	1n	Hd
1876.10	94.9	1.90	7.9... 8.0	4n	Cin
1878.47	274.1	1.85	7.8... 7.9	3n	Cin
1880.22	277.6	2.08	...	1n	Cin
1882.18	274.6	2.03	7.7... 8.0	2n	W
1893.32	279.7	1.75	7½... 7½	2n	Sel
1898.22	282.0	1.90	...	1n	See

Discovered with the 6-inch. Probably without motion. It had been previously seen by the Harvard observers, but not published until after β (IV).

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Cin3...Cin5...Cin6... Wilson (Cinm)...*Annals Harvard Obsy.* XIII...Sellors (3240)...See ( )...]

β 218. Lalande 19765

R.A. 10h 1m 41s
Decl. — 19° 7′

	°	″			
1875.26	122.6	0.99	7.9... 8.4	4n	Δ
1877.12	120.8	0.99	8.0... 8.2	2n	Cin
1878.53	121.9	0.97	7.9... 8.4	3n	Cin
1880.27	117.9	0.96	8.0... 8.2	1n	β
1888.11	120.1	0.91	7.5... 7.9	2n	Lv
1892.14	124.4	0.91	8.0... 8.1	3n	β
1898.26	122.7	0.92	...	1n	See

Discovered with the 6-inch. The measures show no motion. This is the ρ star of a small equilateral triangle.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β3...β (3142)...β (*Pub. L. O.* II)...Δ (I)...Cin4...Cin5...Lv2...See ( )...]

β 911. Lalande 19780

R.A. 10h 2m 41s
Decl. — 19° 10′

A and B

	°	″			
1880.25	311.5	4.75	7.5...11.2	2n	β
1892.10	313.4	4.77	7.3...10.7	3n	β
1898.25	310.0	4.80	...	1n	See
1898.25	310.0	4.84	7.7...12.0	3n	A
1899.13	314.0	4.49	8.0...12.0	1n	β

A and C

	°	″			
1880.26	83.1	47.30	... 9.3	3n	β
1892.10	79.1	49.34	...10.0	3n	β
1898.25	77.0	50.85	...	1n	See
1898.22	76.1	50.69	...	1n	D
1898.25	77.4	51.29	... 9.7	3n	A
1899.13	76.7	51.20	...10.0	1n	β

Discovered with the 18½-inch. The principal star has a large proper motion:

Radcliffe	- -	0″.364 in 195°.8
Porter	- - -	0.365 in 207.2

With the data given by Porter's value, and the measures of A and C in 1880, the position of C, if fixed, should be for 1898.25, 77°.0 : 51″.26, which is practically identical with the actual measures made at Mt. Hamilton at the last-named date. The observations of AB show, beyond question, that the small star is moving in space at the same rate as A.

[β (XIII)...β3...β (3142)...β (*Pub. L. O.* II)...See ( )... Doolittle (*Pub. Flower Obsy.* I)...Aitken ( )...]

β 790. W2 X. 26

R.A. 10h 4m 5s
Decl. — 12° 17′

	°	″			
1881.36	67.9	2.17	8.6...10.1	3n	β
1888.74	70.0	2.18	9.0...10.6	3n	Com
1888.96	67.2	2.13	9.2...10.4	4n	Lv
1899.09	67.2	1.97	8.8... 9.5	1n	β

Discovered with the 15½-inch at the Washburn Observatory. The measures show no change. The magnitude in S.D. is 8.8. It is 10s ρ and 3′.8 s of a 6m star in *Hydra*.

[β (XII)...β4...Comstock (*Pub. Washburn Obsy.* VI)... Lv2...]

β 593. λ *Hydrae*

R.A. $10^h\ 4^m\ 44^s$
Decl. $-11°\ 46'$

1878.23	118°.4	50".76	4	...13.5	1*n*	β
1892.10	118.8	53.58	4	...13.3	3*n*	β
1898.98	117.5	54.46		...13.5	2*n*	β

The faint companion was noted with the 18½-inch. The proper motion of λ *Hydrae* is given by AUWERS (*Fundamental Catalogue*) as 0".227 in the direction of 253°.3. This movement explains the change in the position of B.

[β (x)...β^1...β (3142)...β (*Pub. L. O.* 11)...]

β 25. W[s] X. 242

R.A. $10^h\ 15^m\ 46^s$
Decl. $-9°\ 10'$

1867.10	187°.9	0".88±	...		1*n*	Hd
1872.76	185.1	1.81	8.6...	9.0	2*n*	Du
1875.23	180.5	1.76	8.4...	9.0	4*n*	Δ
1878.23	179.6	1.66	8.0...	9.0	2*n*	Cin
1880.24	180.8	1.85	...		1*n*	Pt
1881.19	180.9	1.78	8.1...	8.6	3*n*	β
1886.30	178.9	1.96	8.0...	9.0	1*n*	LM
1888.22	178.6	1.86	8.0...	8.8	2*n*	Lv
1890.22	176.5	1.79	...		3*n*	T

Discovered with the 6-inch but it had been previously seen by SCHJELLERUP (A. N. 1485; *Catalogue of 10,000 Stars*, p. XXIV). The measures are discordant in angle, and there is probably no sensible motion.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β^3...*Annals Harvard Obsy.* XIII)...Δ (1)...Dunér (*Mesures Microm.* 1876)...Cin[5]...Pritchett (*Pub. Morrison Obsy.* 1)...LM...Lv[1]...Tarrant (3186)...]

β 219. *Hydrae* 214

R.A. $10^h\ 15^m\ 56^s$
Decl. $-21°\ 55'$

1876.14	188°.6	2".33	7.5...	9.2	3*n*	Cin
1878.70	188.5	2.05	6.7...	8.7	1*n*	Cin
1892.21	188.1	2.14	7.0...	9.1	4*n*	Lv.C
1892.26	186.4	2.07	7.0...	8.5	3*n*	β
1898.16	187.7	2.77	...		1*n*	See
1899.26	186.9	2.15	7.5...	8.3	1*n*	β

Discovered with the 6-inch. Evidently fixed. The principal star is 6.5 m in Cord. G. C., No. 14126.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3142)...β (*Pub. L. O.* 11)...Cin[3]...Cin[3]...Collins and Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...See ( )...]

β 912. W[s] X. 253

R.A. $10^h\ 16^m\ 26^s$
Decl. $-13°\ 4'$

1879.17	106°.3	0".95	8.6...11.9		2*n*	β
1880.24	101.4	...	8.5...11.0		1*n*	Cin
1883.16	100.1	...	9.0...12.0		2*n*	W
1894.19	106.0	1.30	9.0...11.8		2*n*	W
1898.30	104.4	1.14	8.1...10.6		4*n*	A

Discovered with the 6-inch. Probably without change. The magnitude in S.D. is 8.7.

[β (XIII)...β^3...Cin[5]...Wilson (Cin[m])...Wilson ( )...Aitken ( )...]

β 1280. Lalande 20225

R.A. $10^h\ 19^m\ 55^s$
Decl. $+4°\ 33'$

B and C

1892.06	...	1".±	9 ...11		β
1899.40	17.8	0.88	9.1...11.7	2*n*	A

A and BC

1899.25	191°.5	116".26	7.2...	8.8	3*n*	β

An examination of my observing book at the L.O. shows that the small star of this wide pair was noted as double with the 36 inch on January 22; 1892, and estimated as given above. It was forgotten, and not subsequently examined. I have looked at it several times with the 40-inch, and on one occasion it had the appearance of being double. It must be a difficult object, and the distance is probably less than 1".

These stars are 6.6 and 8.5 in Boss (*A.G.C.*). His positions for 1875 give 190°.2 : 116".50.

[Since the foregoing was written, I have received from AITKEN the measures of the close pair inserted above.]

[Aitken ( )...]

β 1281. Lalande 20278

R.A. 10h 21m 18s
Decl. + 4° 10′

1899.26	71°.8	0″.87	8.2... 9.7	4*n*	β

This was discovered with the 40-inch in looking for the last preceding pair (β 1280). It is not difficult. According to Boss (*A.G.C.*) this star has a proper motion of 0″.149 in the direction of 264°.2. The magnitude in D.M. is 7.5. It is certain to be a physical system, since the components must have a common proper motion.

β 1073. *Sextantis* 101

R.A. 10h 26m 26s
Decl. — 5° 27′

1889.29	46°.9	3″.02	7.0...11.5	3*n*	β
1898.13	46.8	3.42	7.0...11.8	2*n*	A

Discovered with the 36-inch. No material change. Lalande 20428. Magnitude in L 6½; in S.D. 7.2.

[β (XV)...β (2929)...β (*Pub. L. O.* 11)...Aitken ( )...]

β 1269. 44 *Hydrae*

R.A. 10h 28m 18s
Decl. — 23° 8′

1892.23	63°.8	18″.33	5 ...14	1*n*	β
1898.22	59.7	19.09	...	1*n*	See
1899.04	59.9	18.75	...13.2	2*n*	β

Distant companion noted with the 36-inch. The principal star has a proper motion of 0″.047 in the direction of 309°.9 (Auwers).

[β (XIX)...β (3141)...β (*Pub. L. O.* 11)...See ( )...]

β 1074. Lalande 20453

R.A. 10h 28m 20s
Decl. + 46° 16′

1889.27	208°.4	2″.10	6.4...11.2	3*n*	β
1899.33	205.0	2.50	6.5...11.2	2*n*	A

Discovered with the 36 inch. The magnitude in D.M. is 7.2.

[β (XV)...β (2929)...β (*Pub. L. O.* 11)...Aitken ( )...]

β 411. Lacaille 4360

R.A. 10h 30m 25s
Decl. — 26° 3′

1878.28	294°.6	1″.33	6.7... 8.0	2*n*	Cin
1892.28	288.3	1.08	6.4... 8.2	3*n*	β
1892.30	290.6	1.29	6.8... 8.5	4*n*	L.v
1893.32	287.6	1.00	7 ... 8.0	2*n*	Sel
1898.16	278.8	0.87	...	1*n*	See

Discovered with the 6-inch. Change is uncertain. A naked-eye star according to Heis. In Cord. G. C. 6.6m *Hydra*.

[β (VII)...β (2103,3141)...β (*Pub. L. O.* 11)...Cin4...Cin5... Collins and L.v (*A. J.* 278) (*Proc. Haverford Coll. Obsv.* 1892)...Sellors (3240)...See ( )...]

β 1075. φ5 *Hydrae*

R.A. 10h 30m 25s
Decl. — 15° 43′

1889.14	277°.1	3″.03	6 ...13.0	3*n*	β
1898.22	283.1	2.92	...	1*n*	See
1899.02	275.3	3.25	...13.1	2*n*	β

Discovered with the 36-inch. Auwers gives the proper motion of the bright star, 0″.065 in the direction of 287°.0. This is nearly in the line of the companion, so that it will soon be a very difficult object if the companion does not have the same movement. The measures point to common proper motion.

[β (XV)...β (2929)...β (*Pub. L. O.* 11)...See ( )...]

β 913. 40 *Leonis Minoris*

R.A. 10h 36m 26s
Decl. + 26° 57′

A and B

1880.30	122°.8	10″.92	6.0...13.0	4*n*	β
1892.14	119.9	12.27	6.0...12.7	3*n*	β
1898.34	119.3	12.85	6.0...13.0	3*n*	A
1899.02	118.1	13.10	...12.5	1*n*	β

A and C

1898.31	77°.3	39″.71	...14	1*n*	A

A and D

1899.02	275°.9	55".75	...13.5	1*n*	*β*

Discovered with the 18½-inch. The distant star, C, was added by AITKEN with the 36-inch. PORTER gives the proper motion of the principal star, 0".131 in the direction of 259°.7. This seems to account for the change in the companion.

[*β* (XIII)...β^3...*β* (*Ast. Reg.* XVIII, 140)...*β* (3142)...*β* (*Pub. L. O.* II)...Aitken ( )...]

β 914. Lalande 20750

R.A. 10h 39m 46s
Decl. — 10° 14′

1880.27	338°.6	1".30	6.8...11.4	2*n*	*β*
1894.24	337.8	1.46	7.7...12.0	2*n*	W

Discovered with the 18½-inch.

[*β* (XIII)...β^3...Wilson ( )...]

β 595. Lalande 20804

R.A. 10h 41m 48s
Decl. — 14° 29′

1878.21	14°.6	2".32	9.0...11.0	1*n*	*β*
1879.20	17.8	2.00	8.5...10.0	1*n*	*β*
1880.26	18.1	1.95	...	1*n*	Pt
1884.99	13.0	1.95	8.1...10.5	3*n*	W
1898.26	12.4	2.24	9.0...10.5	3*n*	A

Discovered with the 18½-inch. Probably without change.

[*β* (X)...β^2...β^3...Cin^3...Wilson (Cin^{10})...Pritchett (*Pub. Morrison Obsy.* I)...Aitken ( )...]

β 596. *Leonis* 222

R.A. 10h 43m 2s
Decl. + 17° 47′

1878.26	277°.3	2".38	6.5...13	2*n*	*β*
1886.22	274.7	2.96	...	2*n*	HΣ
1891.28	278.6	2.56	6.7...11.7	3*n*	*β*

Discovered with the 18½-inch. Unchanged. Lalande 20827.

[X)...β^2...*β* (3114)...*β* (*Pub. L. O.* II)...HΣ ( )...]

β 915. D.M. (25°) 2303

R.A. 10h 43m 13s
Decl. + 24° 55′

1880.37	232°.9	1".18	9.0... 9.2	2*n*	*β*
1892.30	232.5	0.7±	9.0... 9.0	4*n*	Lv
1895.35	226.7	1.14	...	1*n*	Lew
1896.52	231.2	1.26	...	2*n*	A
1897.30	226.2	...	...	1*n*	Bow

Discovered with the 18½-inch. Apparently without change. Near Σ 1478.

[*β* (XIII)...β^3...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsns.* 1895)...Aitken (3395)...Bowyer (*Mon. Not.* LIX, 400)...]

β 111. S.D. (8°) 3023

R.A. 10h 45m 11s
Decl. — 8° 28′

1875.21	3°.3	3".32	9.9...10.3	3*n*	J
1880.66	6.3	3.59	9.0... 9.3	2*n*	*β*
1881.28	6.2	3.51	...	1*n*	Pt
1884.57	5.0	3.65	9.0... 9.3	3*n*	W
1886.30	3.3	3.54	9.0... 9.0	1*n*	LM
1888.24	5.4	3.51	9.4... 9.5	5*n*	Lv
1898.25	4.6	3.52	9.0... 9.0	3*n*	A

Discovered with the 6-inch. Without change.

[*β* (III)...*β* (*Mon. Not.* XXXIV, 59)...β^3...*Δ* (1)...LM...Lv^1...Wilson (Cin^{10})...Pritchett (*Pub. Morrison Obsy.*, I)...Aitken ( )...]

β 597. D.M. (24°) 2285

R.A. 10h 48m 20s
Decl. + 24° 24′

1878.22	46°.9	0".88	8.5...11.0	2*n*	*β*
1894.24	46.2	0.79	8.8...10.7	3*n*	W

Discovered with the 18½-inch.

[*β* X)...β^3...Wilson ( )...]

β 1076. 55 *Leonis*

R.A. $10^h\ 49^m\ 32^s$
Decl. $+\ 1^\circ\ 23'$

1889.28	49°.7	0".99	5.8...10.3	3*n*	β
1898.22	35.0	0.88	6.0...10.7	3*n*	A
1899.12	31.9	0.82	6.0...10.5	1*n*	A

Discovered with the 36-inch. AUWERS gives the proper motion of this star 0".086 in the direction of 84°.7. It is obvious from the measures that, if this value is approximately correct, the movement belongs to both components, and that the companion has a retrograde motion around the primary. With this proper motion, and the relation given by the measures of 1889, the position of the companion in 1898, if fixed in space, should have been 358°.1 : 0".57.

[β (xv)...β (2929)...β (*Pub. L.O.* II)...Aitken ( )...]

β 598. 59 *Leonis*

R.A. $10^h\ 54^m\ 32^s$
Decl. $+\ 6^\circ\ 45'$

1878.24	220°.9	46".76	5.5...13	1*n*	β
1892.12	221.2	46.05	5.7...13.4	3*n*	β
1898.26	221.3	46.40	5.5...14.0	2*n*	A
1898.96	220.5	46.83	...	1*n*	β

Discovered with the 18½-inch. The proper motion of 59 *Leonis* from AUWERS is 0".085 in the position angle of 270°.

[β (x)...β'...β (3142)...β (*Pub. L. O.* II)...Aitken ( )...]

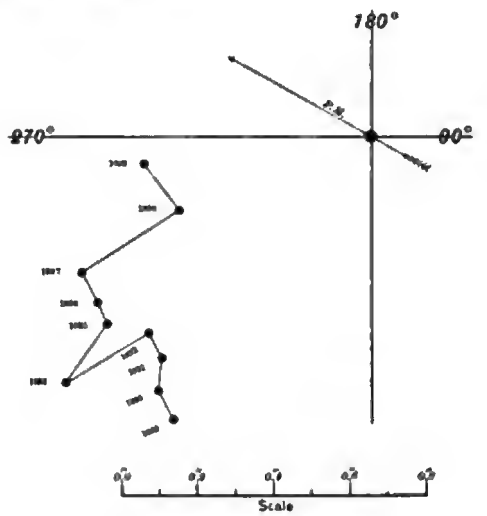
β 1077. α *Ursae Majoris*

R.A. $10^h\ 50^m\ 19^s$
Decl. $+\ 62^\circ\ 24'$

1888.19	326°.1	0".91	2.0...11.1	4*n*	β
1890.26	320.1	0.87	...	4*n*	β
1890.53	316.7	0.81	...	3*n*	HΣ
1891.30	316.8	0.80	...11.0	4*n*	β
1892.11	311.5	0.78	...11.0	3*n*	β
1893.49	308.9	1.03	...	2*n*	Bar
1895.25	305.5	0.85	...	1*n*	Com
1896.30	301.4	0.84	...	2*n*	Com
1897.81	295.4	0.84	...	1*n*	β
1898.35	291°.1	0".54	...	1*n*	β
1899.17	277±	0.6±	...	1*n*	A

This interesting system was discovered with the 36-inch. The measures at Mt. Hamilton were sufficient to show that it was a binary, since the proper motion of the principal star would have been apparent after a short interval in the changed position of the companion. AUWERS (*Fundamental Catalogue*) gives the proper motion of α *Ursae* as 0".149 in the direction of 240°.2, and it was evident at the time it was first seen double that the companion had the same movement in space, as otherwise it would have been recorded as a double star long before. The orbital motion is retrograde, and thus far about 3°.5 per year. There seems to have been no great change in the distance. It is not improbable that this is about the maximum distance, and that it may prove to have a short period. With a much nearer approach it will be difficult, if not impossible, to measure with the largest instruments now in use.

The principal positions are shown on the accompanying diagram:



α Ursae Majoris β1077

There is a small star 384".95 distant from α in the direction of 203°.5 (1881.12) which has nearly the same proper motion, 0".222 in 232°.5.

[β (xv)...β 12891,2929,2979,3048,3114,3142)...β (*Knowledge*, July 1891)...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* x)...Barnard (*A. J.* 417)...HΣ ( )...Aitken ( )...]

β 599. 65 *Leonis*

R.A. 11h 6m 47s
Decl. + 2° 36′

1878.20	82°.4	1″.78	5.5...11.5	4*n*	β
1879.27	84.3	1.47	0.0... 9.5	1*n*	Cin
1886.28	88.7	2.23	...	2*n*	HΣ
1887.32	87.0	1.66	5.5...11.0	3*n*	T
1889.27	88.5	1.78	5.6...10.5	3*n*	β
1893.34	86.7	1.87	...	2*n*	Sp
1894.24	85.3	1.94	6.0...10.8	3*n*	W
1899.13	93.2	1.95	...	1*n*	β

Discovered with the 18½-inch. AUWERS gives the proper motion of this star 0″.434 in the direction of 262°.1. It is obvious from the measures that this belongs also to the small star, and they must form a physical system. The relative motion appears to be direct.

[β (x)...β¹...β (2930)...β (*Pub. L. O.* II)...Cin⁵...Tarrant (2899)...Sp (III)...Wilson ( )...HΣ ( )...]

β 220. *Crateris* 22

R.A. 11h 6m 33s
Decl. − 17° 51′

1875.27	143°.6	0″.58	6.4... 7.0	2*n*	J
1877.29	150.1	0.65	5.8... 6.2	1*n*	Cin
1877.93	143.5	0.55	6.4... 7.0	10*n*	Sp
1878.22	140.0	...	6.0... 6.8	2*n*	Cin
1880.21	323.8	0.87	6.0... 7.0	1*n*	Cin
1880.33	151.1	0.68	...	1*n*	Pt
1884.10	149.1	0.45	5.0... 6.4	5*n*	En
1887.27	140.3	0.58	...	3*n*	Sp
1889.10	136.1	0.71	6.1... 6.8	4*n*	Lv
1890.24	137.0	0.65	6.5... 7.0	3*n*	T
1893.38	140.3	0.66	6.2... 6.6	2*n*	J
1898.16	138.8	0.44	...	1*n*	See

Discovered with the 6-inch. This is ψ *Crateris* of BODE. In ARGELANDER and HEIS 6 m. Lalande 21445. Very little, if any, change.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (1)...J (2086)...Cin⁴...Cin⁵...Cin⁶...Sp (2133)...Sp (II app.)...Pritchett (*Pub. Morrison Obsy.* 1)...Engelmann (2678)...Lv¹...Tarrant (3186)...Jones (*A. J.* 312)...See ( )...]

β 1282. δ *Leonis*

R.A. 11h 7m 43s
Decl. + 21° 11′

B and C

1889.09	190°±	1″±	9.5...12		β

A and BC

1899.13	344°.5	187″.32	3 ...	1*n*	β

I find in my L. O. Observing book, under date of February 4, 1889, with the 36-inch, noted, "The distant companion to δ *Leonis* is a very difficult double," with angle and distance estimated as given above. I have examined this several times with the 40-inch, but have not been able to see the close pair. As there was no doubt expressed of the duplicity of the small star, it is inserted here.

[Since the foregoing was written I have received from AITKEN a set of measures with the 36-inch, giving:

1899.44	204°.3	0″.36	9.0... 9.3	3*n*	A

There is, therefore, no doubt of the duplicity of this star.]

β 916. *Crateris* 31

R.A. 11h 8m 4s
Decl. − 14° 47′

1879.13	360°±	0″.7±	7.5...			β
1879.27	354.4	...	8.5...	9.0	1*n*	Cin
1880.33	368.0	...	...		1*n*	Pt
1884.77	362.2	...	8.0...	9.5	2*n*	W
1888.45	357.7	0.64	7.0...	8.2	3*n*	Lv
1889.25	360.2	0.88	7.5...	8.3	3*n*	β
1897.23	354.5	0.72	7+...	8+	1*n*	D
1898.27	360.6	0.66	7.4...	7.6	4*n*	A

Discovered with the 18½-inch. Early measures are wanting, but the change, if any, is slow. The magnitude in S.D. is 8.0. Lalande 21488.

(β (XIII). ..β¹...β (2930)...β (*Pub. L. O.* II)...Cin⁵...Pritchett (*Pub. Morrison Obsy.* 1)...Wilson (Cin⁸)...Lv¹...Doolittle (*Pub. Flower Obsy.* 1)...Aitken ( )...]

β 1283. D.M. (16°) 2235

R.A. 11h 8m 7s
Decl. + 16° 10′

In my L.O. observing book of February 4, 1889, I find this star was under observation with the 36-inch, and it was noted: "The 9m star *nf θ Leonis* is 0″.5 double." I have examined this several times with the 40-inch, and on one occasion it appeared elongated, but nothing further could be done with it. The D.M. magnitude is 9.0. It is 10°0 *f*, and 4′ 58″ *n* of *θ Leonis*. I am certain this star will prove to be a close pair, and therefore give it a place in this catalogue.

β 600. *Crateris* 36

R.A. 11h 10m 53s
Decl. − 6° 29′

A and B

1878.15	226°.4	1″.25	6.5...12.0	1*n*	β
1892.17	216.0	1.23	6.5...13.0	2*n*	β
1898.27	240.67	0.98	6.0...12.0	3*n*	A

A and C (= H I N. 26)

1823.31	97°.6	67″.06	...	1*n*	Sh
1878.89	97.4	61.25	6.0... 8.0	3*n*	β
1892.16	97.6	60.46	6.7... 8.6	3*n*	β
1898.27	97.7	60.59	6.0... 8.5	3*n*	A
1898.29	97.4	60.53	7.0... 8.7	1*n*	β

The minute attendant to this wide pair of HERSCHEL (= Sh 120) was discovered with the 18½-inch. There appears to be a decided change in the close pair. All the measures of A and C are given above. The distance in Sh is probably too large. These stars are respectively W I XI. 148 and 152. HEIS gives this as a naked-eye star, 6–7 m; Cord. G.C. 6.0. Lalande 21540.

[β (x)...β^{8}...β^{9}...β (3142)...β (*Pub. L. O.* II)...Aitken ( )...]

β 791. W I XI. 197

R.A. 11h 13m 26s
Decl. + 7° 32′

1881.32	199°.9	2″.06	8.3...10.3	3*n*	β
1888.38	198.5	2.21	8.5...10.0	3*n*	Com
1898.27	197.3	2.15	8.7...10.8	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. In D.M. 9.0 m.

[β (XII)...β^{6}...Comstock (*Pub. Washburn Obsy.* VI)... Aitken ( )...]

β 26. Lalande 21697

R.A. 11h 17m 42s
Decl. − 9° 46′

1875.50	70°.3	2″.80	7.2...10.2	4*n*	Δ
1879.31	66.4	2.66	7.5...10.0	2*n*	Cin
1888.67	68.7	2.86	7.9...10.4	2*n*	Lv
1890.23	71.0	2.92	7.0...10.5	2*n*	T
1899.11	70.8	2.60	7.7...10.0	2*n*	β

Discovered with the 6-inch. Probably without change.

[β (I)...β (*Mon. Not.* XXXIII, 351)...Δ (I)...Cin^{5}...Cin^{6}... Lv^{1}...Tarrant (3:86)...]

β 601. S.D. (16°) 3259

R.A. 11h 23m 15s
Decl. − 16° 41′

B and C

1878.32	226°.9	0″.81	8.0... 9.0	1*n*	β
1879.34	232.3	0.73	8.0... 9.0	1*n*	β
1879.18	224.6	0.87	7.2... 8.7	2*n*	Cin
1880.29	224.9	...	8.0... 9.0	1*n*	Cin
1886.29	217.9	...	7 ... 9	1*n*	LM
1886.31	219.9	1.04	8.5... 9.0	1*n*	W
1888.65	223.2	0.75	7.7... 8.7	2*n*	Lv
1898.26	220.0	1.01	8.5... 9.3	3*n*	A
1898.38	220.9	0.95	...	1*n*	See

A and BC (= S 627)

1783.34	148°.7	26″.25	...	1*n*	H
1825.25	330.7	29.96	8.5... 9	3*n*	S
1878.34	331.6	28.16	7.5...	2*n*	β
1879.30	330.9	28.21	8.0... 8.5	2*n*	Cin
1880.29	331.6	28.30	6.0...	2*n*	Cin
1886.31	330.8	27.69	8.0...	1*n*	W
1898.26	330.4	28.31	7.5... 8.5	3*n*	A
1898.38	331.1	28.36	...	1*n*	See

The close pair was discovered with the 18½-inch. There is no material change, and the wide pair is

certainly fixed. The foregoing are all the measures (= H¹ IV. 112 = S 627).

[β (x)...β^{2}...β^{3}...Cin^{5}...Cin^{6}...Wilson (Cin^{25})...Lv^{1}... LM...See ( )...Aitken ( )...]

β 340. W¹ XI. 390

R.A. 11^{h} 23^{m} 49^{s}
Decl. + 3° 52′

1876.33	7.2	3.87	8.0...10.2	3*n*	*A*
1880.28	6.8	3.94	...	1*n*	Pt
1883.84	8.3	4.25	7.9...10.1	9*n*	En
1893.33	9.0	4.28	8.1...10.5	2*n*	Gl
1898.20	16.8	4.23	...	3*n*	D
1899.04	7.5	4.26	8.4... 9.6	2*n*	β

Discovered with the 6-inch. Change, if any, is small.

[β (VI)...β (2062)...*A* (1)...Pritchett (*Pub. Morrison Obsy.* 1)... Engelmann (2678)... Glasenapp (11)... Doolittle (*Pub. Flower Obsy.* 1)...]

β 456. Lalande 22020

R.A. 11^{h} 30^{m} 44^{s}
Decl. − 11° 41′

1877.35	248.2	0.65	10 ...10	2*n*	Hl
1878.22	257.0	...	8.7... 9.0	2*n*	Cin
1880.24	255.2	...	9.5... 9.5	1*n*	Cin
1892.37	274.2	0.46	8.7... 9.0	3*n*	β
1894.28	278.7	0.31	...	1*n*	Com
1895.32	269.7	0.25±	...	1*n*	Com
1898.21	290.8	0.41	8.5... 9.0	3*n*	A

Discovered with the 6-inch. It is a binary system beyond question. In S.D. 9.0 m. Rapid motion in angle will continue. It should be carefully measured each year for the present.

[β (IX) ..β (*Mon. Not.* XXXVIII, 78)...β (3142)...β (*Pub. L. O.* II)...Hall (1)... Hall (2147)...Cin^{5}...Cin^{6}...Comstock (*Pub. Washburn Obsy.* X)...Aitken ( )...]

β 1078. *Crateris* 79

R.A. 11^{h} 33^{m} 47^{s}
Decl. − 13° 48′

1889.30	49.8	8.22	6.3...12.2	3*n*	β
1898.25	51.8	8.11	6.0...13.5	3*n*	A

Discovered with the 36-inch. No sensible change. This is a naked-eye star, HEIS 6–7 m; GOULD 6.2. Lalande 22102.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Aitken ( )...]

β 792. Schj. 4219

R.A. 11^{h} 35^{m} 32^{s}
Decl. + 3° 32′

1881.34	204.5	1.92	8.3...11.0	3*n*	β
1888.35	199.2	1.94	8.2...11.1	4*n*	Com
1898.20	198.9	2.23	8 ...11	3*n*	D
1898.27	202.7	2.19	8.5...11.0	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. Apparently fixed.

[β (XII)...β^{2}...Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* 1)...Aitken ( )...]

β 917. Lalande 22179

R.A. 11^{h} 37^{m} 25^{s}
Decl. + 11° 22′

1880.31	175.2	3.70	8.0...10.4	4*n*	β
1892.24	177.1	3.59	8.1...10.3	3*n*	β
1892.24	175 4	3.19	7.8...11.0	4*n*	Col
1898.17	175.3	3.86	8 ...11	4*n*	D
1898.32	176.3	3.63	7.8...10.8	3*n*	A

Discovered with the 18½-inch. There is no change.

[β (XIII)...β^{3}...β (3142)...β (*Pub. L. O.* II)...Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Aitken ( ) .. Doolittle (*Pub. Flower Obsy.* 1)...]

β 793. D.M. (7°) 2474

R.A. 11^{h} 37^{m} 26^{s}
Decl. + 7° 14′

1881.32	114.2	1.33	9.6...10.3	3*n*	β
1888.35	113.1	1.66	9.2...10.8	3*n*	Com
1898.21	112.5	1.62	9 ...10+	4*n*	D
1898.40	111.2	1.58	9.5...10.3	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. The apparent change in the angle may not be real.

[β (XII)...β^{1}...Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* 1)...Aitken ( )...]

β 602. Lalande 22262

R.A. 11h 40m 39s
Decl. + 15° 40′

1878.15	73.4	0.57	8.5...11.0	1*n*	β
1891.30	80.0	0.47	8.3...11.0	3*n*	β
1898.44	76.9	0.43	8.0...12.5	2*n*	A

Discovered with the 18½inch. The measures are insufficient to decide as to the question of motion. It has been a more difficult pair than the magnitudes and distance would indicate.

[β (x)...β′...β (3114)...β (*Pub. L. O.* II.)...Aitken( )...]

β 603. *Leonis* 472. B.A.C. 3992

R.A. 11h 42m 28s
Decl. + 14° 57′

1878.21	337.2	1.52	6.7...11.0	2*n*	β
1880.28	335.7	1.13	6.5... 9.7	2*n*	β
1882.33	335.4	0.90	6 ...10	1*n*	Ho
1886.28	324.4	1.33	...	2*n*	HΣ
1889.27	326.7	...	7.0...10.0	1*n*	Lv
1889.71	329.1	0.68	...	1*n*	Sp
1891.26	328.7	1.16	6.4...10.2	3*n*	β
1894.85	324.7	1.16	...	2*n*	Bar
1895.67	326.3	1.05	...	1*n*	Lew
1897.33	321.2	0.88	...	3*n*	Lew
1897.34	320.9	1.07	6+...10	3*n*	A
1898.32	321.1	0.88	...	1*n*	Bow

Discovered with the 18½-inch. This star is 1134″.3 from β *Leonis* in the position-angle of 201°.5 (1864.4) Knott. In B.A.C. 6½ m; D.M. 7.0. Certainly binary in slow retrograde motion. A more rapid change in the angle may be expected. Porter gives this star a proper motion of 0″.141 in the direction of 284°.4.

[β (x)...β′...β²...β (*Mon. Not.* XXXVIII, 408)...β (3111)...β (*Pub. L. O.* II)...Ho (2978)...Lv¹...Sp (III)...Lewis (*Greenwich Obsns.* 1895) (*Mon. Not.* LIX, 400)...Dyson (*Mon. Not.* LVI, 359)...Knott (*Mem. R. A. S.* XLIII)...Aitken (3465)...Barnard (*A. J.* 447)...Lewis ( )...HΣ ( )...]

β 604. β *Leonis*

R.A. 11h 42m 56s
Decl. + 15° 15′

A and B

1898.40	346.2	39.74	...15.5	3*n*	A

A and C

1878.28	344.2	77.14	2	...13	1*n*	β
1892.19	349.0	78.10		...14	2*n*	β
1898.34	351.2	79.36		...15	1*n*	β
1898.40	351.4	78.89		...14.3	3*n*	A

The faint star, C, was noted with the 18½-inch. The change in its position is due to the proper motion of the large star. Auwers gives this, 0″.522 in the direction of 258°.7.

The fainter attendant, B, was added by Aitken with the 36-inch. He calls it exceedingly faint and difficult with that instrument.

[β (x)...β′...β (*Mon. Not.* XXXVIII, 408)...β (3142)...β (*Pub. L. O.* II)...Aitken ( )...]

β 794. O. Arg. N. 12149

R.A. 11h 47m 2s
Decl. + 74° 26′

A and B

1881.34	106.6	0.42	6.5... 7.8	5*n*	β
1885.85	119.0	0.50	...	3*n*	HΣ
1889.37	133.3	0.41	7.5... 8.5	2*n*	Com
1890.35	126.9	0.50	...	4*n*	β
1891.30	133.4	0.43	7.1... 8.7	3*n*	β
1892.15	136.9	0.42	7.3... 9.2	3*n*	β
1892.40	135.7	0.4±	...	1*n*	Sp
1898.31	160.7	0.37	7.0... 7.7	2*n*	β
1898.57	162.6	0.40	6.3... 7.3	3*n*	A

AB and C

1886.34	71.5	5.70	...	1*n*	HΣ
1890.37	71.8	5.71	...13.7	2*n*	β
1891.30	72.3	5.54	...14.2	3*n*	β
1892.15	73.2	5.65	...13.7	3*n*	β
1898.31	73.6	5.55	...13.5	2*n*	β
1898.57	72.1	5.36	...14.3	3*n*	A

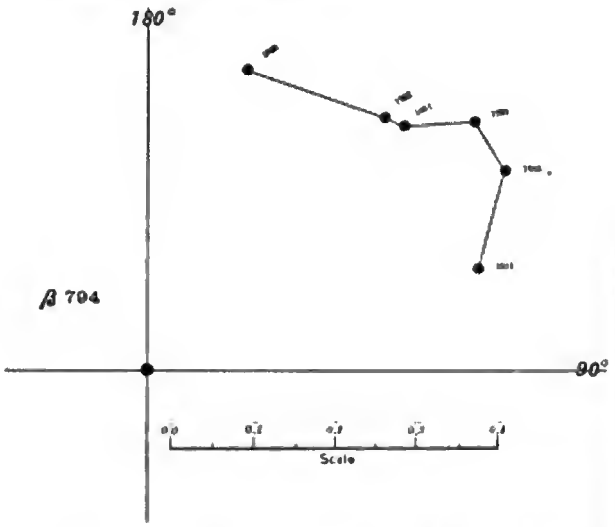
AB and D

1890.37	78.6	26.73	...13	2*n*	β
1898.27	...	26.83	...13	1*n*	β
1898.57	78.4	27.12	...14.2	3*n*	A

The close pair was discovered with the 15½-inch at the Washburn Observatory. A naked-eye star in *Draco;* Heis 6–7 m; D.M. 6.7. This is in rapid

orbital motion, and will probably have a short period.

The arc so far described will be seen from the accompanying diagram.



The distant companions, C and D, were added with the 36-inch, but C had been seen by HΣ in measuring AB. Thus far the positions are unchanged.

[β (XII)...β^3...β (3048,3114,3142)...β (*Sid. Mess.* IX, 299) ...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* VI, X)...Sp (III)...Aitken ( )...HΣ ( )...]

β 918. Lalande 22496

R.A. 11h 50m 36s
Decl. + 32° 52′

1880.37	231°.3	7″.45	6.8...13.0	2*n*	β
1891.22	234.3	7.33	6.4...12.7	3*n*	β
1899.13	230.8	7.21	6.6...13.0	2*n*	β

Discovered with the 18½-inch. In HEIS and ARGELANDER, as a naked-eye star, 6.7 m (*Ursa Major*). Three faint nebulae in a low field-power *p*.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...]

β 919. W^s XI. 1013

R.A. 11h 53m 7s
Decl. + 33° 50′

1880.37	16°.2	4″.22	6.3...12.3	3*n*	β
1891.22	14.3	4.60	6.2...11.7	3*n*	β
1899.11	15.7	4.30	6.7...12.5	2*n*	β

Discovered with the 18½-inch. A naked-eye star in *Ursa Major* (HEIS). Magnitude in D.M. 6.0.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...]

β 795. Radcliffe 2778

R.A. 11h 53m 51s
Decl. + 71° 20′

A and B

1881.30	327°.0	13″.82	7.7...13	3*n*	β
1885.61	329.3	14.44	...	2*n*	HΣ
1888.40	327.2	14.44	8 ...12.8	2*n*	Com
1896.43	328.0	14.39	...	3*n*	A

C and D

1881.30	116°.2	5″.78	7.7...12.5	3*n*	β
1885.61	116.3	6.06	...	1*n*	HΣ
1888.32	116.0	5.58	8 ...12.3	2*n*	Com
1896.43	114.0	6.25	...	3*n*	A

A and C (= OΣ 242 *rej.*)

1868.11	149°.6	33″.72	7.1... 7.3	3*n*	*d*
1881.30	150.9	33.59	7.7... 7.7	3*n*	β
1885.61	150.7	33.52	...	1*n*	HΣ
1888.28	151.4	33.91	8 ... 8	1*n*	Com
1896.58	150.9	33.49	...	3*n*	Eich

The faint companions to the wide pair of OΣ were noted with the 15½-inch at the Washburn Observatory. All the measures of A and C are given. These stars are fixed.

[β (XII)...β^3...Comstock (*Pub. Washburn Obsy.* VI)...Aitken (3395)...*d* (I)...Eichelberger (*A. J.* 397)...HΣ( )...]

β 1079. Lalande 22586

R.A. 11h 54m 34s
Decl. − 21° 7′

1889.30	147°.9	11″.69	6.2...13.3	3*n*	β
1898.26	148.3	11.55	...	1*n*	See

Discovered with the 36-inch. In GOULD 6.5 m (*Corvus*).

β (XV)...β (2929)...β (*Pub. L. O.* II)...See ( )...]

β 457. O. Arg. S. 11836

R.A. 11h 55m 15s
Decl. — 20° 52′

1877.37	84.°2	0.″89	8 . . . 9	2*n*	Hl
1883.80	81.4	1.05	8.5 . . . 9.2	1*n*	W
1886.30	81.3	1.18	8.0 . . . 10.0	1*n*	LM
1898.24	82.1	1.24	8.0 . . . 9.0	2*n*	D
1898.26	86.2	1.27	. . .	1*n*	See
1898.26	80.1	1.18	8.2 . . . 9.8	3*n*	A

Discovered with the 6-inch. Probably without change.

[β (IX) . . . β (*Mon. Not.* XXXVIII, 78) . . . Hall (1) (2147) . . . LM . . . Wilson (Cin^{10}) . . . Doolittle (*Pub. Flower Obsy.* I) . . . See ( ) . . . Aitken ( ) . . .]

β 458. Lalande 22677

R.A. 11h 58m 8s
Decl. — 20° 22′

1879.34	232.°5	30.″35	8.0 . . . 10.5	1*n*	β
1883.22	233.3	30.53	7.0 . . . 9.0	1*n*	W
1898.26	233.1	30.49	. . .	1*n*	See
1898.26	233.0	30.55	7.7 . . . 9.5	3*n*	A
1899.05	232.9	30.38	8.0 . . . 10.0	1*n*	β

Noted with the 6-inch in observing the preceding pair. Relatively fixed. See measures a 14.2 m star nearer. 183.°4 : 12.″33 (1898.26) *1n*. Not seen with the 40-inch at the time of the last measure given above.

[β (IX) . . . β (*Mon. Not.* XXXVIII, 78) . . . Wilson (Cin^{10}) . . . See ( ) . . . Aitken ( ) . . .]

β 412. Lalande 22772

R.A. 12h 2m 10s
Decl. — 17° 55′

1877.29	163.°8	2.″33	8.5 . . . 9.0	1*n*	Cin
1877.86	163.0	2.16	8.0 . . . 8.5	2*n*	J
1879.26	167.1	2.59	8.0 . . . 9.0	1*n*	Cin
1886.30	160.2	1.77	8.0 . . . 9.0	1*n*	LM
1894.18	162.9	2.10	8.0 . . . 8.5	1*n*	W

Discovered with the 6-inch. No change is shown.

[β (VII) . . . β (2103) . . . β (1) . . . Cin^{6} . . . Cin^{5} . . . LM . . . Wilson ( ) . . .]

β 920. *Corvi* 17

R.A. 12h 9m 34s
Decl. — 22° 41′

1879.37	232.°4	0.″77	6.5 . . . 7.0	1*n*	β
1880.36	232.4	0.92	. . .	1*n*	Pt
1892.25	252.4	0.79	6.4 . . . 8.4	3*n*	β
1892.34	250.5	0.81	6.5 . . . 7.8	4*n*	Lv
1894.18	248.8	1.13	7.0 . . . 9.0	1*n*	W
1896.52	244.0	0.84	. . .	1*n*	A
1897.32	253.7	0.94	. . .	3*n*	A
1898.26	251.7	1.04	6.5 . . . 7.3	3*n*	A

Discovered with the 18½-inch. My single observation in 1879 is noted, "Very poor measure," and the apparent motion in angle is probably not real. There seems to be no change since my measures of 1892. The magnitude in GOULD is 6.7. Lalande 22971.

[β (XIII) . . . β^{3} . . . β (3142) . . . β (*Pub. L. O.* II) . . . Pritchett (*Pub. Morrison Obsy.* I) . . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) . . . Wilson ( ) . . . Aitken [3395.3465) . . . Aitken ( ) . . .]

β 796. Lalande 23014

R.A. 12h 11m 19s
Decl. + 7° 16′

1881.34	270.°9	0.″31	8.0 . . . 8.8	3*n*	β
1883.83	78.3	0.27	7.9 . . .	6*n*	En
1886.34	266.9	0.35	. . .	2*n*	HΣ
1888.69	272.7	0.59	8.3 . . . 9.5	2*n*	Com
1896.52	260.0	0.66	. . .	3*n*	A
1898.40	273.3	0.52	8.0 . . . 8.1	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. There is apparently no change unless it is in distance. There seems to be some error, in printing or otherwise, in the angle of ENGELMANN. There is no other known close pair in this vicinity.

[β (XII) . . . β^{3} . . . Engelmann (2678) . . . Comstock (*Pub. Washburn Obsy.* VI) . . . Aitken (3395) . . . Aitken ( ) . . . HΣ ( ) . . .]

β 921. *Corvi* 22

R.A. 12h 11m 42s
Decl. — 23° 21′

1880.55	218°.5	3″.10	7.5 . . . 11.6	5*n*	β
1892.25	217.3	3.20	7.6 . . . 10.3	3*n*	β
1892.31	218.5	2.95	7.0 . . . 12.0	4*n*	Lv
1899.16	215.7	3.39	7.2 . . . 9.7	3*n*	β

Discovered with the 18½-inch. Lalande 23027.

[β (XIII) . . . β^3 . . . β^4 . . . β (3142) . . . β (*Pub. L. O.* II) . . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) . . .]

β 27. Lalande 23106

R.A. 12h 13m 59s
Decl. + 14° 31′

1874.30	105°.0	. . .	7 . . . 12	1*n*	WS
1875.32	113.1	3.43	7.0 . . . 11.0	2*n*	OΣ
1875.53	106.5	3.39	7.1 . . . 11.0	4*n*	J
1881.37	102.6	3.09	. . .	1*n*	Pt
1882.45	109.3	3.27	7.0 . . . 11.0	3*n*	Ho
1886.30	106.8	3.58	. . .	3*n*	HΣ
1898.22	104.1	3.54	7.0 . . . 11.0	3*n*	D
1898.32	105.0	3.41	7.2 . . . 11.5	3*n*	A

Discovered with the 6-inch. Evidently without change.

[β (1) . . . β (*Mon. Not.* XXXIII, 351) . . . Wilson and Seabroke (*Mem. R. A. S.* XLIII) . . . Pritchett (*Pub. Morrison Obsy.* I) . . . J (1) . . . OΣ (*Poulkowa Obsns.* X) . . . Hough (2978) . . . Doolittle (*Pub. Flower Obsy.* I) . . . Aitken ( ) . . . HΣ ( ) . . .]

β 605. *Corvi* 26. B.A.C. 4149

R.A. 12h 13m 58s
Decl. — 21° 30′

1878.22	144°.2	1″.25	6.0 . . . 8.0	2*n*	β
1878.43	136.3	1.01	6.2 . . . 8.3	2*n*	Cin
1882.40	141.7	0.53	6 . . . 8	2*n*	Sp
1884.32	133.0	. . .	8.0 . . . 9.0	1*n*	W
1888.25	157.1	0.8±	. . .	1*n*	Sp
1889.04	137.0	0.8±	6.0 . . . 8.5	1*n*	Lv
1891.32	143.8	1.03	6.2 . . . 8.4	3*n*	β

Discovered with the 18½-inch. The measures are not accordant, but there is probably no sensible change. The magnitude in GOULD is 6.4, and 6½ in B.A.C. It is near ζ *Corvi*. Lalande 23119.

[β (X) . . . β^1 . . . β (3114) . . . β (*Pub. L. O.* II) . . . Cin[3] . . . Sp (II, III) . . . Wilson (Cin[22]) . . . Lv[4] . . .]

β 1245. ζ *Corvi*

R.A. 12h 14m 21s
Decl. — 21° 33′

1891.31	42°.3	4″.81	5.5 . . . 13.8	3*n*	β
1899.16	48.7	5.76	5.0 . . . 14.0	2*n*	A

The very minute companion was discovered with the 36-inch. The proper motion of the bright star is given by AUWERS as 0″.130 in the direction of 254°.4. It is probably only an optical pair as the change in the position of the companion shown by the two sets of measures given above agrees very closely with the proper motion of A. The minimum distance of the companion was 2″.6 about 1860.

[β (XVIII) . . . β (3113) . . . β (*Pub. L. O.* II) . . . Aitken ( ) . . .]

β 606. *Corvi* 35

R.A. 12h 19m 48s
Decl. — 14° 17′

1878.30	97°.9	1″.38	7.0 . . . 9.0	2*n*	β
1882.41	134.5	0.40	7 . . . 9	2*n*	Sp
1889.04	93.5	1.20	. . .	3*n*	Sp
1891.26	99.1	1.25	7.2 . . . 8.2	3*n*	β
1892.40	99.8	1.21	. . .	1*n*	Sp
1898.24	95.3	1.43	7.0 . . . 9.0	2*n*	D

Discovered with the 18½-inch. The first measures of Sp appear to belong to some other pair. I could not find any other pair in the vicinity with the 36-inch. Lalande 23250.

[β (X) . . . β^2 . . . β (3114) . . . β (*Pub. L. O.* II) . . . Sp (II, III) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 922. Lalande 23254

R.A. 12h 19m 58s
Decl. — 3° 49′

1880.22	160°±	0″.5±	8.0 . . . 8.5		β
1889.99	167.4	0.6±	. . .	3*n*	Sp
1891.27	165.3	0.74	8.1 . . . 8.9	3*n*	β
1892.39	163.3	0.55	. . .	1*n*	Sp
1898.24	157.8	0.77	8 . . . 9	2*n*	D

Discovered with the 18½-inch. The change, if any, is small.

[β (XIII) . . . β^2 . . . β (3114) . . . β (*Pub. L. O.* II) . . . Sp (III) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 923. *Virginis* 168

R.A. $12^h\ 22^m\ 12^s$
Decl. $+\ 5^\circ\ 4'$

1879.33	59°.6	2".16	6.8...13.5	3*n*	β
1892.13	61.8	2.66	6.8...11.7	3*n*	β
1898.50	59.1	2.65	7.0...12.2	3*n*	A

Discovered with the 18½-inch. In GOULD 6.9 m. W[1] XII. 344.

[β (XIII)...β^3...β (3142)...β (*Pub. L. O.* II)...Aitken ( )...]

β 1080. 17 *Comae*

R.A. $12^h\ 22^m\ 55^s$
Decl. $+\ 26^\circ\ 35'$

B and C

1889.11	156°.8	1".79	6.0...13.7	3*n*	β
1898.48	156.0	1.83	...14.0	1*n*	A

A and B (= Σ 21 App. 1)

1825.23	250°.8	144".43	6 ... 7	2*n*	S
1836.43	250.7	145.35	4.8... 6.0	5*n*	Σ
1859.25	250.6	146.01	...	1*n*	Se
1870.35	250.6	145.35	5.1... 6.3	5*n*	Δ
1877.77	250.4	145.37	4.8... 6.0	5*n*	Je
1889.11	250.3	145.05	...	2*n*	β
1899.29	250.4	145.27	...	1*n*	β

The close component was discovered with the 36-inch. There is obviously no change in the STRUVE wide stars (= S 638). According to AUWERS, the bright stars have different proper motions:

A = 0".015 in 258°.5
B = 0.018 in 235.9

As the measures show no change, they must have the same proper motion.

[β (XV)...β (2929)...β (*Observatory* XII, 227) (*Pub. L. O.* II) ...Aitken ( )...Secchi (*Cat. 1321 Stelle Doppie*)...Δ (II)...*Radcliffe Obsns.* 1868, 1880, 1881...Jedrzejewicz (2338)...]

β 28. B.A.C. 4213

R.A. $12^h\ 23^m\ 53^s$
Decl. $-12^\circ\ 44'$

1874.30	362°.0	...	...	1*n*	WS
1875.29	353.7	1".81	6.4...10.2	5*n*	Δ
1877.33	355.1	2.16	6.7...10.2	2*n*	Cin
1880.36	356°.3	2".01	...	1*n*	Pt
1885.34	361.1	2.16	6 ...10	1*n*	LM
1889.24	362.4	...	6.0...11.0	2*n*	Lv
1889.32	357.0	2.23	...	3*n*	T
1891.26	368.6	1.81	6.6... 9.3	3*n*	β
1892.34	369.0	2.22	6.3...10.7	4*n*	T
1898.25	366.9	2.04	6.0...11.3	3*n*	A

Discovered with the 6-inch. PORTER gives for the principal star (Piazzi XII. 104) a proper motion of 0".282 in the direction of 261°.7. It is plain that this is a physical system, as this motion is common to the components. There is also slow direct relative motion.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...Δ (1)...Cin[4]...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...LM...Lv[3]...Pritchett (*Pub. Morrison Obsy.* I) ...Tarrant (3186)...Aitken ( )...]

β 797. D.M. (6°) 2630

R.A. $12^h\ 28^m\ 27^s$
Decl. $+\ 6^\circ\ 38'$

A and B

1881.31	171°.2	0".73	8.5... 8.6	3*n*	β
1888.39	170.1	0.75	8.7... 8.7	3*n*	Com
1899.26	164.0	0.53	...	1*n*	β

AB and C

1881.31	3°.2	77".29	... 9.0	3*n*	β
1899.07	3.1	77.08	... 8.5	2*n*	β

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^4...Comstock (*Pub. Washburn Obsy.* VI)...]

β 607. Schj. 4572

R.A. $12^h\ 35^m\ 2^s$
Decl. $-\ 0^\circ\ 48'$

1867.33	320°.0	1".40	...	1*n*	Hd
1878.22	314.4	1.06	9.0...10.7	1*n*	Cln
1878.23	315.8	1.16	8.5...11.0	4*n*	β
1879.75	316.0	1.12	8.9... 9.5	2*n*	β
1880.34	314.5	1.08	9.0...11.0	2*n*	Cin
1889.31	316.3	1.20	9.0...10.0	3*n*	β

Discovered with the 18½-inch. It is 32[s] directly preceding γ *Virginis*. In D.M. 9.2 m. So far

there has been no change. Previously seen at Harvard, but not printed until after β (x). OΣ measures this star from γ *Virginis* for proper motion of the latter.

[β (x)...β^{1}...β^{3}...β (2930)...β (*Pub. L. O.* II)...Cin^{3}... Cin^{6}...*Annals Harvard Obsy.* XIII...OΣ (*Poulkowa Obsns.* X, p. 89)...]

β 924. 31 *Virginis*

R.A. $12^{h}\ 35^{m}\ 52^{s}$
Decl. $+\ 7^{\circ}\ 28'$

1880.14	29.0	3.66	5.8...11.6	5*n*	β
1883.26	36.0	3.9	...	1*n*	Perry
1891.24	29.0	3.94	5 ...11.5	3*n*	β
1899.06	31.8	3.79	...11.4	2*n*	β

Discovered with the 18½-inch. The proper motion of this star is 0".106 in the direction of 273°.2 (AUWERS). With this movement and the measures of 1880, the small star, if fixed in space, should be at the date of the last measures, 50°.7 : 4".88.

[β (XIII)...β^{1}...β^{2}...β (3114)...β (*Pub. L. O.* II)...Perry (*Eng. Mech.* XXXVIII, 192)...]

β 459. W^{1} XII. 689

R.A. $12^{h}\ 41^{m}\ 58^{s}$
Decl. $+\ 4^{\circ}\ 7'$

1877.93	289.5	3.80	8.2...11.5	2*n*	J
1880.61	292.6	3.50	...	2*n*	Pt
1893.39	295.0	3.91	8.0...11.0	3*n*	W
1898.28	292.9	3.76	8.0...11.7	3*n*	A

Discovered with the 6-inch. Without change.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...J (I)...Pritchett (*Pub. Morrison Obsy.* I)...Wilson ( )...Aitken ( )...]

β 925. Groombridge 1938

R.A. $12^{h}\ 51^{m}\ 6^{s}$
Decl. $+\ 44^{\circ}\ 12'$

1879.82	211.3	7.11	6.5...12.0	2*n*	β
1882.41	209.5	6.48	6.5...13.0	2*n*	Ho
1892.13	211.9	6.90	6.3...11.4	3*n*	β
1899.08	211.6	6.77	6.8...12.5	1*n*	β

Discovered with the 18½-inch. KUSTNER gives the proper motion of this star 0".019 in the direction of 294°.9. The measures do not cover a sufficient time to show whether or not the motion belongs to both stars. This is a naked-eye star in *Canes Venatici*.

[β (XIII)...β^{2}...β (3142)...β (*Pub. L. O.* II)...Hough (2978)...]

β 926. Lalande 24147

R.A $12^{h}\ 52^{m}\ 14^{s}$
Decl. $-\ 5^{\circ}\ 24'$

1880.33	270.4	2.06	8.1...11.3	3*n*	β
1892.24	274.8	2.24	8.3...11.0	3*n*	β
1892.33	269.9	2.23	8.2...11.7	3*n*	Lv

Discovered with the 18½-inch. There is no indication of motion.

[β (XIII)...β^{1}...β (3142)...β (*Pub. L. O.* II)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 1081. 37 *Comae*

R.A. $12^{h}\ 54^{m}\ 32^{s}$
Decl. $+\ 31^{\circ}\ 26'$

1889.13	351.3	5.15	4.5...13.8	3*n*	β
1898.52	348.7	5.24	...14.0	2*n*	A

Discovered with the 36-inch. AUWERS gives the proper motion of this star, 0".034 in the direction of 268°.3. It is impossible to say with certainty from the two sets of measures whether the small star shares in this movement. If it does not, the angle should have increased 3°.5 at the last date, the distance remaining substantially the same.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Aitken ( )...]

β 112. Piazzi XII. 243

R.A. $12^{h}\ 54^{m}\ 46^{s}$
Decl. $+\ 19^{\circ}\ 1'$

B and C

1874.30	293.4	...	9 ...10	2*n*	WS
1875.08	292.4	1.75	9.6...10.0	3*n*	J
1892.14	293.7	1.86	9.3... 9.8	3*n*	β
1892.32	291.1	1.90	9.1... 9.8	3*n*	Lv

1893.33	291°.2	1".99	8.8... 9.0	2n	Gl
1895.40	...	2.57	...	1n	Dyson
1895.40	297.5	2.34	...	1n	Lew
1897.41	293.1	1.96	...	2n	Lew
1897.81	293.4	2.12	...	4n	Doo
1898.29	293.1	2.40	...	1n	Bry
1898.28	292.9	2.12	8.8... 9.0	3n	A

A and BC

1874.30	347°.3	...	6.5...	1n	WS
1875.38	347.4	153".39	6.2...	2n	J
1892.13	348.9	150.70	6.0...	2n	β
1893.33	349.3	150.90	5.7...	2n	Gl
1894.25	348.8	150.11	6.8...	2n	W
1897.45	349.2	151.18	7 ... 9	4n	Doo
1898.15	349.3	150.77	...	2n	Doo
1898.28	348.9	151.05	6.3...	3n	A

Discovered with the 6 inch. There has been no sensible change. The *Berlin A. G. Catalogue* gives the proper motion of A 0".312 in the direction of 287°.7. This probably explains the change in the position of the double companion star. It should be remarked that some of the measures give the distance of A and B, and others the distance of A and BC, and, therefore, the measures as given are more accordant with the proper motion than would at first appear.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (3142)...β (*Pub. L. O.* II)...J (I)...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ...Glasenapp (II)...Lewis, Bryant and Dyson (*Mon. Not.* LVI, 359; LIX, 400) (*Greenwich Obsns.* 1895)... Wilson ( )...Aitken ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 1082. 78 *Ursae Majoris*

R.A. 12h 55m 35s
Decl. + 57° 1'

1889.17	74°.6	1".50	6.0... 9.6	6n	β
1890.26	76.9	1.46	...	3n	β
1898.29	85.4	1.26	...	3n	Lew
1898.51	86.5	1.42	6.0... 9.5	3n	A

Discovered with the 36-inch. KRUEGER gives the proper motion 0".062 in the direction of 108°.8. It is evident from the measures that this is the movement of both components; otherwise, the position of B for 1898.5 would be 56°.9 : 1".07.

[β (XV)...β (2029,2979,3048)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...]

β 927. Lalande 24257

R.A. 12h 56m 34s
Decl. — 5° 53'

1880.31	291°.3	4".17	8.3...10.3	3n	β
1892.26	291.5	4.20	8.2...10.2	3n	β
1892.31	290.5	4.42	8.2...10.0	3n	Lv
1899.20	292.8	4.73	...	2n	β

Discovered with the 18½-inch. Unchanged.

[β (XIII)...β³...β (3142)...β (*Pub. L. O.* II)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 928. Lalande 24274

R.A. 12h 57m 10s
Decl. — 5° 47'

1880.31	313°.2	1".83	7.8... 8.7	3n	β
1888.70	312.5	1.98	8.2... 9.6	3n	Lv
1892.25	312.8	2.01	8.0... 9.0	3n	β
1892.37	305.8	...	8.0... 9.0	1n	C
1893.37	313.8	2.01	8.2... 9.2	2n	J

Discovered with the 18½-inch. No relative motion.

[β (XIII)...β³...β (3142)...β (*Pub. L. O.* II)...Collins and Jones (*A. J.* 378, 312) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 341. *Hydrae* 348

R.A. 12h 57m 20s
Decl. — 19° 56'

1876.39	313°.6	0".85	6.0... 6.1	2n	Cin
1877.00	136.2	0.83	6.2... 6.7	3n	J
1877.37	134.4	1.00	6.0... 6.1	2n	Cin
1879.27	312.0	...	6.5... 7.0	1n	Cin
1881.38	312.9	0.62	6.5... 7.0	3n	Sp
1881.46	313.4	0.71	6.2... 6.2	2n	β
1884.35	317.1	0.96	8.0... 8.0	1n	W
1889.26	306.8	0.66	...	1n	Sp
1894.46	310.5	0.3±	6 ... 6	2n	Sel
1896.54	307.9	0.78	...	2n	A
1898.26	315.5	0.60	6.5... 6.5	3n	A

Discovered with the 6-inch. Change is doubtful. This is a naked-eye star; GOULD 5.9 m (*Virgo*). Lalande 24275.

[β (VI)...β (2062)...β²...J (I)...Cin³...Cin⁴...Cin⁵... Wilson (Cin^m)...Sp (II, III)...Sellors (3303)...Aitken (3395,)...]

β 929. 48 *Virginis*

R.A. $12^h\ 57^m\ 43^s$
Decl. $-\ 3°\ 1'$

1879.40	229°.4	0".48	6.2 ... 6.2	3*n*	β
1879.40	233.2	...	7.0 ... 8.0	1*n*	Cin
1880.35	227.3	...	...	1*n*	Cin
1881.42	222.1	0.33	...	1*n*	Big
1881.46	223.6	0.48	6.0 ... 6.0	3*n*	β
1885.86	42.2	0.38	...	6*n*	En
1887.54	222.7	0.36	...	2*n*	Sp
1888.25	219.1	0.54	6.3 ... 6.3	5*n*	T
1888.32	220.1	0.64	6.0 ... 6.5	2*n*	Lv
1889.33	217.1	0.66	6.2 ... 6.2	5*n*	T
1891.26	221.2	0.50	6.0 ... 6.3	3*n*	β
1892.40	223.7	0.5±	...	1*n*	Sp
1897.32	220.8	0.67	6 ... 6+	3*n*	A
1898.32	212.3	0.60	...	1*n*	Bow
1899.35	219.2	0.58	6.2 ... 6.6	2*n*	A

Discovered with the 18½-inch. There may be some retrograde motion, but it is very slow. The components have a common proper motion, and it is therefore a physical system. The proper motion from AUWERS is 0".091 in the direction of 258°.7.

[β (XIII)...β^3...β^4...β (3114)...β (*Pub. L. O.* II)...Cin^5... Cin^6...Engelmann (2786)...Lv^a...Lv (*Sid. Mess.* VIII, 77)...Tarrant (2991,3186)...Sp (III)...Bigourdan (*Annals Paris Obsy.* 1883)...Aitken (3465)...Bowyer (*Mon. Not.* LIX, 400)...Aitken ( )...]

β 798. Lalande 24307

R.A. $12^h\ 58^m\ 40^s$
Decl. $-\ 17°\ 2'$

1881.38	174°.3	0".54	8.1 ... 8.5	5*n*	β
1892.40	172.6	0.44	8.1 ... 8.5	2*n*	β

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^6...β (3142)...β (*Pub. L. O.* II)...]

β 1083. Piazzi XII. 268

R.A. $13^h\ 0^m\ 27^s$
Decl. $+\ 29°\ 40'$

B and C

1889.11	237°.3	0".49	11.5 ... 11.7	3*n*	β
1897.38	243.6	0.42	...	1*n*	Lew
1898.30	234.7	0.40	...	1*n*	Lew
1898.31	226.6	0.38	11.2 ... 11.7	2*n*	β
1898.52	238.2	0.47	12.5 ... 12.5	2*n*	A

A and BC (= H 2638)

1831	209°.6	6".±	6 ...	1*n*	H
1878.42	218.9	6.54	6 ...	1*n*	β
1889.11	219.9	6.23	6.5 ...	3*n*	β
1898.03	219.1	6.35	...	3*n*	Lew
1898.31	218.4	6.25	6.2 ...	2*n*	β
1898.52	219.1	6.40	...	2*n*	A
1898.94	217.8	6.16	...	1*n*	Bar

A and D

1831	6°.0	20".±	...15	1*n*	H
1878.42	7.2	40.28	...	1*n*	β
1898.31	9.5	39.24	...10.8	2*n*	β
1898.52	8.8	39.34	...12.5	2*n*	A

The duplicity of Herschel's nearest companion was discovered with the 36-inch. This is a naked-eye star in *Coma Berenices*. It is probable that B and D are only optical companions. There is a faint nebula in the field (Dreyer 4966), 149".1 distant, in the direction of 36°.1.

On the occasion of my second measure of these stars with the 40-inch in 1898, I saw as I supposed a very minute star near A, at a distance of perhaps 2" in the second quadrant. When the measure then being made was finished, the conditions had changed, and the new star could not be seen. It was looked for several times subsequently with the 40-inch without success. I think it is a real star.

[β (XV)...β (2929)...β^5...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...Barnard ( )...]

β 930. B.A.C. 4389

R.A. $13^h\ 0^m\ 28^s$
Decl. $+\ 45°\ 55'$

1879.28	109°.2	2".68	6.0 ... 12.3	3*n*	β
1891.24	113.3	2.67	6.2 ... 11.3	3*n*	β
1898.43	116.7	2.75	...	1*n*	Lew
1898.63	119.0	3.07	...	1*n*	Bry
1899.29	116.0	2.70	...	1*n*	β

Discovered with the 6-inch. A naked-eye star in *Canes Venatici*.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...Lewis and Bryant (*Mon. Not.* LIX, 400)...]

β 799. Groombridge 1960

R.A. 13h 1m 7s
Decl. + 73° 40'

1881.34	238°.7	0".57	6.5 ... 8.5	5*n*	β
1885.61	238.3	0.57	...	1*n*	HΣ
1888.63	244.4	0.65	6.7 ... 8.5	3*n*	Com
1891.30	245.3	0.71	7.1 ... 9.2	3*n*	β
1896.71	245.3	0.83	7 ... 8+	3*n*	A

Discovered with the 15-inch at the Washburn Observatory. A naked-eye star in *Draco*.

[β (XII)...β[4]...β (3114)...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* VI)...Aitken (3395)...HΣ ( )...]

β 609. W[1] XIII. 27

R.A. 13h 4m 30s
Decl. — 4° 18'

1878.32	356°.1	0".89	7.0 ... 11.0	1*n*	β
1879.40	351.9	...	8.0 ... 11.0	1*n*	Cin
1880.34	356.2	...	7.0 ... 10.0	2*n*	Cin
1889.31	349.1	0.91	6.8 ... 9.8	3*n*	β

Discovered with the 18½-inch. Probably unchanged.

[β (X)...β[2]...β (2930)...β (*Pub. L. O.* II)...Cin[3]...Cin[6]...]

β 608. 17 *Canum Venaticorum*

R.A. 13h 4m 33s
Decl. + 39° 8'

A and B

1878.32	284°.9	1".22	5.5 ... 10.5	2*n*	β
1885.54	272.4	1.36	...	2*n*	HΣ
1889.51	285.0	1.04	...	1*n*	Sp
1899.08	284.7	1.12	... 10.0	1*n*	β

A and C (= Σ 24 App. I.)

1835.69	297°.5	289".98	5.5 ... 5.9	5*n*	Σ
1867.71	297.3	287.92	5.6 ... 6.1	6*n*	J
1877.42	297.3	288.25	5.5 ... 5.9	4*n*	Je

The close star was discovered with the 18½-inch. C is 15 *Canum Ven.* Auwers gives the proper motions of the large stars:

A . . . 0".107 in 295°.5
C . . . 0.029 in 284.1

It is evident that the new star has the same proper motion as A.

[β (X)...β[1]...Sp (III)...J (II)...J (1574)...Jedrzejewicz (2338)...*Radcliffe Obsvt.* XXVI...Secchi (*Catalogo di 1321 Stelle Doppie, Appendix*)...Maiebekato (*Measures* 1892)...]

β 931. *Virginis* 454

R.A. 13h 4m 51s
Decl. + 13° 57'

1879.25	204°.9	4".89	6.7 ... 11.8	4*n*	β
1883.26	208.5	5.1	...	1*n*	Perry
1883.44	204.0	4.71	7 ... 12	3*n*	Ho
1898.20	200.4	5.23	7 ... 12	3*n*	D
1898.32	202.6	5.02	7 ... 11.5	3*n*	A

Discovered with the 18½ inch. No material change. Lalande 24489.

[β (XIII)...β[9]...]. J. M. Perry (*Eng. Mech.* XXXVIII, 192)...Hough (2978)...Doolittle (*Pub. Flower Obsy.* I)...Aitken ( )...]

β 221. Lalande 24532

R.A. 13h 6m 54s
Decl. — 14° 49'

1875.35	48°.6	1".68	8.1 ... 9.6	3*n*	J
1878.43	46.2	1.42	8.0 ... 9.5	1*n*	Cin
1880.36	46.4	1.52	8.0 ... 10.0	2*n*	Cin
1886.30	43.5	1.62	8 ... 9	1*n*	LM
1896.49	45.6	1.34	8.0 ... 9.0	3*n*	A

Discovered with the 6-inch.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...J (1)...Cin[5]...Cin[6]...LM...Aitken (3395)...]

β 342. O. Arg. S. 12741

R.A. 13h 8m 49s
Decl. — 18° 17'

1876.33	36°.3	3".89	8.0 ... 8.6	2*n*	J
1877.11	33.3	4.03	8.0 ... 8.5	1*n*	Cin
1878.84	34.9	3.98	7.5 ... 7.7	2*n*	Cin
1880.38	33.8	3.96	8.0 ... 8.5	4*n*	Cin
1881.38	33.8	5.32	8.0 ... 8.5	3*n*	Sp
1882.33	35.2	4.29	7.7 ... 8.5	1*n*	W
1888.32	34.2	3.80	8.4 ... 8.7	2*n*	Lv

1892.40	35°.5	3".96	...	1*n*	Sp
1893.37	33.0	4.84	8.1 ... 8.4	2*n*	J
1896.40	34.4	5.20	8 ... 8½	3*n*	Scott
1898.37	34.8	3.95	8.0 ... 8.6	3*n*	A
1899.09	37.2	4.00	9.0 ... 9.1	1*n*	β

Discovered with the 6-inch. In S.D. 8.2 m. Probably unchanged. 54 *Virginis* (=Sh 151) is 1ᵐ 46ˢ *p* and 6′ *n*. These two pairs are curiously similar in all respects except brightness. They have practically the same position angle, the same relative magnitudes, and differ in distance only a little more than 1″. The measure given above of 1896.40 certainly belongs to 54 *Virginis*, and this may be true of some of the others.

[β (VI)...β (2062)...J (I)...Cin⁴...Cin⁵...Cin⁶...Sp (II, III)...Wilson (Cin⁸)...Lv¹...Jones (*A. J.* 312)...Scott (*Brit. Ast. Ass.* VIII, 66)...Aitken ( )...]

β 800. *Comae* 201

R.A. 13ʰ 10ᵐ 52ˢ
Decl. + 17° 40′

1881.36	121°.5	1".27	7.1 ... 10.2	4*n*	β
1886.34	118.9	1.94	...	2*n*	HΣ
1889.12	117.1	2.17	6.9 ... 9.7	4*n*	Com
1890.33	115.5	2.02	7.5 ... 10.2	3*n*	β
1891.25	115.0	2.23	7.2 ... 10.7	3*n*	β
1892.60	117.8	2.12	...	5*n*	Sp
1894.39	114.7	2.29	...	1*n*	Com
1895.39	115.6	2.56	...	2*n*	Com
1896.39	113.1	2.50	...	3*n*	Com
1896.40	115.0	2.60	...	2*n*	Lew
1897.39	112.1	2.44	...	1*n*	Lew
1898.14	110.1	2.88	...	3*n*	D
1898.32	111.9	2.57	6.8 ... 10.3	3*n*	A
1898.37	113.5	2.33	...	1*n*	Bow
1898.39	117.0	2.53	...	3*n*	Lew
1898.54	116.4	2.54	...	1*n*	β

Discovered with the 15½-inch at the Washburn Observatory. This is a very interesting physical system. The change so far has been principally in distance, indicating that the plane of the orbit is nearly in the line of sight. The system has a large proper motion, according to KRUEGER, of 0″.697 in the direction of 113°.6. Lalande 24652.

[β (XII)...β⁶...β (*Sid. Mess.* IX, 299)...β (3048,3114)...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* VI, X) (*Sid. Mess.* IX, 78)...Sp (III)...Doolittle (*Pub. Flower Obsy.* I)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...Aitken ( )...HΣ ( )...]

β 222. Lalande 24636

R.A. 13ʰ 10ᵐ 55ˢ
Decl. − 20° 54′

1867.38	12°.1	1".46	8 ... 9	1*n*	Hd
1877.11	7.7	1.89	8.0 ... 9.0	1*n*	Cin
1894.44	14.7	1.50	8 ... 10	2*n*	Sel
1896.48	14.8	1.51	...	3*n*	A

Discovered with the 6-inch, but it had been previously seen by the Harvard observers, and is included in a list of new stars first published in 1882. The components seem to be fixed.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Cin⁴...*Annals Harvard Obsy.* XIII...Sellors (3303...Aitken (3395)...]

β 1084. W¹ XIII. 235

R.A. 13ʰ 15ᵐ 59ˢ
Decl. − 4° 2′

1889.31	89°.8	2".69	7.1 ... 12.7	3*n*	β
1898.26	88.7	2.78	7.2 ... 13.5	3*n*	A

Discovered with the 36-inch. The two sets of measures show no change.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Aitken ( )...]

β 610. *Virginis* 504

R.A. 13ʰ 17ᵐ 28ˢ
Decl. − 20° 18′

1878.24	18°.3	4".02	6.8 ... 10.5	1*n*	β
1878.41	17.4	3.77	7.0 ... 10.5	1*n*	J
1892.25	20.3	3.69	7.5 ... 10.3	3*n*	β
1892.38	18.5	3.82	7.1 ... 11.8	3*n*	Lv

Discovered with the 18½-inch. Apparently without change. In GOULD 6.9 m. Lalande 24812.

[β (X)...β¹...β (3142)...β (*Pub. L. O.* II)...Glasenapp (I) ...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 460. W¹ XIII. 273

R.A. 13ʰ 18ᵐ 40ˢ
Decl. − 13° 0′

1877.90	36°.4	2".19	8.2 ... 10.5	2*n*	J
1878.28	33.6	1.99	8.0 ... 10.5	1*n*	β
1892.38	34.8	2.26	8.0 ... 10.4	3*n*	Lv
1892.39	33.9	2.13	8.1 ... 10.0	3*n*	β

Discovered with the 6-inch. There is no indication of motion.

[β (IX)...β (*Mem. Not.* XXXVIII, 78)...β¹...β (3142)...β (*Pub. L. O.* II)...*J* (1)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 1107. O. Arg. S. 12884

R.A. 13ʰ 20ᵐ 37ˢ
Decl. — 21° 44′

1889.37	133°.8	1″.17	8.5... 8.5	3*n*	β
1897.37	132.4	1.05	8.0... 8.0	3*n*	A

Discovered with the 36-inch.

[β (XVI)... β (2956)...β (*Pub. L.O.* II)...Aitken (3465)...]

β 237. Lalande 24896

R.A. 13ʰ 20ᵐ 59ˢ
Decl. + 15° 0′

1875.27	202°.3	2″.95	8.3...10.3	3*n*	*J*
1883.44	204.2	2.91	8.5...11.0	3*n*	Ho
1883.64	207.7	2.95	8.2...10.2	7*n*	En
1899.07	200.1	3.12	8.3...11.5	1*n*	β

Discovered with the 6-inch. This system has a proper motion of 0″.189 in the direction of 152°.1 (PORTER). It is obviously a physical pair, but the relative change is slow.

[β (V)...β (*Mon. Not.* XXXV, 31)...*J* (1)...Engelmann (2678)...Hough (2978)...]

β 113. D.M. (12°) 2597

R.A. 13ʰ 23ᵐ 10ˢ
Decl. + 12° 6′

1875.32	188°.8	1″.57	8.5...11.0	4*n*	*J*
1891.25	197.2	1.45	8.0...10.2	3*n*	β
1896.50	203.8	1.32	...	3*n*	A
1898.32	204.2	1.39	8.2...11.3	3*n*	A

Discovered with the 6-inch. Slow angular motion, and probably binary.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β 13114)...β (*Pub. L. O.* II)...*J* (1)...Aitken (3395) ( )...]

β 114. W¹ XIII 438

R.A. 13ʰ 28ᵐ 0ˢ
Decl. — 8° 0′

1874.30	133°.5	1″.38	8 ... 8	1*n*	WS
1875.30	137.1	1.49	7.6... 8.0	4*n*	*J*
1876.38	134.5	1.60	8.0... 8.0	1*n*	Cin
1876.91	134.6	1.43	7.6... 8.0	4*n*	Sp
1877.29	132.9	1.39	8.0... 8.0	1*n*	Cin
1878.43	135.4	1.40	8.2... 8.5	2*n*	Cin
1880.33	137.0	1.50	7.9... 8.0	2*n*	Cin
1885.32	139.4	1.50	8.7... 9.0	4*n*	W
1885.34	135.4	1.60	8.0... 8.0	1*n*	LM
1888.36	138.8	1.34	7.5... 8.0	3*n*	T
1888.49	137.2	1.44	8.1... 8.3	2*n*	Lv
1890.07	138.0	1.58	...	3*n*	Maw
1890.40	133.5	1.98	8.1... 8.2	2*n*	Gl
1893.37	140.7	1.41	8.1... 8.3	3*n*	J

Discovered with the 6-inch. Probably without change.

[β (III)...β (*Mon. Not.* XXXIV, 59)...*J* (1)...*J* (2086)...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...Cin⁵...Cin⁴...Cin⁵...Cin⁶...Wilson (Cin⁵⁵)...Sp (II)...LM...Lv¹...Tarrant (2991)...Glasenapp (1)...Maw (*Mem. R. A. S.* L)...Jones (*A. J.* 312)...]

β 932. *Virginis* 550

R.A. 13ʰ 28ᵐ 18ˢ
Decl. — 12° 36′

A and B

1879.39	81°.2	0″.47	6.1... 6.6	4*n*	β
1881.37	84.9	0.51	6.0... 6.8	3*n*	β
1884.42	83.8	0.34	...	3*n*	Hl
1888.26	81.6	0.51	6.0... 6.5	3*n*	T
1898.32	84.3	0.44	6.4... 6.4	4*n*	A

AB and C

1879.68	155°.2	23″.82	...12.4	3*n*	β
1898.32	153.5	25.15	...12.4	5*n*	A
1899.30	153.6	25.10	...12.7	2*n*	β

Discovered with the 18½-inch. The measures of the distant star indicate a proper motion of A of 0″.08 in the direction of 305°.7. Evidently this belongs to both components, but there has been no sensible relative motion.

This is a naked-eye star in *Virgo* (B. A. C. 4531) and said to be variable, 5 to 8 m, by SCHMIDT in

1866. It seems to have been neglected since that time by variable star observers. It would be specially interesting to know in which, if only one, of the close stars the variability occurs. This is Z *Virginis* of some of the variable star catalogues.

[β (XIII)...β^3...β^4...β (*Observatory* III, 92)...Hall (II)... Tarrant (2091)...*Nature*, XXVII, 617; XXX, 325... Aitken ( )...]

β 933. W° XIII. 555

R.A. $13^h\ 29^m\ 7^s$
Decl $+\ 33°\ 45'$

A and B

1879.80	30°.7	1".88	8.4...	8.8	4*n*	β
1881.41	32.8	2.46	...		1*n*	Big
1888.68	29.0	2.09	8.2...	9.2	2*n*	Lv
1891.11	31.6	2.29	...		3*n*	Sp
1892.40	29.7	2.23	...		1*n*	Sp
1895.41	31.0	2.20	...		2*n*	Sp
1897.47	31.1	2.52	8+...	9.0	1*n*	D
1898.27	29.0	2.44	...		3*n*	D
1898.37	29.5	2.32	8.3...	8.7	3*n*	A

A and C (= H 2661)

1830.	28°.0	30"±	8.9...12-13	1*n*	H
1879.68	21.8	34.48	...12.5	3*n*	β
1898.27	17.6	34.46	...12.0	3*n*	D
1898.37	16.5	34.71	...12.5	3*n*	A

The close companion to the principal star of H 2661 was discovered with the 18½-inch. The foregoing are all the measures of AC. There seems to be some change in the angle, probably from proper motion.

[β (XIII)...β^3...Bigourdan (*Paris Obsn.* 1883)...(1.v¹...Sp (III)...Aitken ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 611. Lalande 25159

R.A. $13^h\ 31^m\ 15^s$
Decl. $-\ 14°\ 7'$

1878.35	259°.4	4".63	8.5...12.0	2*n*	β
1882.31	260.1	...	8.7...10.0	1*n*	W
1886.35	266.0	...	8.5...11.5	1*n*	W
1893.37	263.2	4.68	9.0...12.0	2*n*	W
1898.44	258.8	4.86	8.8...12.2	2*n*	A

Discovered with the 18½-inch. Unchanged.

[β (x)...β^1...Wilson (Cin^{to})...Wilson ( )...Aitken ( )...]

β 934. D.M. (51°) 1855

R.A. $13^h\ 32^m\ 50^s$
Decl. $+\ 51°\ 4'$

1879.28	264°.1	1".04	9.0...	9.2	3*n*	β
1891.31	266.5	1.26	9.1...	9.1	3*n*	β

Discovered with the 18½-inch. In D.M. 9.4 m. It is $2^m\ 39^s$ *p* Σ 1774 *rej.*

β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...]

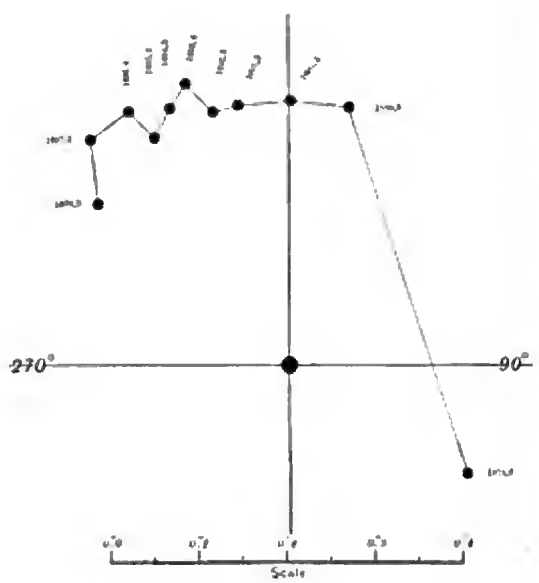
β 612. B.A.C 4559

R.A. $13^h\ 33^m\ 40^s$
Decl. $+\ 11°\ 21'$

1878.33	56°.1	0".23	6.0...	6.0	3*n*	β
1878.96	60.5	0.24	6 ...	6	4*n*	Hl
1884.02	52.4	0.28	...		5*n*	En
1886.44	196.6	...	...		1*n*	HΣ
1889.46	166.8	0.3±	...		3*n*	Sp
1890.39	179.7	0.3±	...		2*n*	Sp
1891.28	191.1	0.28	6.4...	6.5	3*n*	β
1891.44	191.1	0.32	6 ...	6	3*n*	Hl
1891.49	186.1	0.2±	...		1*n*	Sp
1892.14	198.7	0.31	6.3...	6.5	3*n*	β
1892.37	196.9	0.35	...		2*n*	HΣ
1892.40	194.6	0.25	...		3*n*	Sp
1893.42	207.4	0.36	6.1...	6.2	5-1*n*	W
1893.45	199.9	0.28	...		4*n*	Sp
1893.47	193.1	0.39	...		1*n*	Lew
1893.58	Single		...		1*n*	Com
1894.12	207.4	0.32	...		4*n*	Bar
1894.28	203.7	0.3±	...		2*n*	Com
1894.48	203.7	0.29	...		4*n*	Sp
1895.32	210.6	0.52	6.4...	6.5	2*n*	Lew
1895.40	209.3	0.30	...		2*n*	Sp
1895.42	212.1	0.25±	...		4*n*	Com
1896.37	212.5	0.4±	...		2*n*	Com
1896.41	212.1	0.34	...		2*n*	Lew
1897.21	222.6	0.38	...		3*n*	A
1897.36	223.9	0.33	...		2*n*	Lew
1897.42	217.3	0.30	...		6*n*	Sp
1898.32	210.9	0.48	...		1*n*	Bow
1898.40	221.0	0.39	...		2*n*	Lew
1898.47	225.1	0.36	...		2*n*	Sp
1898.61	231.5	0.28	6.2...	6.2	3*n*	A
1899.25	227.7	0.29	6.5...	6.5	4*n*	A

Discovered with the 18½-inch. It was very soon apparent from the measures that this was a binary

system in rapid motion. In the twenty years covered by the measures, the companion has passed over an arc of 175°. GLASENAPP, from the measures down to and including 1892, has computed an orbit from which he finds a period of 30.00 years (*Astronomy and Astro-Physics*, June 1892). This represents the observations as well as could be desired, but evidently the arc was too short for any very accurate determination, and even now widely differing apparent orbits will satisfy the observed positions equally. It is probable that the measures of the next ten years will furnish sufficient data for an orbit which shall be substantially correct. The principal measured positions are shown on the accompanying diagram:



β 612

This is a naked-eye star in *Virgo*. It has no sensible proper motion.

[β (x)...β²...β (3114,3142)...β (*Pub. L. O.* II)...β (*Sid. Mess.* x, 323) (*Astronomy & A.-P.* XI, 268)...Hall (I, II)...Engelmann (2678)...Sp (III)...Wilson ( )...Comstock (*Pub. Washburn Obsy.* X)...Lewis (*Mon. Not.* LIV, 316; LIX, 400) (*Greenwich Obsn.* 1895)...Everett (*Mon. Not.* LVI, 464)...Glasenapp (*Astronomy & A.-P.* XI, 466)...Barnard (*A. J.* 447)...HΣ ( )...Lewis ( )...Aitken ( )...]

β 223. Lalande 25350

R.A. 13h 38m 58s
Decl. − 2° 43′

1875.65	343.7	18.73	7.9...11.1	3*n*	J
1879.40	343.1	18.93	8.0...10.5	1*n*	Cin
1880.33	344.7	18.75	8.0...10.0	1*n*	β
1889.37	344.7	18.56	7.8...11.3	2*n*	T
1899.07	344.3	18.98	8.0...11.0	1*n*	β

Discovered with the 6-inch.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β¹...J (1)...Cin⁵...Tarrant (3186)...]

β 115. Lalande 25365

R.A. 13h 39m 24s
Decl. + 9° 40′

1877.40	224.4	1.42	8.0...11.5	2*n*	J
1891.25	223.6	1.64	8.0...10.4	3*n*	β

Discovered with the 6-inch. There is an error in the declination given in β (III).

[β (III)...β (*Mon. Not.* XXXIV, 50)...β (3114)...β (*Pub. L. O.* II)...J (1)...]

β 935. 86 *Virginis*

R.A. 13h 39m 33s
Decl. − 11° 49′

A and B

1879.37	298.4	1.61	5.5...10.5	5*n*	β
1879.50	293.5	1.61	6 ...11	5*n*	Hl
1880.42	299.9	1.63	...	2*n*	Cin
1881.44	296.1	1.33	6.0... 9.7	2*n*	β
1885.38	290.3	1.70	...	2*n*	Hl
1889.30	299.6	1.66	5.8...10.0	3*n*	β
1897.40	293.8	1.52	6.0...10.0	3*n*	A
1899.20	297.9	1.63	... 9.8	3*n*	β

C and D

1879.40	274.2	1.72	11.6...12.8	4*n*	β
1879.50	276.1	1.80	12 ...13	2*n*	Hl
1889.30	275.9	2.24	10.5...11.2	3*n*	β
1897.40	270.6	2.09	11 ...12	3*n*	A
1899.20	273.7	2.03	11.5...12.4	2*n*	β

A and C (= Σ 1780 *rej.*)

1836.40	160°.3	″ ...	...	1*n*	H
1879.33	164.7	26.94	...	2*n*	β
1889.30	164.6	27.17	...	3*n*	β
1899.20	164.3	27.07	...	3*n*	β

Both components of STRUVE's rejected pair were found to be double with the 18½-inch. With a large aperture it is one of the finest of the quadruple groups.

According to AUWERS, 86 *Virginis* has a proper motion of 0″.043 in the direction of 287°.5. The measures of AB show conclusively that this movement belongs to both stars. With this proper motion and the position of B in 1879, the latter star, if fixed in space, for 1897 should be 308°.2 : 0″.86. It is evident that no such relative change has taken place. The measures are insufficient in point of time to show whether or not the double companion is moving with the principal star. All the measures of AC are given above.

In making the measures of 1889 with the 36-inch, two new nebulae were discovered in the field. One is 4½′ *p* and 136″.8 *s*, and the other 19½′ *p* and 101″.6 *s*.

[β (XIII)...β^{13}...β^{14}...β (2930)...Cin^{4}...Hall (I, II)... Aitken (3465)...]

β 801. Lalande 25399

R.A. 13^{h} 40^{m} 43^{s}
Decl. + 11° 26′

1881.31	328°.0	″2.76	8.1...10.9	3*n*	β
1888.39	326.5	2.66	8.5...10.5	3*n*	Com
1898.37	324.3	2.62	8.1... 9.7	3*n*	D

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^{4}...Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* I)...]

β 413. Lacaille 5686

R.A. 13^{h} 42^{m} 16^{s}
Decl. — 27° 46′

1877.37	109°.1	″78.68	7.5... 9.0	1*n*	Cin
1879.33	108.8	78.00	6.2... 8.5	1*n*	β
1885.32	108.7	77.77	7.0... 8.0	1*n*	W
1889.39	109.5	77.66	7.7... 9.2	2*n*	β
1899.27	108.6	76.88	8.0... 9.0	2*n*	β

The distant companion to this blood-red star was noted with the 6-inch. It is not likely to be of any interest as a double star. The color of the principal star is very striking. It is not given in any of the catalogues of red stars. The measures indicate a proper motion of 0″.07 nearly in the line of the components.

[β (VII)...β (2103,2957)...β^{3}...β (*Pub. L. O.* II)...Cin^{4}... Wilson (Cin^{10})...]

β 802. D.M. (49°) 2245

R.A. 13^{h} 43^{m} 48^{s}
Decl. + 48° 57′

1881.33	223°.9	″3.43	7.8...11.0	3*n*	β
1885.54	220.8	3.73	...	3*n*	HΣ
1888.44	221.3	3.65	8.0...11.7	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^{4}...Comstock (*Pub. Washburn Obsy.* VI)...HΣ ( )...]

β 343. *Centauri* 219

R.A. 13^{h} 45^{m} 8^{s}
Decl. — 31° 1′

1877.41	130°.2	″1.44	6.0... 8.5	1*n*	Cin
1889.37	129.7	1.70	6.2... 7.1	4*n*	β
1894.45	122.0	0.93	6 ... 8	2*n*	Sel
1897.22	123.0	1.05	6.4... 8.0	3*n*	See
1898.32	118.7	1.28	6.5... 7.4	3*n*	A

Discovered with the 6-inch. Apparently slow retrograde motion. In GOULD 6.7 m. B.A.C. 4624.

[β (VI)...β (2062,2957)...β (*Pub. L. O.* II)...Cin^{4}...Sellors (3303)...See (3496)...Aitken ( )...]

β 613. D.M. (35°) 2494

R.A. 13^{h} 46^{m} 3^{s}
Decl. + 35° 16′

A and B

1878.42	146°.2	″0.78	9.0... 9.0	1*n*	β
1880.37	149.3	0.92	9.0... 9.0	1*n*	β
1892.13	149.7	0.73	9.1... 9.1	3*n*	β
1898.43	153.6	0.48	...	1*n*	Lew
1898.44	153.5	0.87	9.0... 9.9	4*n*	D

AB and C

1880.37	83°.4	49".21	... 8.8	1*n*	*β*
1892.15	83.2	48.75	... 9.0	2*n*	*β*
1898.44	82.1	48.73	... 8.9	4*n*	D

Discovered with the 18½-inch. It is 12".4 *f* the 6 m star, B.A.C. 4628. Some change in the close pair is probable.

[*β* (x)...*β*²...*β* (3142)...*β* (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...Doolittle (*Pub. Flower Obsy.* I)...]

β 1108. B.A.C. 4631

R.A. 13ʰ 46ᵐ 32ˢ
Decl. — 35° 4'

A and B

1889.38	84°.0	1".28	6.0... 6.0	3*n*	*β*
1893.47	86.3	0.83	6 ... 6	2*n*	Sel
1897.37	86.5	0.99	6.0... 6.0	3*n*	A

AB and C

1889.38	168°.2	27".52	...12	1*n*	*β*

AB and D (= H² V. 124)

1783.08	...	54".02	...	1*n*	H²
1889.38	359.0	65.21	... 8.5	3*n*	*β*

Discovered with the 12-inch, but it had been previously seen and recorded by HOWE. Lacaille 5726.

[*β* (XVI)...*β* (2956)...*β* (*Pub. L. O.* II)...Howe (Cin¹)...Sellors (3240)...Aitken (3465)...]

β 614. Lalande 25573

R.A. 13ʰ 48ᵐ 2ˢ
Decl. + 10° 44'

1878.37	268°.3	0".60	8.0...11.7	2*n*	*β*
1889.40	271.1	0.44	7.8...11.2	3*n*	*β*

This very difficult pair was discovered with the 18½-inch. The principal star is identical with that of OΣ 271, which was marked "oblonga?" in the *Poulkowa Catalogue* of 1843, but rejected as single in the revised edition of 1850. It is not certain that the very minute star now measured has any connection with the suspected elongation previously noticed. At the time of making the measures given above, the principal star was perfectly round, with the 18½ and 36-inch refractors. It is the southern star of three in the field.

[*β* (x)...*β*²...*β* (2199,2957)...*β* (*Pub. L. O.* II)...]

β 461. W¹ XIII. 850

R.A. 13ʰ 50ᵐ 36ˢ
Decl. + 3° 34'

A and B

1879.38	234°.9	33".33	7.5...12.5	1*n*	*β*
1893.36	235.1	33.33	7.7...12.2	3*n*	W
1899.37	235.9	33.12	7 ...12.2	2*n*	*β*

A and C

1879.38	216°.3	40".55	...11.8	1*n*	*β*
1893.36	216.6	40.50	...11.3	3*n*	W
1899.37	216.6	40.84	...12.3	2*n*	*β*

Noted with the 6-inch. Of no particular interest as a double star.

[*β* (IX)...*β* (*Mon. Not.* XXXVIII, 78)...*β*²...Wilson ( )...]

β 936. D.M. (35°) 2505

R.A. 13ʰ 51ᵐ 3ˢ
Decl. + 35° 13'

1880.37	97°.8	3".94	8.4...12.2	2*n*	*β*
1892.13	95.8	4.58	8.5...11.3	3*n*	*β*
1898.51	95.9	4.66	8.7...12.0	3*n*	A

Discovered with the 18½-inch. Probably fixed.

[*β* (XIII)...*β*²...*β* (3142)...*β* (*Pub. L. O.* II)...Aitken ( )...]

β 937. W¹ XIII. 1122

R.A. 13ʰ 51ᵐ 52ˢ
Decl. + 35° 1'

1880.37	104°.8	0".94	8.1... 8.3	3*n*	*β*
1890.48	108.8	0.77	...	2*n*	Sp
1896.49	102.8	0.88	8 ... 8+	3*n*	A

Discovered with the 18½-inch. Very little, if any, change.

[*β* (XIII)...*β*²...Sp (III)...Aitken (3395)...]

β 344. O. Arg. S. 13285

R.A. $13^h\ 52^m\ 22^s$
Decl. $-24°\ 57'$

1877.29	121.1	3.32	9.0 ... 9.0	1*n*	Cin
1879.27	125.7	...	9.0 ... 9.5	1*n*	Cin
1880.33	124.4	3.31	8.0 ... 9.0	2*n*	Cin
1898.32	123.8	3.44	8.7 ... 8.8	3*n*	A

Discovered with the 6-inch. There is no evidence of change.

[β (VI)...β (2062)...Cin⁴...Cin⁵...Cin⁶...Aitken ( )...]

β 30. D.M. (20°) 2904

R.A. $13^h\ 52^m\ 26^s$
Decl. $+20°\ 3'$

1875.25	199.8	7.82	8.2 ... 11.5	2*n*	J
1892.24	200.0	8.05	8.0 ... 10.4	3*n*	β
1892.29	199.6	8.29	8.0 ... 11.0	4*n*	Lv
1898.36	198.8	8.27	8.1 ... 11.0	2*n*	Gl
1898.37	197.2	8.18	8.0 ... 9.7	2*n*	D
1898.46	201.3	8.75	...	1*n*	Lew

Discovered with the 6-inch.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3142)...β (*Pub. L. O.* II)...J (I)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (V)...Doolittle (*Pub. Flower Obsy.* I)...Lewis (*Mon. Not.* LIX, 400)...]

β 1197. Lacaille 5791

R.A. $13^h\ 56^m\ 4^s$
Decl. $-31°\ 6'$

1890.41	178.9	0.86	6.8 ... 8.1	3*n*	β
1897.37	187.9	0.93	6+ ... 8+	3*n*	A
1897.42	185.2	1.18	6.9 ... 9.2	1*n*	See

Discovered with the 12-inch. There may be some change in the angle.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken (3465)...See (3496)...]

β 1270. Lalande 25825

R.A. $13^h\ 57^m\ 46^s$
Decl. $+9°\ 4'$

1892.27	329.7	0.27	8.2 ... 8.3	3*n*	β
1896.40	356.2	0.43	...	1*n*	Lew
1897.41	346.0	0.27	...	1*n*	Lew
1898.44	341.8	0.36	...	2*n*	Lew
1898.44	344.9	0.45	...	1*n*	Bow
1899.24	361.5	0.24	8.2 ... 8.5	3*n*	A

Discovered with the 36-inch. In D.M. 7.9 m. Change in angle appears certain, but further measures are needed.

[β (XIX)...β (3141)...β (*Pub. L. O.* II)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...Aitken ( )...]

β 938. O. Arg. S. 13375

R.A. $13^h\ 59^m\ 29^s$
Decl. $-26°\ 0'$

1879.39	117.6	0.89	7.5 ... 7.5	2*n*	β
1892.40	117.1	0.65	7.9 ... 8.2	3*n*	β
1892.41	299.1	0.62	7.5 ... 7.7	3*n*	Lv
1897.42	111.5	0.72	8 ... 8	1*n*	A

Discovered with the 18½-inch. Probably unchanged. It is 6′ *n* of *π Hydrae*.

[β (XIII)...β³...β (3142)...β (*Pub. L. O.* II)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Aitken (3465)...]

β 1109. D.M. (5°) 2846

R.A. $14^h\ 3^m\ 18^s$
Decl. $+5°\ 14'$

A and B

1889.39	321.9	1.78	9.0 ... 13.7	3*n*	β
1899.24	314.8	1.85	9.0 ... 13.0	2*n*	A

A and C

1889.39	356.3	53.04	... 9.0	3*n*	β
1899.18	355.3	53.30	... 9.0	1*n*	A

Discovered with the 36-inch.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken ( )...]

β 803. Lalande 25991

R.A. $14^h\ 4^m\ 46^s$
Decl. $-2°\ 6'$

1881.45	227.9	5.27	7.8 ... 12.0	1*n*	β
1892.40	226.5	5.54	7.4 ... 11.3	3*n*	β
1899.27	224.6	5.67	7.5 ... 11.7	2*n*	β

Discovered with the 15½-inch at the Washburn Observatory. Another pair found at the same place is 30^s *p*.

1881.37	243°.6	4″.33	8.8...	9.5	3*n*	*β*
1899.27	243.5	4.70	9.0...	9.2	2*n*	*β*

[*β* (XII)...*β*^{s}...*β* (3142)...*β* (*Pub. L. O.* II)...]

β 224. W^s XIV. 95

R.A. 14^h 7^m 38^s
Decl. + 13° 8′

1875.64	71°.0	0″.71	8.9...	9.3	3*n*	J
1879.47	61.7	0.95	9.0...	9.5	2*n*	Sp
1884.98	68.6	0.78	8.2...	8.5	5*n*	En
1893.36	65.0	0.88	7.8...	8.3	3*n*	W
1898.20	63.7	0.86	...		5*n*	D
1898.32	65.6	0.69	8.3...	8.5	3*n*	A

Discovered with the 6-inch. Change uncertain.

[*β* (IV)...*β* (*Mon. Not.* XXXIV, 382)...*β* (I)...Sp (II)... Engelmann (2678)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...Aitken ( )...]

β 939. Lalande 26065

R.A. 14^h 7^m 48^s
Decl. — 7° 57′

A and B

1879.92	156°.1	0″.65	8.0...	8.1	2*n*	*β*
1887.46	147.9	0.45	...		2*n*	Sp
1888.34	147.5	0.68	8.0...	8.4	2*n*	Lv
1892.39	149.3	0.6±	...		2*n*	Sp
1895.40	150.9	0.35±	...		1*n*	Sp
1898.27	147.5	0.71	8 ...	8	3*n*	D

AB and C

1879.37	280°.9	87″.25	...	9.0	1*n*	*β*
1898.27	280.0	87.63	...	9	3*n*	D

Discovered with the 18½-inch. Apparently without change.

[*β* (XIII)...*β*^{s}...Sp (III)...Lv^s...Doolittle (*Pub. Flower Obsy.* I)...]

β 1246. B.A.C. 4740

R.A. 14^h 12^m 12^s
Decl. — 25° 16′

A and B

1891.43	187°.1	2″.99	5.5...	13.5	3*n*	*β*
1898.52	189.2	3.30	5.5...	13.8	2*n*	A

A and C

1891.42	88°.8	36″.35	...	11	1*n*	*β*
1898.44	92.0	39.09	...		1*n*	*β*
1898.52	93.0	39.05	...	13.5	2*n*	A

Discovered with the 36-inch. The principal star has a large proper motion, 0″.458, in the direction of 307°.0 (PORTER). The change in the position of C is explained by this motion of A. The companion to A evidently has the same proper motion, and the two doubtless form a physical system. LACAILLE 5892.

[*β* (XVIII)...*β* (3113)...*β* (*Pub. L. O.* II)...Aitken ( )...]

β 1110. Taylor 6665

R.A. 14^h 12^m 29^s
Decl. — 36° 18′

1889 39	130°.7	3″.95	7.0...	12.3	3*n*	*β*
1897.37	133.4	3.52	6.9...	14.2	1*n*	See
1898.52	131.2	3.78	7.2...	11.7	3*n*	A

Discovered with the 12-inch. So far unchanged.

[*β* (XVI)...*β* (2956)...*β* (*Pub. L. O.* II)...See (3496)... Aitken ( )...]

β 116. Lalande 26177

R.A. 14^h 13^m 3^s
Decl. — 13° 9′

1875.69	279°.0	2″.90	7.7...	8.2	3*n*	J
1876.38	278.7	3.21	8.0...	8.5	2*n*	Cin
1877.41	278.2	3.08	8.0...	8.5	1*n*	Cin
1878.42	277.4	2.98	7.7...	8.2	2*n*	Cin
1880.37	278.3	3.08	...		1*n*	Cin
1885.28	278.7	3.12	8.0...	8.5	1*n*	W
1886.30	279.2	3.06	8 ...	8	1*n*	LM
1888.36	98.6	3.16	7.7...	8.5	3*n*	T
1888.36	277.7	3.01	8.2...	8.2	2*n*	Lv
1890.41	279.1	3.32	7.8...	8.1	2*n*	Gl
1893.38	276.5	3.08	7.8...	8.0	1*n*	J

Discovered with the 6-inch. No material change. It is 20′ *n* of λ *Virginis*.

[β (111)...β (*Mon. Not.* XXXIV, 59)...J (1)...Cin²... Cin⁴... Cin⁵... Cin⁶...Wilson (Cin²⁰)...LM...Lv¹...Tarrant (2991)...Glasenapp (1)...Jones (*A. J.* 312)...]

β 1271. Radcliffe 3181

R.A. 14ʰ 13ᵐ 4ˢ
Decl. + 55° 6′

1892.36	355°.2	2″.81	6.8...12.0	3*n*	β
1897.58	351.0	2.31	7.0...12.0	3*n*	A

Discovered with the 36-inch. In D.M. 7.0 m.

[β (XIX)...β (3141)...β (*Pub. L. O.* II)...Aitken (3465)...]

β 1272. O. Arg. N. 14451

R.A. 14ʰ 13ᵐ 22ˢ
Decl. + 49° 18′

A and B

1892.17	132°.5	1″.25	8.4... 9.5	4*n*	β
1897.52	132.8	1.32	...	2*n*	Lew
1897.56	126.5	1.14	8+... 9+	3*n*	A
1898.53	129.3	1.18	...	1*n*	Lew
1898.63	134.2	1.44	...	1*n*	Bry

A and C (= H 2710)

1830	324°.0	25″±	9 ...10	1*n*	H
1892.17	321.8	23.67	... 8.6	4*n*	β
1898.63	321.4	23.60	...	1*n*	Bry

The duplicity of the principal star of H 2710 was discovered with the 36-inch. Thus far there appears to be no certain change, and the same is true of the distant star. All the measures of this are given above. C is O. Arg. N. 14448.

[β (XIX)...β (3141)...β (*Pub. L. O.* II)...Aitken (3465)... Lewis and Bryant (*Mon. Not.* LIX, 400)...]

β 1273. O. Arg. N. 14457

R.A. 14ʰ 14ᵐ 2ˢ
Decl. + 48° 28′

1892.17	193°.0	1″.08	8.6... 9.8	3*n*	β
1897.52	193.3	0.94	...	2*n*	Lew
1897.56	187.1	1.08	9 ...11	3*n*	A
1898.53	199.4	0.80	...	1*n*	Lew
1898.63	193.6	...	...	1*n*	Bry

Discovered with the 36-inch.

[β (XIX)...β (3141)...β (*Pub. L. O.* II)...Aitken (3465)... Lewis and Bryant (*Mon. Not.* LIX, 400)...]

β 1111. Piazzi XIV. 69

R.A. 14ʰ 17ᵐ 29ˢ
Decl. + 9° 0′

B and C

1889.40	315°.3	0″.19	8.4... 8.4	3*n*	β
1890.43	321.2	0.25±	...	2*n*	Sp
1892.17	336.1	0.21	8.2... 8.6	4*n*	β
1898.44	336.6	0.30	...	2*n*	Lew
1898.48	18.4	0.22	...	3*n*	β
1898.57	19.0	0.28	8.2... 8.2	4*n*	A

A and BC (= Σ 1835)

1832.08	186°.5	6″.06	5.5... 6.8	3*n*	Σ
1853.98	189.5	6.27	4.8... 6.8	6*n*	J
1866.72	188.4	6.24	5.7... 7.0	3*n*	J
1885.41	187.9	6.33	4.5... 6.5	3*n*	Per
1889.40	189.6	6.36	5.4...	3*n*	β
1889.80	188.4	6.29	...	6*n*	Sp
1892.17	189.3	6.25	5.0...	2*n*	β
1898.48	189.5	6.38	...	3*n*	β
1898.56	189.9	6.47	5.2... 8.0	3*n*	A

The duplicity of the smaller component of Σ 1835 was discovered with the 36-inch. The measures of only nine years are sufficient to show that this is a binary in rapid motion. It will probably take a place with the short period systems. Thus far the motion has been about 7° per year, with little or no change in the distance. It is not improbable that the distance now is about maximum, and that the mean angular motion is much more rapid.

There has been no change in the position of this star with reference to A. A few of the measures are given. The principal star is B.A.C. 4766.

[β (XVI)...β (2956,3142)...β (*Pub. L. O.* II)...Sp (III)... Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...]

The wide pair, Σ 1835, is also H¹ II. 38=Sh 177. These original catalogues, and the following include all the measures:

[Madler (*Fixstern-Systeme* I, II) (*Dorpat Obsvt.* X, XII, XIII XV)...Madler (324)...Dawes (*Measures at Bishop's Obsy.*)... Herschel (*Fourth Catalogue*)...Secchi (*Catalogo di 1321 Stelle*

Doppie)...Wrottesley (*Mem. R. A. S.* XXIX)...*Obsns. at Barclay's Obsy.* II, III...*Radcliffe Obsns.* XXII...Duner (*Measures Mic. d'Etoiles Doubles*, Lund, 1876)...Gledhill, Wilson and Seabroke (*Mem. R. A. S.* XLII, XLIII)...*d* (I, II)...*d* (1031, 1036)...Perrotin (2684.2748)(*Measures Mic. d'Etoiles Doubles*) ...See and Wellman (*Beob. Stern.* Berlin, No. 6, 1892)... Glasenapp (I, III)...]

β 615. O. Arg. N. 14509

R.A. $14^h\ 17^m\ 52^s$
Decl. $+40°\ 4'$

1878.30	237°.1	2".35	8.5... 9.5	1*n*	β
892.17	236.6	2.84	8.5... 9.8	3*n*	β
1892.37	235.0	2.52	8.4... 9.8	3*n*	Lv
1898.28	233.1	2.82	8.4... 9.9	5*n*	D

Discovered with the 18½-inch. Motion in angle is probable. Σ 1834 is 2^m exactly preceding.

[β (X)...B^1...β (3142)...β (*Pub. L. O.* II)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* I)...]

β 225. Lalande 26320

R.A. $14^h\ 18^m\ 48^s$
Decl. $-19°\ 26'$

B and C

1867.39	102°.5	1".06	7 ... 9	1*n*	Hd
1875.71	101.9	1.40	7.3... 8.2	3*n*	J
1877.39	101.8	1.34	7.5... 8.5	2*n*	Cln
1880.38	101.0	1.36	8.0... 9.2	2*n*	Cin
1890.39	101.5	1.66	7.2... 7.9	2*n*	Gl
1893.49	98.7	1.24	7½... 9	1*n*	Sel
1897.38	101.3	1.58	...	3*n*	D
1898.34	96.5	1.37	7.0... 8.2	4*n*	A

A and B (= H^1 N. 80 = Sh 179)

1822.60	295°.8	35".12	7 ... 7	3*n*	Sh
1847.70	295.7	35.23	...		Jacob
1875.70	295.5	35.03	6.0...	3*n*	J
1890.39	295.3	35.56	6.8...	2*n*	Gl
1897.34	295.4	35.24	6 ... 7	3*n*	D

The close pair was discovered with the 6-inch. It is found, however, in the subsequently published observations of the Harvard Observatory.

There is no change in AB, and very little, if any, in the close pair. This is a naked-eye star in *Virgo*, according to Heis, but Gould places it in *Libra*. All the measures of the wide pair are given above.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...*d* (I)...Cin^4...Cin^5... *Annals Harvard Obsy.* XIII ... Glasenapp (I) ... Jacob (*Mem. R. A. S.* XVII)...Sellors (3240) ... Doolittle (*Pub. Flower Obsy.* I)...]

β 940. 52 *Hydrae*

R.A. $14^h\ 21^m\ 9^s$
Decl. $-28°\ 57'$

1879.42	276°.8	4".00	5.0...11.3	3*n*	β
1889.38	278.7	4.27	...10.8	3*n*	β
1897.44	278.7	5.37	...13	2*n*	See
1899.27	277.5	4.37	...11.0	2*n*	β

Discovered with the 18½-inch. The principal star has a proper motion of 0".063 in the direction of 228°.4. It is probable that the companion is moving with it, as otherwise the distance would be less at the date of the last measures, and the angle nearly 15° more than it was in 1879.

[β (XIII)...β^1...β (2957)...β (*Pub. L. O.* II)...See (3496)...]

β 462. S.D. (3°) 3635

R.A. $14^h\ 23^m\ 46^s$
Decl. $-3°\ 11'$

A and B

1877.48	324°.4	2".01	9.5... 9.7	2*n*	J
1880.32	328.9	1.96	9.0... 9.3	1*n*	β
1891.30	325.1	2.16	9.1... 9.1	3*n*	β
1898.36	325.4	2.22	9.0... 9.2	1*n*	D

A and C

1880.32	65°.4	14".81	...12.0	1*n*	β
1898.36	66.5	15.38	... 9.8	1*n*	D

Discovered with the 18½-inch.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β^3...β...(3114)...β (*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

β 117 Lalande 26481

R.A. $14^h\ 24^m\ 43^s$
Decl. $-15°\ 4'$

1867.37	96°.7	2".16	...	1*n*	Hd
1876.64	95.8	2.44	8.3... 9.2	3*n*	Δ
1877.11	93.8	2.05	8.0... 9.0	1*n*	Cin
1879.39	96.0	...	8.0... 9.0	1*n*	Cin
1880.33	91.4	2.18	7.8... 8.5	1*n*	β
1880.38	92.0	2.41	7.5... 8.5	1*n*	Cin
1883.42	95.4	2 36	...	2*n*	Hl
1883.46	92.9	2.17	...	1*n*	β
1884.41	95.3	2.36	...	3*n*	Hl
1886.35	93.7	2.58	7.5... 8.5	1*n*	W
1888.35	92.9	2.26	8.0... 9.0	2*n*	T
1888.39	90.4	2.29	8.2... 8.9	2*n*	Lv
1890.44	96.6	2.53	8.1... 8.8	2*n*	Gl
1898.43	93.0	2.24	7.4... 8.8	4*n*	D

Discovered with the 6-inch. There is no relative motion, but it is undoubtedly a physical system, as the components have same large proper motion of 0".424 in the position-angle of 153°.2 (PORTER). This pair had been previously seen by the Harvard observers, but not published until long after β (111).

[β (111)...β (*Mon. Not.* XXXIV, 59)...β^3...*Annals Harvard Obsy.* XIII ... Cin^4... Cin^5... Cin^6... Hall (11)... Wilson (Cin^{10})...Tarrant (2991)...Lv^1...Glasenapp (1) ...Doolittle (*Pub. Flower Obsy.* 1)...]

β 1112. Lacaille 5893

R.A. $14^h\ 26^m\ 3^s$
Decl. $-30°\ 11'$

1889.41	7°.6	2".44	6.3... 11.1	6*n*	β
1897.37	3.1	2.46	...	3*n*	A
1897.41	7.7	2.66	5.8... 12.4	2*n*	See

Discovered with the 12-inch. In GOULD 6.4 m.

[β (XVI)...β (2956)...β (*Pub. L. O.* 11)...Aitken (3465)... See (3496)...]

β 238. Lalande 26529

R.A. $14^h\ 27^m\ 1^s$
Decl. $-20°\ 30'$

1877.39	90°.3	6".96	8.2... 10.2	2*n*	Cin
1893.42	91.1	6.94	8.4... 10.5	2*n*	W
1893.47	90.6	6.94	...	1*n*	Lv

Discovered with the 6-inch. Unchanged.

[β (v)...β (*Mon. Not.* XXXV, 31)...Cin^4... Lv... Wilson ( )...]

β 616. γ *Bootis*

R.A. $14^h\ 27^m\ 15^s$
Decl. $+38°\ 50'$

1878.25	98°.6	26".18	2.8... 12.5	2*n*	β
1891.24	103.6	28.23	... 13.8	3*n*	β
1898.27	105.5	29.38	... 13.0	2*n*	β
1898.28	102.2	29.37	...	1*n*	D

The faint companion was detected with the 18½-inch. AUWERS gives the proper motion of γ *Bootis* 0".198 in the direction of 320°.5. This movement and the position of the companion given by the measures of 1878 give for the date of the measures in 1898, 103°.8 : 29".33. It is therefore evident that this is only an optical companion. The minimum distance of 19".5 occurred in about 1780.

[β (x)...β^1...β (3114)...β (*Pub. L. O.* 11)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 941. Lalande 26605

R.A. $14^h\ 29^m\ 40^s$
Decl. $+0°\ 46'$

1879.28	218°.3	0".80	8.2... 8.2	1*n*	β
1888.31	40.2	0.80	8.4... 8.5	2*n*	Lv
1888.80	222.1	0.6±	...	3*n*	Sp
1893.40	216.8	0.83	8.7... 8.8	3*n*	W
1893.96	215.5	0.7±	...	2*n*	Sp
1897.41	223.0	0.5±	...	1*n*	Sp

Discovered with the 18½-inch. Evidently unchanged.

[β (XIII)...β^2...Lv^4...Sp (111)...Wilson ( )...]

β 804. W[1] XIV. 558

R.A. $14^h\ 31^m\ 42^s$
Decl. $-8°\ 9'$

1881.46	166°.2	1".40	8.1... 10.7	2*n*	β
1888.74	159.5	1.39	8.5... 10.8	2*n*	Com
1891.26	160.9	1.29	8.4... 11.5	3*n*	β
1898.39	161.6	1.37	7.8... 9.7	3*n*	D

Discovered with the 15½-inch at the Washburn Observatory. No sensible change.

[β (XII)...β^1...β (3114)...β (*Pub. L. O.* 11)...Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 226. Lalande 26665

R.A. $14^h\ 32^m\ 5^s$
Decl. $-21°\ 49'$

1876.09	81.6	0.80	7.5	7.5	3*n*	Sp
1878.37	80.4	1.05	7.7	8.2	2*n*	Cin
1879.44	82.7	0.95	7.8	8.0	1*n*	β
1880.34	83.1	0.99	8.0	8.0	1*n*	Cin
1884.35	84.7	1.01	8.5	8.7	2*n*	W
1890.46	87.6	0.9±	7.7	8.0	4*n*	Gl

Discovered with the 6-inch. There may be a slow advance in the angle.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β^5...Sp (II)...Cin^6... Cin^5...Cin^6.., Wilson (Cin^m)...Glasenapp (I)...]

β 805. O. Arg. S. 13799

R.A. $14^h\ 32^m\ 58^s$
Decl. $-26°\ 37'$

A and B

1881.41	135.4	24.12	7.2	13.0	2*n*	β
1888.93	133.8	23.46	7.0	11.5	2*n*	Com
1899.29	133.8	23.47	...		2*n*	β

C and D

1881.44	239.7	1.99	9.2	11.7	3*n*	β
1888.93	243.1	1.99	9.0	11.2	1*n*	Com

A and C

1881.42	42.0	123.98	...		3*n*	β
1888.41	42.0	123.45	...		1*n*	Com
1899.29	41.4	124.38	...		2*n*	β

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^4...Comstock (*Pub. Washburn Obsy.* VI)...]

β 806. O. Arg. S. 13813

R.A. $14^h\ 33^m\ 27^s$
Decl. $-25°\ 44'$

A and B

1890.39	96.3	0.67	7.3	9.3	3*n*	β
1899.45	97.1	0.69	7.2	9.8	3*n*	A

C and D

1881.44	347.8	1.22	8.5	9.6	3*n*	β
1890.39	344.9	1.20	8.3	9.2	3*n*	β
1899.41	341.6	1.21	8.5	10.2	3*n*	A

A and C

1881.42	67.4	71.50	...		3*n*	β
1890.39	67.3	71.48	...		3*n*	β
1899.32	66.7	71.75	...		1*n*	β
1899.38	67.2	71.97	...		1*n*	A

A and *a*

1890.38	329.6	17.78	...	13.5	2*n*	β
1899.34	327.2	16.91	...	14.5	3*n*	A

The duplicity of the smaller member of the wide pair was discovered with the 15½-inch at the Washburn Observatory; and in measuring that with the 36-inch the other star was found to be a still closer pair, thus forming an apparently interesting quadruple group.

[β (XII)...β^4...β (3048)...β (*Pub. L. O.* II)...Aitken ( )...]

β 345. Lacaille 6051

R.A. $14^h\ 34^m\ 40^s$
Decl. $-29°\ 11'$

1875.41	330±	1±	7.0	7.0	1*n*	β
1877.41	128.2	0.94	7.0	7.3	1*n*	Cin
1880.42	299.4	0.90	7.8	8.5	1*n*	Cin
1892.37	303.5	0.94	7.5	8.2	3*n*	β
1897.45	301.9	0.98	7+	8	3*n*	A
1897.50	303.7	0.92	7.2	8.1	2*n*	See

Discovered with the 6-inch. Change is doubtful.

[β (VI)...β (2062,3142)...β (*Pub. L. O.* II)...Cin^4...Cin^6... Aitken (3465)...See (3496)...]

β 414. *Centauri* 315

R.A. $14^h\ 34^m\ 42^s$
Decl. $-30°\ 25'$

1889.43	345.6	1.01	6.5	7.9	3*n*	β
1896.49	346.5	0.90	6.7	8.0	4*n*	A
1897.39	342.5	0.86	6.0	8.2	1*n*	See
1897.45	344.9	0.89	6+	8	3*n*	A

Discovered with the 6-inch. So far without change. In GOULD 6.6 m. LACAILLE 6052.

[β (VII)...β (2103,2957)...β (*Pub. L. O.* II)...Glasenapp (1) ...Aitken (3395,3465)...See (3496)...]

β 807. Schj. 5216

R.A. $14^h\ 36^m\ 37^s$
Decl. $-\ 6°\ 18'$

1881.41	239.0	1.24	8.0...	9.1	3*n*	β
1888.46	241.0	1.15	8.0...	9.0	1*n*	Lv
1888.46	237.2	1.19	8.5...	9.7	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^6...Lv^1...Comstock (*Pub. Washburn Obsy.* VI)...]

β 1113. B.A.C. 4886

R.A. $14^h\ 41^m\ 21^s$
Decl. $+\ 2°\ 32'$

1889.40	137.1	4.54	6.2...11.8		3*n*	β
1898.39	136.0	4.37	7.0...12.0		2*n*	β
1898.40	136.4	4.14	6.0...12.0		3*n*	A

Discovered with the 36-inch. The magnitude in D.M. is 7.7.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken ( )...]

β 346. *Librae* 23

R.A. $14^h\ 41^m\ 50^s$
Decl. $-\ 16°\ 50'$

1877.41	236.2	1.23	7.2...	7.9	2*n*	Cin
1877.44	236.1	1.27	7.2...	8.0	2*n*	J
1879.34	233.2	1.27	7.0...	8.0	1*n*	Cin
1890.98	239.2	1.18	7.0...	8.0	2*n*	Sp
1888.35	233.4	1.27	7.0...	8.0	3*n*	T

Discovered with the 6-inch. No material change. Lalande 26940.

[β (VI)...β (2062)...Δ (I).. Cin^4...Cin^5...Sp (II)...Tarrant (2991)...]

β 617. Lalande 26952

R.A. $14^h\ 42^m\ 23^s$
Decl. $-\ 23°\ 45'$

B and C

1878.34	336.6	2.73	8.5...11.5		2*n*	β
1880.38	337.2	2.14	8.8...11.5		2*n*	Cin
1897.50	335.3	2.57	8 ...11.2		1*n*	See
1898.39	334.5	2.52	8.3...11.2		3*n*	A

A and B (= H^1 VI. 117 = S 663)

1825.35	219.1	56.69	7.5...10		2*n*	S
1878.34	219.5	59.44	6.5...		2*n*	β
1898.39	219.8	60.44	6.2...		3*n*	A

The smaller star of HERSCHEL'S wide pair was found to be double with the 18½-inch. The measures show no change in the last twenty years. All the measures of AB are given above. There would seem to be an increase in the distance, implying a proper motion of about 0".05 in a direction nearly opposite B. There is an error of 16' in the declination of this star in H^1.

[β (X)...β^1...Cin^6...See (3496)...Aitken ( )...]

β 106. μ *Librae*

R.A. $14^h\ 42^m\ 45^s$
Decl. $-\ 13°\ 39'$

A and B

1874.29	345.0	1.54	...		1*n*	WS
1875.60	335.0	1.38	5.4...	6.3	5*n*	J
1876.99	335.1	1.53	5.5...	6.2	7*n*	Sp
1877.40	334.7	1.69	5.0...	7.0	2*n*	Cin
1878.32	333.2	1.50	5.5...	6.3	1*n*	β
1879.35	335.0	2.02	5.5 ..	7.0	2*n*	Cin
1883.43	337.4	1.51	5.4...	6.6	6*n*	En
1885.28	337.0	1.56	5.0...	7.0	1*n*	W
1886.39	337.2	1.52	5.0...	6.3	4*n*	T
1888.35	339.2	1.63	6.0...	7.2	3*n*	Lv
1889.38	340.6	1.61	5 ...	6	3*n*	β
1889.46	339.6	1.84	5.5...	6.5	4*n*	T
1890.41	339.0	2.01	6.0...	8.0	2*n*	Gl
1897.29	343.5	1.84	5.4...	6.3	2*n*	D
1897.41	340.2	1.57	5+...	6	3*n*	A
1898.42	344.8	1.58	5½...	6½	2*n*	Sc
1898.55	339.6	1.59	5.5...	6.0	3*n*	A

A and C

1889.38	283.7	18.33	...14.5		2*n*	β
1898.52	281.6	17.98	...15.0		2*n*	A

A and D

1889.38	185.5	25.96	...13.9		3*n*	β
1898.52	184.8	26.20	...14.0		2*n*	A

A and E

1878.32	229.2	27.35	...12.5		1*n*	β
1889.38	232.5	27.19	...12.8		3*n*	β
1898.51	232.8	27.46	...13.5		2*n*	A

The close pair was discovered with the 6-inch, the distant star E with the 18½-inch, and the faint companions, C and D, added with the 36-inch. The large star has a proper motion of 0".097 in the direction of 260°.6 (AUWERS), and it is obvious that this belongs to both components. It is probable that the distant companions are not attached to the binary.

[β (II)...β (*Mon. Not.* XXXIII, 437)...β'...β (2957)...β (*Pub. L. O.* II)...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...Δ (1)...Δ (2081)...Sp (II)...Cin⁴...Cin⁵...Engelmann (2678)...Wilson (Cin¹⁰)...Tarrant (2866,3186)...Lv'...Lv (*Sid. Mess.* VIII, 77)...Glasenapp (1)...Doolittle (*Pub. Flower Obsv.* I)...Aitken (3465)...Scott (*Mon. Not.* LIX, 427)...Aitken ( )...]

β 31. Lalande 27106

R.A. 14ʰ 46ᵐ 59ˢ
Decl. + 19° 13′

A and B

1874.94	181°.5	1".11	8.5...10.2	2*n*	Δ
1878.24	187.8	1.29	...	1*n*	β
1879.43	188.4	1.40	8.5... 9.8	1*n*	β
1883.71	193.2	1.51	8.0...10.2	5*n*	Eu
1890.35	190.3	1.40	8.4... 9.7	3*n*	β
1893.26	192.7	1.35	...	5*n*	Sp
1893.46	196.3	1.87	...	4*n*	Lew
1896.46	192.1	1.57	...	4*n*	A
1896.91	194.3	1.48	...	4*n*	Lew
1897.44	193.7	1.52	...	1*n*	Bow
1898.45	196.2	1.45	...	1*n*	Lew

A and C

1878.25	161°.4	9".04	...12.5	1*n*	β
1890.35	162.7	9.03	...12.2	3*n*	β
1896.37	167.3	9.76	...	2*n*	Lew
1898.46	166.0	9.05	...	1*n*	Lew

The close pair was discovered with the 6-inch, and C subsequently added with the 18½-inch. The *Berlin A. G. Catalogue* gives the principal star a proper motion of 0".230 in the direction of 347°.9 (PORTER 0".223 in 343°.0). The measures show conclusively that the movement is common to the three components, and there can be no doubt that they constitute a physical system. There is slow direct angular motion in the close pair, and, perhaps, some change in the direction of C. This triple is about 31′ *sf* ξ *Bootis*.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β'...β²...β (3048)...β (*Pub. L. O.* II)...Δ (1)...Engelmann (2678)...Sp (III)...Lewis (*Mon. Not.* LIV, 317; LIX, 400)...Aitken (3395)...]

β 118. O. Arg. S. 14034

R.A. 14ʰ 47ᵐ 1ˢ
Decl. — 16° 1′

1875.90	307°.4	1".83	9.8...10.7	2*n*	Δ
1879.87	306.1	1.86	8.5...10.0	2*n*	Cin
1886.30	308.6	1.95	8.0... 9.0	1*n*	LM
1888.35	306.4	1.59	10.0...10.5	2*n*	T

Discovered with the 6-inch. Without change. It is 2½ᵐ *f* and 28′ *s* of *a Librae*.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Δ (1)...Cin⁵...Cin⁶...LM...Tarrant (2991)...]

β 347. *Centauri* 330

R.A. 14ʰ 47ᵐ 18ˢ
Decl. — 32° 49′

A and B

1889.45	320°.6	13".01	6.5...10.5	3*n*	β
1890.43	319.9	13.47	6.0...10.2	1*n*	Gl
1897.39	318.1	12.94	6+...10	2*n*	A

A and C

1889.45	243°.1	58".46	... 9.8	3*n*	β
1890.43	243.1	58.34	... 9.2	2*n*	Gl
1897.39	242.8	58.04	...10	2*n*	A

Discovered with the 6-inch. B.A.C. 4912. The measures of C indicate a small proper motion.

[β (VI)...β (2062)...β (2957)...β (*Pub. L. O.* II)...Glasenapp (1) (*A. f.* 241)...Aitken (3465)...]

β 942

R.A. 14ʰ 47ᵐ 29ˢ
Decl. + 0° 2′

1879.44	189°.9	1".24	9.2... 9.2	2*n*	β
1892.30	191.2	1.26	9.2 .. 9.3	3*n*	β
1892.38	189.8	1.02	9.1... 9.2	4*n*	Lv
1897.44	200.1	0.94	...	1*n*	Lew

Discovered with the 18½-inch. Not in the D.M. It is 187″ from the wide pair, OΣ (app.) 131, in the direction of 221°.5. This wide pair is

210°.5 : 89″.69 : 6.5...7.2 (1873.44) 2*n* J

[β (XIII)...β^1...β (3142)...β (*Pub. L. O.* II)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Lewis (*Mon. Not.* LIX, 400)...]

β 239. 59 *Hydrae*

R.A. 14h 51m 33s
Decl. −27° 10′

1874.50	303°.7	0″.8 ±	6.0...	6.0	5*n*	β
1878.36	309.5	0.93	6.0...	6.0	1*n*	β
1878.96	312.6	0.77	6.0...	6.0	2*n*	Sp
1879.40	310.1	0.89	...		2*n*	Cin
1879.92	311.8	0.83	6.0...	6.2	2*n*	β
1880.38	307.4	0.90	6.2...	6.7	4*n*	Cin
1881.40	312.0	1.07	6.0...	6.0	4*n*	β
1884.39	313.8	1.20	7.0...	7.5	1*n*	W
1888.43	308.3	0.96	6.0...	6.0	1*n*	Lv
1889.44	311.4	0.86	5.8...	5.9	3*n*	β
1897.51	315.8	0.92	6.8...	7.9	2*n*	See
1898.28	316.5	0.99	5.5...	6.0	3*n*	A

Discovered with the 6-inch. The angle is probably increasing, but the motion is very slow. The distance seems to have remained practically constant. ATWERS gives the proper motion of this star, 0″.085 in the direction of 234°.8. It is evident from the measures that this movement is common to the components, and that they must form a physical system. If one component was fixed in space, the relation in 1898 should be 31°.5 : 1″.89.

[β (V)...β (*Mon. Not.* XXXV, 31)...β^1...β^3...β^4...β^5 2957) ...β (*Pub. L. O.* II)...Sp (II)...Cin^5...Cin^6...Wilson (Cin^{10})...Lv^1...Lv (*Std. Mess.* VIII, 77)...See (3496)... Aitken ( )...]

β 808. S.D. (8°) 3872

R.A. 14h 51m 53s
Decl. −8° 13′

A and B

1881.44	201°.5	0″.63	9.0...	9.0	2*n*	β
1893.49	200.6	0.64	9.0...	9.0	1*n*	W

AB and C

1881.41	305°.1	94″.60	...	8.9	2*n*	β
1888.51	305.6	93.86	8.7...	8.4	3*n*	Com
1893.40	305.6	93.21	9.0...	8.5	3*n*	W
1899.26	305.7	93.47	9.0...	9.2	3*n*	β

Discovered with the 15½-inch at the Washburn Observatory. C is S.D. (8°) 3871. The measures indicate a proper motion of one of the wide stars of 0″.06, nearly in the direction of the other. This is confirmed by the meridian positions in S.D., which give a distance of 101″ for 1855.

[β (XII)...β^4...Comstock (*Pub. Washburn Observatory* VI)... Wilson ( )...]

β 1085. Piazzi XIV. 229

R.A. 14h 52m 37s
Decl. −4° 30′

1889.30	19°.5	9″.34	6.0...	13.2	3*n*	β
1898.31	21.0	9.44	6.0...	13.5	2*n*	A
1899.27	20.7	9.30	6.5...	13.1	1*n*	β

Discovered with the 36-inch. This star has a proper motion, according to PORTER, of 0″.413 in the direction of 254°.7. The short interval covered by the measures is sufficient to show that the new star is moving with the other. If fixed in space, the position of the companion at the date of the second measures would be 34°.4 : 11″.87. This is a naked-eye star in *Libra*.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Aitken ( )...]

β 348. 2 *Serpentis*

R.A. 14h 55m 40s
Decl. +0° 20′

1875.75	114°.6	0″.47	5.1...	7.4	4*n*	J
1876.44	118.3	0.67	6.0...	6.8	2*n*	OΣ
1876.50	119.0	0.52	5.0...	7.5	4*n*	Sp
1877.51	123.3	0.42	...		2*n*	Sp
1878.36	121.4	0.51	...		1*n*	β
1879.92	114.5	0.47	6.0...	7.2	2*n*	β
1881.41	119.7	0.45	6.0...	7.8	3*n*	β
1884.40	119.2	...	7.0...	8.0	2*n*	W
1885.53	119.7	0.50	...		2*n*	HΣ
1887.45	118.3	0.48	5.0...	7.5	3*n*	T

1887.57	120°.7	0".44	...	3*n*	Hl
1887.60	116.7	0.53	...	7*n*	Sp
1888.53	120.0	0.52	5.0... 8.0	3*n*	T
1889.31	119.0	0.76	6.0... 6.7	2*n*	β
1897.49	111.7	0.70	6 ... 7	3*n*	A

Discovered with the 6-inch. There has been but little change in either angle or distance. AUWERS gives this star a proper motion of 0".010 in the direction of 188°.5. The annual change is very small, and, perhaps, somewhat uncertain. If substantially correct, and it belongs to the larger star only, it would produce a diminution in the position-angle of 27° in the interval between the measures of 1875 and 1897, the distance remaining practically unchanged. There can be no doubt of the physical relation of these stars, but the period will certainly be long. There is a 13.5 m star, 215°.9 : 32".86 (1899.26) 1*n*.

One of HERSCHEL's wide pairs, H^I VI. 51, is erroneously called 2 *Serpentis*. It is 1 *Serpentis*, a 4 m star 4^m 17^s *p* and 77' *s*.

[β (VI)...β (2062,2930)...β^c...β^3...β^4...β (*Pub. L. O.* II) ...J (1)...J (2086)...OΣ (*Poulkowa Obsns.* X)...Sp (II) ...Wilson (Cin^m)...Hall (I, II)...Tarrant (2899,2991) ...Aitken (3465)...HΣ ( )...]

β 119. Lalande 27454

R.A. 14^h 59^m 10^s
Decl. — 6° 33'

1875.90	313°.0	1".51	8.0... 8.5	4*n*	J
1878.60	311.1	1.41	8.0 ... 9.0	3*n*	Cin
1887.45	309.1	1.56	8.0... 8.5	3*n*	T
1888.33	307.6	1.59	8.0... 8.5	4*n*	T
1888.45	306.4	1.61	7.9... 8.4	2*n*	Lv
1890.39	304.9	1.78	8.1... 8.6	2*n*	Gl
1892.35	307.1	1.47	8.0... 8.5	3*n*	Lv
1894.48	304.4	1.61	...	2*n*	Sp
1897.92	304.6	1.69	8.0... 8.7	7*n*	D
1897.95	305.2	1.48	...	2*n*	Sp

Discovered with the 6-inch. The measures indicate some motion in angle.

[β (III)...β (*Mon. Not.* XXXIV, 59)...J (1)...Cin^5...Lv^1... Lv (*Sid. Mess.* VIII, 77)...Tarrant (2899,2991)...Glasenapp (1)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* 1)...Sp (III)...]

β 1086. *47 Bootis*

R.A. 15^h 1^m 27^s
Decl. + 48° 37'

1889.21	256°.6	6".03	5.5...13.2	3*n*	β
1898.49	254.1	6.31	...	3*n*	β

Discovered with the 36-inch. It is practically certain from the measures already made that this is a physical system. The bright star has a proper motion of 0".080 in the direction 277°.2. If the small star was fixed, this movement with the position of the companion in 1889 would give 253°.8 : 5".33 for 1898. It is obvious from the measures that there has been no such change in the distance.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...]

β 349. Lalande 27579

R.A. 15^h 2^m 52^s
Decl. + 2° 9'

1876.43	39°.3	4".17	7.0...10.0	1*n*	OΣ
1876.51	39.6	4.06	7.5...11.8	1*n*	J
1876.51	36.7	3.96	8 ...12	3*n*	Hl
1884.42	40.9	3.83	...	3*n*	Hl
1886.44	36.3	4.04	...	1*n*	HΣ
1892.39	36.2	3.80	8.0...11.9	2*n*	Lv
1899.27	39.2	3.62	8.0...10.0	1*n*	β

Discovered with the 6-inch.

[β (VI)...β (2062)...J (1)...Hall (I, II)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 809. S.D. (22°) 3908

R.A. 15^h 3^m 3^s
Decl. — 22° 16'

1881.36	120°.1	1".47	8.0... 9.3	4*n*	β
1888.51	123.5	1.75	8.2...10.0	3*n*	Com
1892.40	119.2	1.64	8.1...10.1	2*n*	Lv
1898.47	122.5	1.68	8.0... 9.8	2*n*	D

Discovered with the 15½-inch at the Washburn Observatory. No material change. The magnitude in S.D. is 8.3.

[β (XII)...β^4...Comstock (*Pub. Washburn Obsy.* VI)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 618. 24 (ι¹) *Librae*

R.A. $15^h\ 5^m\ 23^s$
Decl. $-19°\ 20'$

B and C

1878.34	24°.3	1".86	10 ...10	3*n*	β
1879.96	23.4	1.74	10.0...10.7	2*n*	β
1885.33	19.8	1.40	10.5...11.2	1*n*	W
1896.46	19.1	1.68	10 ...10	5*n*	A
1899.30	17.4	1.70	...	2*n*	β

A and B (= H¹ VI. 44 = Sh 376)

1782.39	112°.5	59".07	...	1*n*	H¹
1822.84	111.6	66.50	6 ...11	1*n*	Sh
1878.33	110.5	57.46	...	3*n*	β
1879.96	110.8	57.26	...	2*n*	β
1885.33	110.3	57.78	4.5...	2*n*	W
1896.44	111.0	58.23	...	2*n*	A
1899.30	111.0	57.48	...	2*n*	β

The duplicity of the Herschel companion was discovered with the 18½-inch. There may be a slow diminution in the angle.

All the measures of the wide pair are given above. According to AUWERS the principal star has a proper motion of 0".067 in the direction of 231°.3. This does not fully explain the change in B. The distance in the early measures would represent not B, but BC. The distance in Sh is printed 50".63, but SADLER has shown (*Eng. Mech.* XXXVIII, 65) that the micrometer readings were wrongly reduced, and that the distance should be 66".50. The principal star was found to be variable by the Harvard observers.

[β (x)...β'...β''...Wilson (Cin^{10})...Aitken (3305)...]

β 350. B.A.C. 5020

R.A. $15^h\ 8^m\ 29^s$
Decl. $-27°\ 9'$

1876.52	163°.2	1".31	6.5 ... 8.0	2*n*	Hl
1879.46	158.1	1.15	7.0... 8.0	2*n*	Cin
1883.40	160.3	1.34	6.5 ... 8.2	2*n*	W
1886.49	157.7	1.28	...	3*n*	Hl
1892.41	160.2	1.15	7.2... 8.4	2*n*	Lv
1897.48	154.1	0.95	7.1... 8.5	1*n*	See
1898.49	155.9	1.24	6½... 8	3*n*	Sc

Discovered with the 6-inch. Change is uncertain. In GOULD 6.9 m.

[β (VI)...β (2062)...Cin^5...Cin^6...Wilson (Cin^{10})...Hall (I, II)...Glasenapp (1)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...See (3496)...Scott (*Mon. Not.* LIX, 427)...]

β 351. O. Arg. S. 14417

R.A. $15^h\ 10^m\ 20^s$
Decl. $-15°\ 8'$

A and B

1876.56	303°.3	10".36	9.5...12	1*n*	Hl
1884.46	302.9	10.91	9.5...12	3*n*	Hl
1896.49	302.0	10.75	8.5...12	2*n*	Lv
1899.27	303.3	10.53	8.1...10.7	3*n*	β

A and C

1899.26	235°.0	33".36	...12.0	1*n*	β

Discovered with the 6-inch. Apparently fixed.

[β (VI)...β (2062)...Hall (I, II)...Lv (*A. J.* 407)...]

β 352. O. Arg. S. 14427

R.A. $15^h\ 10^m\ 42^s$
Decl. $-26°\ 33'$

1879.40	66°.9	14".10	7.7... 9.7	2*n*	Cin
1880.36	65.1	14.37	7.8... 9.0	3*n*	Cin
1890.42	68.1	13.17	8.2... 9.6	2*n*	Gl
1892.41	68.3	13.95	8.1... 9.2	2*n*	Lv

Discovered with the 6-inch. Apparently fixed.

[β (VI)...β (2062)...Cin^5...Cin^6...Glasenapp (1)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 227. B.A.C. 5039

R.A. $15^h\ 12^m\ 7^s$
Decl. $-23°\ 50'$

1874.40	184°.1	1".7 ±	7.0...10.5		β
1876.47	180.9	1.98	7.0... 9.0	1*n*	Cin
1878.44	179.2	1.96	7.5... 9.0	2*n*	Cin
1880.42	180.2	1.90	7.0... 9.5	1*n*	Cin
1886.30	177.5	2.28	8 ... 9	1*n*	LM
1890.40	179.7	2.31	7.7... 8.6	2*n*	Gl
1896.44	176.8	1.89	...	2*n*	Sc
1898.05	177.8	1.97	7.1... 8.4	8*n*	D

Discovered with the 6-inch. No certain change. In the field with β 228.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Cin³...Cin⁵...Cin⁴... LM...Glasenapp (1)...Scott (*Brit. Ast. Assn.* VIII, 66) ...Doolittle (*Pub. Flower Obsy.* 1)...]

β 943. Lalande 27885

R.A. 15h 12m 16s
Decl. + 1° 23′

1879.70	92°.5	2″.30	6.6...12.2	4*n*	β
1889.30	92.7	2.63	6.2...12.3	3*n*	β
1899.27	94.1	3.01	6.7...10.5	1*n*	β

Discovered with the 18½-inch. Near 6 *Serpentis*.

[β (XIII)...β³...β (2930)...β (*Pub. L. O.* II)...]

β 228. B.A.C. 5041

R.A. 15h 12m 38s
Decl. — 23° 50′

1876.95	329°.6	1″.16	7.5... 7.9	2*n*	Cin
1884.41	329.4	1.14	9.0... 9.3	1*n*	W
1886.30	328.4	...	7 ... 8	1*n*	LM
1892.40	327.6	0.98	7.2... 8.1	2*n*	Lv
1898.48	321.3	1.02	8.1... 8.7	2*n*	D

Discovered with the 6-inch in looking for H 4756, which is given by HERSCHEL (*Cape Observations*), 180° ± : 2½″ : 9...9½, with the note, "requires verification." His place is substantially the same as that given here, but the magnitude is very different from that of B.A.C. 5041, which is at least 7½, and his estimated angle and distance do not correspond with the star measured. The measures of the new pair do not so far show any material change. β 227 is in the field *p*.

[β (IV)...β (*Mon. Not.* XXXIV, 382)...Cin³...Cin⁴...Wilson (Cin⁶⁶)...LM...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 353. Redhill 2307

R.A. 15h 13m 55s
Decl. + 85° 57′

1881.48	297°.0	3″.60	9.3... 9.4	3*n*	β
1892.42	295.5	3.62	9.4... 9.8	1*n*	Lv
1892.42	295.7	3.74	9.5...10.0	1*n*	Col

Discovered with the 6-inch. One of a wide pair.

[β (VI)...β (2062)...β⁴...Lv and Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 32. 6 *Serpentis*

R.A. 15h 14m 55s
Decl. + 1° 9′

1875.40	14°.8	3″.11	4.5...10	1*n*	Hl
1875.43	13.2	2.28	4.7... 9.3	4*n*	J
1876.43	9.3	2.81	6.0... 9.5	1*n*	OΣ
1879.40	13.6	2.37	5.7...10.9	2*n*	β
1885.49	14.1	2.27	4.7... 9.6	3*n*	T
1886.44	12.7	...	...	1*n*	HΣ
1887.34	15.6	2.39	5.0... 9.5	2*n*	T
1888.44	13.8	2.78	4.5... 9.5	1*n*	Lv
1888.52	16.2	2.68	4.5... 9.5	2*n*	T
1889.30	17.9	2.44	5.8...10.0	3*n*	β
1897.48	11.6	2.38	6.0...10.0	3*n*	A
1898.20	14.5	2.63	...10	3*n*	D

Discovered with the 6-inch. Relative change is not entirely certain, but it is a physical system, as the components have a common proper motion. The principal star has an annual movement of 0″.126 in the direction of 219°.0 (AUWERS). If the small star was fixed in space, the position-angle should increase 12° and the distance 2″.5 in the interval covered by the measures.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β³...β (2930)...β (*Pub. L. O.* II)...J (1)...J (2081)...Hall (1)...Tarrant (2866, 2899,2991)...OΣ (*Poulkowa Obsns.* X)...Lv²...Aitken (3465)...Doolittle (*Pub. Flower Obsy.* 1)...HΣ ( )...]

β 1114. B.A.C. 5090

R.A. 15h 21m 42s
Decl. — 28° 27′

A and B

1889.38	325°.7	0″.65	7.0... 7.3	3*n*	β
1897.41	323.1	0.81	7 ... 7+	3*n*	A
1897.48	319.2	0.60	6.9 .. 8	1*n*	See

AB and C (= H 4774)

1834.30	8°.5	10″±	7 ...10	1*n*	H²
1877.41	7.5	8.95	7.0...10.0	1*n*	Cin
1880.39	6.5	9.17	6.8...10.0	1*n*	Cin
1889.38	5.8	9.21	7.0... 9.8	3*n*	β
1890.43	2.3	9.71	7.2...10.0	1*n*	Gl
1897.39	5.4	8.90	...10.0	2*n*	A
1897.48	4.2	9.25	...10.5	1*n*	See

The close pair was discovered with the 36-inch. So far there is no sensible change.

The above are all the measures of the Herschel companion, which seems to be fixed. The magnitude of A in GOULD is 6.8.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3465)...See (3496)...Cin⁴...Cin⁶...Glasenapp (1)...]

β 33, 34. Lalande 28246

R.A. 15h 24m 43s
Decl. − 12° 35′

A and B (= β 33)

1875.36	47°.5	2″.75	8.0...10.3	3*n*	J
1878.49	43.0	2.94	8.0...10.0	2*n*	Cin
1886.41	41.0	3.14	8.2...10.5	1*n*	LM
1892.40	42.1	3.08	7.8...10.4	2*n*	Lv
1898.04	41.4	2.74	8 ...10	5*n*	D
1898.44	41.8	2.95	8.0...10.0	3*n*	A

C and D (= β 34)

1872.43	55°±	3″±	10 ...10		β
1898.04	55.2	6.54	...	5*n*	D
1898.44	56.2	6.58	10.8...10.8	3*n*	A

A and C

1898.45	138°.7	246″.5	...	1*n*	A

A and E

1898.27	132°.2	31″.52	...12.3	4*n*	D

Discovered with the 6-inch.

[β (1)...β (*Mon. Not.* XXXIII, 351)...*A* (1)...Cin⁵...LM... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Aitken ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 944. Lalande 28326

R.A. 15h 25m 34s
Decl. + 48° 8′

1879.28	128°.5	10″.74	6.5...12.5	2*n*	β
1891.26	126.7	10.98	6.7...11.9	3*n*	β
1899.08	126.6	10.53	7.0...11.5	1*n*	β

Discovered with the 18½-inch. Apparently fixed. Magnitude in D.M. 6.7; Lalande 6.

[β (XIII)...β¹...β (3114)...β (*Pub. L. O.* II)...]

β 945. Lalande 28358

R.A. 15h 26m 6s
Decl. + 57° 51′

1879.28	13°.1	16″.37	6.8...12.7	3*n*	β
1891.42	25.5	15.89	6.3...11.7	2*n*	β
1896.49	30.8	15.68	...	3*n*	A
1896.51	31.8	16.03	6.6...12.0	2*n*	Lv
1898.57	34.3	16.09	6.0...12.0	3*n*	A

Discovered with the 18½-inch. The large star has a considerable proper motion:

Stumpe	0″.304	in 297°.4
Krueger	0.295	in 298.5
Porter	0.308	in 299.1

With PORTER'S proper motion and the position given by the measures of 1879, the small star, at the date of the last measures in 1898, should be 34°.3 : 15″.80. It is evident that this is only an optical pair.

[β (XIII)...β¹...β (3114)...β (*Pub. L. O.* II)...Aitken (3395) ...Lv (*A. J.* 407)...Aitken ( )...]

β 121. B.A.C. 5163

R.A. 15h 32m 20s
Decl. −27° 15′

1877.72	278°.3	1″.68	7.7... 7.9	3*n*	Cin
1888.50	274.0	...	...	1*n*	Lv
1889.47	277.5	1.45	8.2... 8.2	3*n*	β
1890.45	101.8	1.65	7.2... 7.3	2*n*	Gl
1898.48	275.1	1.66	8.3... 8.4	2*n*	D

Discovered with the 6-inch. Unchanged.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (2057)...β (*Pub. L O.* II)...Cin³...Cin⁴...Cin⁵...Lv¹...Glasenapp (1)... Doolittle (*Pub. Flower Obsy.* 1)...]

β 122. Lalande 28495

R.A. 15h 32m 59s
Decl. − 19° 23′

1868.51	22°.5	2″.01	...	1*n*	Hd
1875.45	204.0	1.76	7.1... 7.3	4*n*	J
1877.39	203.6	1.96	7.6... 7.7	2*n*	Cin
1881.03	26.7	1.99	7.0... 7.5	2*n*	Sp

1885.36	202°.8	″...	8 ... 8	1*n*	LM
1887.45	25.8	1.75	7.0... 7.3	2*n*	T
1888.35	24.9	1.74	7.0... 7.5	2*n*	T
1888.39	206.9	1.96	7.5... 7.7	3*n*	Lv
1890.40	26.1	2.03	7.5... 7.7	2*n*	Gl
1894.54	207.9	1.67	7.5... 7.5	2*n*	Sel
1897.49	208.0	1.84	7 ... 7½	2*n*	Sc

Discovered with the 6-inch. Probably without change. The small difference in the magnitudes is probably the explanation of the quadrants assigned by the several observers. This pair is $2^m\ 3^s$ *p* κ *Librae* and 5′ *s*. It is found in the subsequently published Harvard observations.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Δ (1)...Δ (2086)...Cin⁴ ...LM...Lv¹...*Annals Harvard Obsy.* XIII ...Tarrant (2899,2991)...Sp (II)...Glasenapp (1)...Sellors (3303) ...Scott (*Mon. Not.* LIX, 427)...]

β 354. O. Arg. S. 14797

R.A. $15^h\ 36^m\ 0^s$
Decl. $-25°\ 2'$

1876.44	285°.7	″5.17	7.0... 9.0	1*n*	Cin
1877.41	285.6	5.37	7.9... 8.7	2*n*	Cin
1890.42	287.7	5.32	7.4... 9.2	2*n*	Gl

Discovered with the 6-inch. Relatively fixed.

[β (VI)...β (2062)...Cin³...Cin⁴...Glasenapp (1)...]

β 35. B.A.C. 5184

R.A. $15^h\ 36^m\ 1^s$
Decl. $-15°\ 38'$

1875.41	99°.2	″2.40	7.1... 8.2	4*n*	Δ
1877.42	97.4	2.53	6.7... 8.7	2*n*	Cin
1886.47	100.5	...	8.0... 11.0	1*n*	LM
1887.44	98.0	2.28	7.0... 8.0	2*n*	T
1888.35	100.5	2.39	7.0... 8.0	2*n*	T
1890.41	102.4	2.64	7.2... 8.4	2*n*	Gl

Discovered with the 6-inch. Without sensible change, but the components have a common proper motion of 0″.185 in the direction of 250°.5 (PORTER), and hence it is a physical pair. Lalande 28591 = PIAZZI XV. 150.

[β (I)...β (*Mon. Not.* XXXIII, 351)...Δ (1)...Δ (2081)...Cin⁴ ...LM...Tarrant (2899,2991)...Glasenapp (1)...]

β 619. *Serpentis* 55

R.A. $15^h\ 37^m\ 34^s$
Decl. $+14°\ 3'$

1878.35	359°.7	″0.58	6.5... 7.0	2*n*	β
1878.46	354.0	0.38	6.2... 6.2	2*n*	Δ
1883.49	353.7	0.45	6.5... 6.5	3*n*	Sp
1884.17	364.9	0.33	6.0... 6.4	6*n*	En
1885.52	361.8	0.45	...	2*n*	HΣ
1887.61	358.4	0.47	...	6*n*	Sp
1888.39	360.6	0.63	6.0... 7.0	2*n*	Lv
1888.66	358.1	0.54	6.5... 7.0	3*n*	T
1891.29	359.8	0.59	6.9... 7.7	3*n*	β
1894.50	363.1	0.55	...	1*n*	Sp

Discovered with the 18½-inch. A fine, close pair, but so far without change. Lalande 28656.

[β (X)...β¹...β (3114)...β (*Pub. L. O.* II)...Δ (1)...Sp (II, III)...HΣ ( )...Engelmann (2678)...Lv²...Tarrant (2991)...]

β 620. O. Arg. S. 14842

R.A. $15^h\ 38^m\ 54^s$
Decl. $-27°\ 41'$

A and B

1878.38	166°.8	″0.86	7.5... 7.5	1*n*	β
1892.41	154.4	0.50	7.7... 7.9	3*n*	β
1892.41	165.5	0.65	7.0... 7.6	1*n*	Lv
1896.49	170.2	0.72	...	1*n*	A
1896.52	174.5	0.63	...	3*n*	Lv

AB and C (= H 4803)

1836.7	214°.8	″40±	8 ... 9	1*n*	H
1878.38	214.1	50.25	7.5... 9.0	1*n*	β
1879.46	213.4	51.15	7.5... 9.0	1*n*	Cin
1890.45	213.9	50.75	7.1... 8.5	2*n*	Gl
1891.49	214.2	50.80	7.2... 9.0	3*n*	β
1892.41	214.5	50.74	... 8.6	3*n*	β
1892.41	215.4	50.53	...10.0	1*n*	Lv

The duplicity of the principal star of the wide pair, H 4803, was discovered with the 18½-inch. Change is probable. All the measures of C are given. LACAILLE 6516.

[β (IX)...β¹...β (3114,3142)...β (*Pub. L. O.* II)...Lv (*A. J.* 278, 407) (*Proc. Haverford Coll. Obsy.* 1892)...Aitken (3395)...Glasenapp (1)...]

β 240. W¹ XV. 731

R.A. 15h 39m 32s
Decl. + 4° 24′

A and B

1875.90	135°.4	2″.35	8.5 . . . 10.0	4*n*	J
1880.46	135.9	2.49	8.5 . . . 9.0	1*n*	β
1892.70	135.0	2.27	8.4 . . . 9.8	3*n*	Lv
1899.26	134.0	2.33	8.5 . . . 9.3	1*n*	β

A and C

1880.46	42°.1	27″.88	. . . 11.5	1*n*	β
1892.36	40.2	28.33	. . . 12.0	2*n*	Lv
1899.26	39.7	28.73	. . . 11.8	1*n*	β

Discovered with the 6-inch. Fixed. By an error in the reduction, the distance in β^1 is printed 31″.60.

[Δ (v). . . β (*Mon. Not.* XXXV, 31). . . β^1. . . Δ (1). . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892). . .]

β 946. B.A.C. 5248

R.A. 15h 44m 44s
Decl. + 55° 45′

1879.28	152°.0	1″.31	5.2 . . . 10.9	3*n*	β
1891.28	148.9	1.43	5.7 . . . 11.5	3*n*	β

Discovered with the 18½-inch. A fine unequal pair in *Draco*. In HEIS 5 m; D.M. 6.0.

[β (XIII). . . β^3. . . β (3114). . . β (*Pub. L. O.* II). . .]

β 415. O. Arg. N. 15675

R.A. 15h 44m 50s
Decl. + 65° 57′

A and B

1876.39	336°.8	12″.72	8.5 . . . 11.5	1*n*	J
1892.42	335.4	12.77	8.2 . . . 10.5	2*n*	Lv.C
1899.08	334.5	12.86	8.2 . . . 11.6	2*n*	β

A and C

1876.39	357°.6	30″.82	. . . 12.0	1*n*	J
1892.42	358.3	29.22	. . . 10.6	2*n*	Lv.C
1899.08	358.7	28.39	. . . 11.7	2*n*	β

Discovered with the 6-inch. The measures of AC indicate a proper motion of 0″.1 in one of the stars. There appears to be no change in AB.

[β (VII). . β (2103). . . J (1). . . Lv and Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892). . .]

β 621. W² XV. 1130

R.A. 15h 45m 55s
Decl. + 44° 53′

1878.48	75°.1	0″.5±	7.5 . . . 8.0	1*n*	β
1884.61	65.5	0.40	. . .	4*n*	HΣ
1891.32	62.2	0.57	8.1 . . . 9.3	3*n*	β
1898.47	58.8	0.62	8 . . . 8	2*n*	D
1898.53	57.0	0.54	. . .	1*n*	Lew
1898.57	57.0	0.63	7.5 . . . 8.5	3*n*	A

Discovered with the 18½-inch. My single measure in 1877 was noted as somewhat uncertain, and therefore the apparent change in the angle may not be real.

[β (X). . . β^1. . . β (3114). . . β (*Pub. L. O.* II). . . Lewis (*Mon. Not.* LIX, 400). . . HΣ ( ). . . Aitken ( ). . . Doolittle (*Pub. Flower Obsy.* I). . .]

β 36. 2 *Scorpii*

R.A. 15h 46m 24s
Decl. − 24° 58′

1877.37	277°.6	2″.47	6.0 . . . 8.0	1*n*	Cin
1878.46	279.0	2.58	5.5 . . . 8.0	1*n*	Cin
1880.38	275.4	2.80	5.0 . . . 7.5	1*n*	Cin
1884.14	274.7	2.89	5.7 . . . 7.7	4*n*	W
1888.57	277.1	2.63	5.8 . . . 7.6	1*n*	Lv
1889.47	276.3	2.84	5.5 . . . 10.2	2*n*	T
1892.38	277.8	2.86	5.8 . . . 7.6	2*n*	Lv
1894.58	276.6	1.94	6 . . . 9.5	2*n*	Sel
1896.32	279.7	2.83	4.5 . . . 7	3*n*	Teb
1897.47	274.4	2.93	5.9 . . . 9	1*n*	See
1898.49	275.5	2.88	5 . . . 9	3*n*	Sc

Discovered with the 6-inch. There has been no sensible relative change, but it is without doubt a physical system, as the components have the same proper motion of 0″.049 in the direction of 253°.6 (AUWERS).

[β (1). . . β (*Mon. Not.* XXXIII, 351). . . Cin^4. . . Cin^1. . . Cin^6. . . Wilson (Cin^m). . . Lv^1. . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892). . . Tarrant (3186). . . Sellors (3303). . . Tebbutt (*Mon. Not.* LVII, 584). . . See (3496). . . Scott (*Mon. Not.* LIX, 427). . .]

β 810. W[3] XV. 1156

R.A. 15[h] 46[m] 55[s]
Decl. + 42° 50′

1881.32	93°.2	1".09	8.5...11.2	3*n*	β
1888.51	91.5	1.35	8.9...12.2	3*n*	Com
1893.37	89.1	1.15	8.8...11.2	3*n*	W
1896.51	86.0	0.82	8.6...10.8	3*n*	Lv
1898.61	89.4	0.99	8.6...11.7	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. The motion, if any, is slow.

[β (XII)...β[4]...Comstock (*Pub. Washburn Obsy.* VI)...Lv (*A. J.* 407)...Wilson ( )...Aitken ( )...]

β 622. π *Scorpii*

R.A. 15[h] 51[m] 36[s]
Decl. — 25° 46′

1878.40	132°.6	49".99	6 ...12	2*n*	β
1892.39	132.2	50.41	...12.3	3*n*	β
1899.44	132.2	50.21	...11.5	1*n*	β

Distant companion noted with the 18½-inch. The large star has a proper motion of 0".056 in the direction of 234°.3 (AUWERS). B is probably only an optical companion.

[β (X)...β[5]...β (3142)...β (*Pub. L. O.* II)...]

β 623. Lalande 29127

R.A. 15[h] 54[m] 51[s]
Decl. — 6° 38′

1878.45	238°.4	0".97	8.0... 9.0	1*n*	β
1878.68	236.8	0.99	8.0... 8.5	3*n*	Cin
1888.27	237.8	1.01	8.0... 9.0	1*n*	Lv

Discovered with the 18½-inch. Recent measures are wanting.

[β (X)...β[6]...Cin[5]...Lv[1]...Glasenapp (I)...]

β 37. Cord. (24°) 12474

R.A. 15[h] 55[m] 15[s]
Decl. — 24° 15′

1879.39	39°.1	2".85	8.5... 9.5	1*n*	Cin
1891.49	44.6	2.69	9.0... 9.4	3*n*	β
1892.41	43.4	3.09	8.6... 9.7	3*n*	Lv

Discovered with the 6-inch.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1893)...]

β 38. Lalande 29136

R.A. 15[h] 55[m] 39[s]
Decl. — 24° 41′

1877.53	350°.4	4".08	8.0...10.5	1*n*	Cin
1880.48	351.5	4.07	8.5...10.0	1*n*	Cin
1891.49	352.9	4.52	7.7... 9.2	3*n*	β

Discovered with the 6-inch. Unchanged.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...Cin[4]...Cin[6]...]

β 947. β *Scorpii*

R.A. 15[h] 58[m] 28[s]
Decl. — 19° 29′

A and B

1879.59	97°.3	0".85	2 ...10	1*n*	Hl
1880.06	88.4	0.91	... 9.7	5*n*	β
1881.50	92.7	0.96	... 9.3	3*n*	β
1887.59	99.2	1.09	...	2*n*	Hl
1887.60	88.5	0.98	...	3*n*	Sp
1889.41	93.9	0.94	...10.8	5*n*	β
1891.55	95.7	1.00	...10	2*n*	Hl
1892.41	95.8	1.03	... 9.5	3*n*	β
1897.57	90.6	1.00	...11	3*n*	A

A and C (= H[4] III. 7 = Sh 217)

1782.29	25°.1	14".37	...	1*n*	H[4]
1823.28	26.5	13.65	...	1*n*	Sh
1868.56	25.5	13.71	2.7... 5.1	4*n*	J
1879.52	24.4	13.50	...	4*n*	β
1879.55	24.3	13.82	...	4*n*	Cin
1881.59	25.2	13.41	...	3*n*	β
1885.01	25.3	13.59	3.9... 6.0	6*n*	En
1888.08	24.8	13.62	...	4*n*	Hl

The close pair was discovered with the 18½-inch. The measures do not indicate any material change, but it is a physical system, as the components have a common proper motion. This movement is given by AUWERS in his *Fundamental Catalogue* as 0".0457 in the direction of 233°.7. If the small star was fixed in space the change in the

position of B would be very apparent in the time covered by the measures. The Herschel companion appears to be fixed with reference to A, and is therefore a member of the system. If C had no proper motion, its angle and distance in the interval between 1823 and 1888 would increase respectively 4°.7 and 2″.7. It is evident from the measures that no such change has taken place. The Harvard photometric magnitude of *β Scorpii* is 3.0, and of C 5.2.

[*β* (XIII)...β^{2}...β^{3}...*β* (2957,3142)...*β* (*Fus. L. O.* II)... Sp (II)...Hall (I, II)...Aitken (3465)...]

A few only of the measures of AC are given. The following refer to this companion:

Powell (*Mem. R. A. S.* XXV, XXXII)...Mitchell (Cin^{2}) (*Sid. Mess.* April 1840)...Madler (*Fixstern-Systeme* I, p. 213) *Analen d. Konigsberg Sternwarte*, Munchen XVII...Worster and Jacob (*Madras Obsns.* 2d Series)...Herschel (*Mem. R. A. S.* V, XXXVIII)...Beer and Madler (280)...Oudemans (926) ...Secchi (*Cat. 1321 Stelle Doppie*) (*Double Star Measures* 1855) ...*Radcliffe Obsns.* XXI, XXII, XXVIII...Hall (*Wash. Obsns.* 1863)...Δ (1192)...Δ (1)...Pritchett (*Pub. Morrison Obsy.* I) ...Engelmann (2786)...Cin^{3}...Tebbutt (*Mon. Not.* L. 23)... Wilson (Cin^{10})...Cruls (*Annals Imp. Obsy. Rio de Janeiro*, IV, Part 1)...Glasenapp (1)...Hussey (*A. J.* 397)...]

β 948. *Librae* 213

R.A. $15^{h}\ 59^{m}\ 20^{s}$
Decl. $-\ 5^{\circ}\ 58'$

A and B

1879.59	150°.5	1″.46	6.8... 9.5	4*n*	*β*
1888.46	147.4	1.55	6.9... 9.4	2*n*	Lv
1892.40	149.3	1.54	7.1... 9.4	3*n*	Lv

A and C (= Σ 2005 *rej.*)

1835.6	230°.5	20″±	7 ...12	1*n*	H²
1879.42	233.7	28.54	...10.4	2*n*	*β*
1892.41	234.8	29.05	...10.4	2*n*	Lv

A and D

1835.6	185°.0	35″±	...12	1*n*	H²
1879.42	192.7	52.27	...10.8	2*n*	*β*
1892.41	194.9	52.72	...10.8	2*n*	Lv

The duplicity of the principal star of Σ 2005 *rej.* was discovered with the 18½-inch. All the measures of the distant stars are given above. GOULD puts this in *Ophiuchus*, 6.8 m. Lalande 29280.

[*β* (XIII)...β^{3}...Lv^{1}...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Herschel (*Cape Obsns.*)...]

β 811. W⁸ XV. 1500

R.A. $16^{h}\ 0^{m}\ 4^{s}$
Decl. $+\ 22^{\circ}\ 30'$

1881.31	221°.6	3″.49	8.1...12.1	3*n*	*β*
1888.56	219.0	3.76	8.5...12.0	3*n*	Com
1889.49	220.7	3.70	7.8...10.8	3*n*	*β*
1899.28	221.5	3.88	8.0...10.0	2*n*	*β*

Discovered with the 15½-inch at the Washburn Observatory. This star, according to the *Berlin A. G. Catalogue*, has a proper motion of 0″.109 in the direction of 297°.3. The components are obviously moving together.

[*β* (XII)...β^{5}...*β* (2957)...*β* (*Pub. L. O.* II)... Comstock (*Pub. Washburn Obsy.* VI)...]

β 39. 11 *Scorpii*

R.A. $16^{h}\ 0^{m}\ 57^{s}$
Decl. $-\ 12^{\circ}\ 25'$

1872.55	258°.2	3″.75	...10.3	1*n*	Kn
1875.71	256.5	3.35	6.1...10.4	4*n*	J
1879.38	258.9	3.77	6.0...11.0	1*n*	Cin
1879.49	258.4	3.33	6.0...11.0	3*n*	*β*
1879.58	256.5	3.31	...	1*n*	Pt
1880.48	256.9	3.20	6.0... 9.0	1*n*	Cin
1882.38	254.6	3.36	... 9.0	2*n*	W
1888.44	259.4	3.33	5.5...10.0	1*n*	Lv
1889.44	257.7	3.25	6.0...10.5	2*n*	T
1899.38	258.3	3.31	6.0... 9.7	2*n*	*β*

Discovered with the 6-inch. The measures do not show any relative motion, and the proper motion of the principal star of 0″.080 in the direction of 245°.8 (AUWERS) belongs to the small star as well. It will be shown hereafter to be a physical system, but of long period. There is a 13 m star, 313°.8 : 30″.0.

[*β* (1)...*β* (*Mon. Not.* XXXIII, 351)...β^{3}...Δ (1)...Knott (*Mem. R. A. S.* XLIII)...Cin^{5}...Cin^{6}...Pritchett (*Pub. Morrison Obsy.* I)...Wilson (Cin^{10})...Lv^{1}...Tarrant (3186)...]

β 812. W^s XV. 1553

R.A. 16^h 1^m 42^s
Decl. + 17° 13′

1881.31	127.4	0.87	8.2 ...	8.3	3n	β
1888.45	125.2	0.76	8.7 ...	9.0	3n	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (VII)...β^W... Comstock (*Pub. Washburn Obsy.* VI)...]

β 949. Lalande 29365

R.A. 16^h 1^m 54^s
Decl. — 9° 47′

1880.25	197.8	0.62	7.6 ...	7.7	4n	β
1887.89	195.2	0.48	...		2n	Sp
1898.52	208.6	0.41	7.5 ...	7.5	3n	A

Discovered with the 18½-inch. Motion is probable.

[β (XIII)... β^W...Sp (III)...Aitken ( )...]

β 355. Lalande 29506

R.A. 16^h 4^m 14^s
Decl. + 45° 42′

A and B

1876.34	279.3	0.34	7.8 ...	8.0	4n	J
1878.83	269.5	0.40	7.2 ...	8.0	3n	Sp
1886.67	280.0	0.36	...		7n	En
1887.57	269.5	0.35	...		5n	Sp
1888.61	273.8	0.4 ±	...		3n	Sp
1892.27	277.4	0.40	7.9 ...	9.2	3n	β
1897.34	278.5	0.44	...		1n	Lew
1898.53	278.1	0.42	...		2n	Bow

AB and C

1892.27	97.3	12.8	...13	1n	β
1898.53	99.2	12.87	...	1n	Bow
1898.53	98.0	12.49	...	1n	Lew

Discovered with the 6-inch. The measures, taken together, do not indicate any change. It is 56° *p* Σ 2015. The faint star was added with the 36-inch.

[β (VI)...β (2062,3142)...β (*Pub. L. O.* II)...J (1)...Sp (II, III)...Engelmann (2780)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...]

β 40. O. Arg. S. 15343

R.A. 16^h 4^m 29^s
Decl. — 27° 14′

1877.00	352.7	5.02	8.0 ...	9.5	2n	Cin
1890.46	354.7	5.71	8.5 ...	9.3	2n	Gl
1891.48	355.2	5.07	8.4 ...	9.4	4n	β

Discovered with the 6-inch April 27, 1870. This pair precedes all others in this catalogue in reference to date of discovery. There does not appear to be any sensible change. GLASENAPP measures a third star 9.8 m, 95.°9 : 98.″37 (1890.46) 2n.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)... Cin^1...Cin^4...Glasenapp (I)...]

β 1087. τ *Coronae*

R.A. 16^h 4^m 35^s
Decl. + 36° 48′

1889.21	169.1	3.11	5.5 .. 13.8	3n	β
1890.32	168.3	3.12	...13.5	3n	β
1891.32	170.7	3.17	...14.2	3n	β
1892.36	169.9	3.10	...13.9	3n	β
1898.37	172.9	3.17	...14.0	3n	β
1898.64	169.9	3.27	5.3 ...14.3	3n	A

Discovered with the 36-inch. τ *Coronae* has a considerable proper motion :

Auwers	- -	0.″345 in	348.°3
Porter	- -	0.346 in	349.8

It is obvious from an inspection of the measures that the small star is moving at the same rate. This movement of A is almost exactly in the opposite direction, and if the small star was fixed in space, its distance would increase annually by the amount given above, which would make the distance in 1898 more than double that given by the first measures.

[β (XV)...β (2929,3048,3114,3142)...β (*Pub. L. O.* II)... Aitken ( )...]

β 120. ν *Scorpii*

R.A. 16^h 5^m 1^s
Decl. — 19° 9′

A and B

1874.40	357.7	...	...	6n	β
1874.47	365.2	...	...	1n	N
1876.35	360.0	0.73	4.2 ... 6.7	8n	J

1876.53	361°.5	0".67	4.2 ... 6.5	5*n*	Sp
1877.49	364.4	0.64	4.2 ... 6.0	1*n*	Cin
1878.35	363.7	1.04	...	2*n*	*β*
1878.36	359.4	0.52	...	2*n*	Ru
1879.03	360.2	0.74	4.2 . 6.0	3*n*	Cin
1879.58	362.0	0.65	...	5*n*	Sp
1879.59	365.3	0.74	4 ... 7	1*n*	Hl
1880.00	366.2	0.66	4.7 ... 5.7	8*n*	*β*
1880.40	361.0	...	...	1*n*	Cin
1880.54	360.9	0.53	...	2*n*	Pt
1881.45	366.7	0.81	...	6*n*	*β*
1882.55	359.9	0.72	...	2*n*	Sp
1884.40	363.4	...	7.0 ... 7.5	1*n*	W
1886.30	367.2	0.65	4 ... 6	1*n*	LM
1886.42	357.3	...	...	1*n*	Sm
1886.52	369.3	1.08	4.0 ... 7.0	2*n*	T
1886.61	363.9	0.74	...	3*n*	Hl
1888.36	362.8	0.95	...	3*n*	T
1888.41	364.1	0.80	4.0 ... 5.5	3*n*	Lv
1888.57	364.9	0.59	...	2*n*	Hl
1889.44	361.2	0.80	...	3*n*	*β*
1895.48	362.8	0.81	6.0 ... 6.5	3*n*	A
1896.51	363.5	1.15	...	1*n*	Hu
1896.59	367.4	0.88	...	2*n*	Pt
1897.48	360.6	0.71	...	3*n*	A

C and D (= Mitchell)

1846.58	39°.0	1".11	7.0 ... 8.0	2*n*	Mh
1868.51	41.3	2.03	...	1*n*	Hd
1875.42	47.9	1.89	7.0 ... 8.0	4*n*	J
1877.78	45.6	2.08	7.0 ... 8.0	8*n*	Sp
1879.41	45.2	2.07	7.1 ... 8.0	9*n*	Cin
1881.31	46.6	2.02	...	4*n*	*β*
1886.51	49.5	2.10	7.3 ... 8.0	4*n*	T
1886.61	45.8	2.05	...	3*n*	Hl
1888.42	48.3	2.22	7.4 ... 8.1	3*n*	Lv
1897.48	48.7	2.02	7 ... 8	3*n*	Sc
1897.48	43.6	2.05	...	3*n*	A
1897.60	45.5	1.78	...	4*n*	Bar
1898.54	45.0	2.05	...	2*n*	Maw

AB and C (= H I V. 6 = Sh 220)

1782.30	334°.9	38".33	...	1*n*	H I
1821.36	338.2	40.82	...	1*n*	Sh
1875.43	336.8	40.77	...	4*n*	J
1879.58	337.7	40.98	...	3*n*	Sp
1881.60	336.6	40.97	...	3*n*	*β*
1886.61	336.5	40.91	...	3*n*	Hl
1897.60	326.4	41.12	...	3*n*	Bar

The close pair was discovered with the 6-inch. The duplicity of Herschel's companion was discovered by MITCHELL at Cincinnati in 1846, and independently by JACOB the following year. The measures of AB show no sensible motion, and the same may be said of CD. There has been no change in the distance or direction of the two pairs with reference to each other. The principal star, according to AUWERS, has a proper motion of 0".042 in the direction of 251°.9. The four components are evidently moving together, and undoubtedly form one vast quadruple system. This is in the midst of a complex nebulous area discovered by BARNARD (see *Mon. Not.* LIX, 367).

[*δ* (III)...*β* (*Mon. Not.* XXXIV, 50; XXXV, 28)...*β*' ...*β*⁶... *β*⁶...*β* (2057)...*β* (*Pub. L. O.* II)...Newcombe (*Wash. Obsns.* 1874)...*δ* (I)...*δ* (2186).. Russell (*Sydney Obsns.* 1871–81)...Cin⁴...Cin⁵...Cin⁶.. Sp (II)...Sp (2133) ...Hl (I, II)...Pritchett (*Pub. Morrison Obsy.* I) (*A. J.* 397)...Wilson (Cin¹⁰)...LM...Smith (*Mem. R. A. S.* L) ...Tarrant (2866,2991)...Lv¹...Lv (*Sid. Mess.* VIII, 77) ...Hussey (*A. J.* 397)...Aitken (3465) (*Ast. Soc. Pac.* VII, 305)...Scott (*Mon. Not.* LIX, 427)...Barnard( )...]

The following relate to observations of the old components:

[Herschel (*Cape Obsns.*)...Wrottesley (*Mem. R. A. S.* XXIX) ...Worster and Jacob (*Madras Obsns.*, First Series)...Secchi (*Catalogo di 1321 Stelle Doppie*, app.) (*Mem. Coll. Rom.* 1855) ...*Annals Harvard Obsy.* XIII. .Mitchell (Cin⁶)...Glasenapp (I)...Sellors (3154)...*Maw* (*Mem. R. A. S.* LIII)...]

β 624. O. Arg. S. 15565

R.A. $16^h\ 15^m\ 42^s$
Decl. $-22°\ 50'$

1878.47	321°.7	1".12	8.0 ... 9.7	2*n*	*β*
1879.39	320.0	1.25	7.7 ... 9.3	3*n*	Cin
1880.38	320.9	...	...	1*n*	Cin
1891.51	322.2	1.17	8.1 ...10.2	6*n*	*β*
1895.63	316.1	1.15	8.1 ...9.6	3*n*	A

Discovered with the 6-inch. Near 5 *Ophiuchi*.

[*β* (X)...*β*'...*β* (3114)...*β* (*Pub. L. O.* II)...Cin⁵...Cin⁶... Aitken (*Ast. Soc. Pac.* VII, 305)...]

β 1198. τ *Herculis*

R.A. $16^h\ 16^m\ 8^s$
Decl. $+46°\ 36'$

1890.35	145°.3	6".57	4 ...13.9	4*n*	*β*
1892.40	145.6	6.70	...14.0	1*n*	*β*
1898.51	145.0	6.79	...14.0	2*n*	*β*
1898.64	149.4	7.10	...14.2	3*n*	A

Discovered with the 36-inch. AUWERS gives the proper motion of τ *Herculis* 0".035 in the direction of 330°.5. It is uncertain from the measures whether or not the companion shares this movement. From the position of 1890, and this proper motion, the small star in 1898, if fixed in space, should be 145°.5 : 6".8. The probabilities are that this is not a physical system. The magnitude of the companion, and its distance from the primary during the whole of the present century, will explain its non-discovery heretofore.

[β (XVII)...β (3048,3142)...β (*Pub. L. O.* II)...Aitken ( )...]

β 41. D.M. (61°) 1583

R.A. 16h 17m 26s
Decl. + 61° 44'

1875.37	58°.9	2".44	9.0...10.7	3*n*	J
1893.46	64.1	2.41	9.0...11.2	3*n*	W
1897.71	62.5	2.22	9 ...11	3*n*	D
1898.63	61.6	2.36	9.0...11.0	3*n*	A

Discovered with the 6-inch. Probably fixed. Σ 2045 is *sp* in a low-power field.

[β (I)...β (*Mon. Not.* XXXIII, 351)...J (I)...Wilson ( )...Aitken ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 1115. Lalande 29840

R.A. 16h 18m 13s
Decl. − 23° 11'

1889.39	26°.3	0".90	8.1... 9.2	4*n*	β
1897.42	18.4	0.72	8.0... 9.0	3*n*	A
1897.65	26.7	0.97	8.0...10.5	1*n*	See
1898.47	23.5	1.02	8.0... 9.2	2*n*	D

Discovered with the 36-inch. This is in the field with 5 *Ophiuchi* (= Sh 228), and was measured from that star by JACOB at Madras. These are all the measures:

5 *Ophiuchi* and β 1115

1846.21	253°.8	161".00	1*n*	Jacob
1889.39	253.0	156.43	3*n*	β
1890.41	253.2	155.97	2*n*	Glasenapp
1898.33	253.3	156.86	4*n*	Doolittle

The proper motion of Lalande 29840 is given by PORTER as 0".064 in the direction of 225°.3. The components are therefore moving together in space, and doubtless form a binary system. The last *Radcliffe Catalogue* gives the proper motion of 5 *Ophiuchi* 0".046 in the direction of 258°.7.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3465)... See (3495)...Glasenapp (1)...]

β 950. S.D. (9°) 4381

R.A. 16h 18m 41s
Decl. − 9° 35'

1880.50	355°.1	1".18	8.2... 9.3	5*n*	β
1888.46	350.9	...	8.0...10.0	1*n*	L.v
1892.37	354.5	1.07	8.2... 9.0	3*n*	β

Discovered with the 18½-inch.

[β (XIII)...β^1...β (3142)...β (*Pub. L. O.* II)...L.v^2...]

β 951. W ° XVI. 543

R.A. 16h 18m 59s
Decl. + 33° 38'

1879.32	57°.3	0".98	8.2... 8.7	2*n*	β
1892.24	55.4	0.91	8.1... 9.0	3*n*	β
1898.53	56.8	1.07	...	1*n*	L

Discovered with the 18½-inch. Near ν *Coronae*.

[β (XIII)...β^1...β (3142)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 4001...]

β 625. ω *Herculis*

R.A. 16h 19m 53s
Decl. + 14° 19'

A and B

1879.21	176°.8	1".91	5.0...11.5	3*n*	β
1885.51	183.2	2.11	...	2*n*	HΣ
1890.38	178.2	1.76	...11.7	2*n*	β
1898.50	184.3	1.86	5.5...11.5	3*n*	A

A and C

1879.05	103°.5	33".89	...11.2	4*n*	β
1890.37	103.5	33.41	...12.2	3*n*	β
1898.50	102.7	32.96	...12.2	3*n*	A

Discovered with the 18½-inch. AUWERS (A.N. 3509) gives the corrected proper motion of this star 0".065 in the direction of 159°.1. The measures of C in 1890 and 1898 give for the movement of A, assuming the small star to be fixed, 0".079 in 149°.0. It is probable, therefore, that this star has no sensible motion of its own, and that AB form a physical system.

[β (x)...β^1...β^2...β (3048)...β (*Pub. L. O.* II)...Aitken ( )...HΣ ( )...]

β 813. W² XVI. 661

R.A. 16ʰ 23ᵐ 2ˢ
Decl. + 26° 48′

1881.30	165°.4	0".96	8.4...	8.4	3*n*	β
1888.61	165.4	1.09	8.5...	8.6	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^4...Comstock (*Pub. Washburn Obsy.* VI)...]

β 814. W² XVI. 676

R.A. 16ʰ 23ᵐ 9ˢ
Decl. + 40° 9′

1881.38	322°.6	0".36	8.4...	8.7	3*n*	β
1891.32	324.1	0.31	8.4...	8.4	3*n*	β
1893.57	318.9	0.25±	...		1*n*	Com
1895.62	328.4	0.25±	...		3*n*	Com
1896.43	331.9	0.25	...		2*n*	Com
1898.47	325.9	0.29	8+...	8+	2*n*	D
1898.53	325.2	0.28	...		1*n*	Lew
1898.67	326.4	0.35	8.5...	8.5	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. The measures show no sensible change.

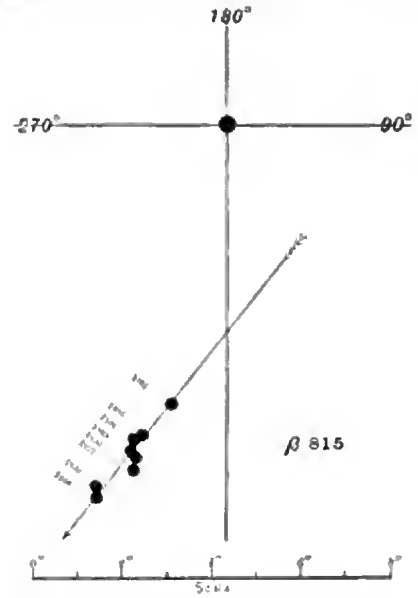
[β (XII)...β^4...β (3114)...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* X)...Doolittle (*Pub. Flower Obsy.* I)...Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...]

β 815. W² XVI. 686

R.A. 16ʰ 23ᵐ 16ˢ
Decl. + 43° 11′

1881.30	348°.4	6".42	8.1...10.4		3*n*	β
1886.40	344.5	7.28	8.2...10.3		7*n*	En
1888.95	343.2	7.42	8.1...10.0		4*n*	Com
1889.43	343.3	7.68	8.5...10.8		3*n*	β
1890.33	344.4	7.76	8.4... 9.7		3*n*	β
1892.17	344.5	8.07	8.4...10.2		3*n*	β
1896.47	341.6	8.65	8.1...10.3		3*n*	Lv
1896.59	337.8	8.73	8.5...10.2		2*n*	Soulé
1897.70	340.1	9.09	...		3*n*	D
1898.61	340.6	8.89	8.5...10.5		3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. The change shown by the measures is certainly due to proper motion of one star or the other. PORTER finds no evidence of this in the meridian observations of A. The companion has an apparent annual motion of 0".155 in the direction of 141°.6. This is unusual in so small a star. The measured positions are shown in the following diagram:



[β (XII)...β^4... β (2957,3048,3142)...β (*Pub. L. O.* II)...β (*Sid. Mess.* IX, 290) (*Ast. & A. P.* XIII, 18)...Engelmann (2786)...Comstock (*Pub. Washburn Obsy.* VI) (*Sid. Mess.* IX, 78)...Lv (*A. J.* 407)...Soulé (*A. J.* 410)...Doolittle (*Pub. Flower Obsy.* I)...Aitken ( )...]

β 626. φ *Ophiuchi*

R.A. 16ʰ 24ᵐ 16ˢ
Decl. − 16° 21′

1878.41	35°.9	32".46	4	...12.5	2*n*	β
1892.40	35.8	33.40		...13.0	2*n*	β
1898.30	35.5	33.59		...13.5	2*n*	β
1898.41	36.7	33.38		...12.5	3*n*	A

This distant companion was noted with the 18½-inch. The principal star has a proper motion of 0".078 in the direction of 249°.1 (AUWERS). This accounts for the change in the companion. The proper motion and the position of 1878 give for B in 1898, 37°.4 : 33".61.

[β (x)...β⁵...β (3142)...β (*Pub. L. O.* 11)...Aitken ( )...]

β 816. 31 *Herculis*

R.A. 16h 27m 0s
Decl. + 33° 46'

1881.30	224°.1	4".97	6.3...11.8	3*n*	β
1884.89	223.6	5.65	...	3*n*	HΣ
1888.54	221.2	5.31	7.5...11.8	3*n*	Com
1892.17	224.2	5.28	6.3...11.8	3*n*	β
1898.47	221.9	5.11	6.0... 9.5	2*n*	D

Discovered with the 15½-inch at the Washburn Observatory. AUWERS gives this star a proper motion of 0".042 in the direction of 260°.3. With this movement, and the position of 1881, the companion, if fixed, should be at the date of the last measures, 218°.6 : 4".41. It is therefore probable that it is moving with the primary.

[β (XII)...β⁵...β (3142)...β (*Pub. L. O.* 11)...HΣ ( )...Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* I)...]

β 817. W° XVI. 796

R.A. 16h 27m 29s
Decl. + 23° 29'

1881.31	147°.0	1".14	8.2... 8.2	4*n*	β
1888.48	327.6	1.14	8.6... 8.7	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory. Unchanged.

[β (XII)...β⁴...Comstock (*Pub. Washburn Obsy.* VI)...]

β 818. 32 *Herculis*

R.A. 16h 28m 49s
Decl. + 30° 45'

1881.48	33°.5	3".29	6.3...13.5	3*n*	β
1885.53	33.4	3.83	...	3*n*	HΣ
1889.25	36.1	3.42	6.5...13.5	3*n*	Com
1889.28	32.9	3.64	6.0...13.5	3*n*	β
1898.64	33.8	3.96	6.3...13.8	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. AUWERS gives the proper motion of 32 *Herculis*, 0".067 in the direction of 243°.7. This does not fully explain the change in the distance of the companion. That change would indicate a proper motion of about 0".04 in 213°.

[β (XII)...β⁵...β (2930)...β (*Pub. L. O.* 11)...HΣ ( )... Comstock (*Pub. Washburn Obsy.* VI)...Aitken ( )...]

β 356. O. Arg. N. 16336

R.A. 16h 29m 42s
Decl. + 69° 12'

1876.21	118°.8	6".85	9.2...11.5	3*n*	Δ
1892.34	118.9	7.17	8.6...11.5	3*n*	β
1897.70	119.2	6.85	8.9...11	3*n*	D

Discovered with the 6-inch. Without change.

[β (VI)...β (2062,3142)...β (*Pub. L. O.* 11)...Δ (I)...Doolittle (*Pub. Flower Obsy.* I)...]

β 819. S.D. (4°) 4133

R.A. 16h 30m 26s
Decl. — 4° 55'

1881.44	230°.8	1".59	8.6...11.3	3*n*	β
1888.60	231.3	1.59	8.7...11.5	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β⁴...Comstock (*Pub. Washburn Obsy.* VI)...]

β 952. W° XVI. 938

R.A. 16h 31m 9s
Decl. + 37° 9'

A and B

1880.48	146°.1	3".85	8.0...10.3	3*n*	β
1892.24	146.1	3.96	8.1... 9.3	3*n*	β
1898.67	144.8	3.78	8.0... 9.0	2*n*	A

B and C

1892.24	244°.3	2".13	...13.7	3*n*	β
1898.67	233.5	2.58	...14.0	2*n*	A

B was discovered with the 18½-inch, and in measuring that with the 36-inch the third star was added.

[β (XIII)...β^3...β (3142)...β (*Pub. L. O.* II)...Aitken ( )...]

β 820. Lalande 30279

R.A. $16^h\ 33^m\ 8^s$
Decl. $-\ 2^\circ\ 52'$

1881.35	237°.6	4″.24	8.0... 9.5	3*n*	β
1888.50	233.1	4.30	7.8... 9.5	3*n*	Com
1892.38	237.4	4.28	7.8...10.4	3*n*	β

Discovered with the 15½-inch at the Washburn Observatory. The *Radcliffe Catalogue* for 1890 gives the proper motion of this star 0″.112 in the direction of 290°.9. The measures show no relative change, and therefore this movement belongs to both stars.

[β (XIII)...β^3...β (3142)...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* VI)...]

β 42. W^s XVI. 1076

R.A. $16^h\ 35^m\ 20^s$
Decl. $+\ 29^\circ\ 15'$

1873.47	39°.3	7″.50	8.5... 9.0	1*n*	OΣ
1874.40	39.4	6.80	9 ...10	1*n*	WS
1875.10	41.9	7.23	10.0...10.5	3*n*	J
1892.33	41.9	7.28	8.8... 9.1	2*n*	β
1898.51	40.2	7.45	9.7... 9.9	2*n*	Gl

Discovered with the 6-inch. Probably fixed.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3142)...β (*Pub. L. O.* II)...Wilson and Seabroke (*Mem. R. A. S.* XLIII)... OΣ (*Foulkowa Obsns.* X)...J (1)...Glasenapp (V)...]

β 1116. B.A.C. 5600

R.A. $16^h\ 36^m\ 51^s$
Decl. $-\ 27^\circ\ 14'$

1889.39	359°.4	1″.78	6.7...11.7	3*n*	β
1897.46	355.3	1.85	6+...12	3*n*	A
1897.48	356.7	2.21	6.5...11.2	1*n*	See

Discovered with the 12-inch. In *Scorpio;* Gould 6.8 m. See measures a 14 m star, 197°.0 : 25″.42 (1897.48) 1 n.

[β (XVI)...β (2956)...Aitken (3465)...See (3496)...]

β 953. O. Arg. N. 16454

R.A. $16^h\ 37^m\ 21^s$
Decl. $+\ 70^\circ\ 2'$

1879.27	328°.7	0″.30	7.8... 8.3	1*n*	β
1891.42	302.8	0.12	7.8... 8.5	1*n*	β
1892.39	298.1	0.18	8.0... 8.5	3*n*	β
1898.27	265.9	0.32	8.0... 9.0	1*n*	β

Discovered with the 18½-inch. It was a very difficult pair with that aperture at the time of discovery, and is still more difficult since. It is a binary in rapid motion. The distance in the last measure (1898) is certainly too large. This is the *sp* of two 8 m stars; the other is 22″ *f* and 1′40″ *n*.

[β (XIII)...β^3... β (3114,3142)...β (*Pub. L. O.* II)...]

β 1199. (*Messier* 13)

R.A. $16^h\ 37^m\ 23^s$
Decl. $+\ 36^\circ\ 41'$

B and C

1890.45	239°.4	0″.88	11.4...12.0	3*n*	β
1898.54	240.4	0.97	...	2*n*	Bar

A and B

1890.45	310°.3	2″.61	10.8...	3*n*	β
1898.54	308.1	2.76	...	4*n*	Bar

One of the principal stars, and near the center, of the great cluster in *Hercules* (Messier 13); discovered with the 36-inch. The close pair is No. 320 of *Scheiner's Catalogue* of the stars in M 13.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Barnard ( )...]

β 43. W^s XVI. 785

R.A. $16^h\ 42^m\ 19^s$
Decl. $+\ 2^\circ\ 57'$

1874.43	71°.0	0″.95	8 ... 9	1*n*	WS
1875.22	246.5	0.89	8.7... 8.8	4*n*	J
1878.54	244.6	0.98	8.5... 9.0	2*n*	Sp
1892.38	245.0	1.01	8.2... 8.3	2*n*	β
1898.64	242.8	1.15	...	1*n*	Br

Discovered with the 6-inch. Fixed.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3142)...β (*Pub. L. O.* II)...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...J (1)...Sp (II)...Brown ( )...]

β 627. 52 *Herculis*

R.A. 16h 45m 43s
Decl. + 46° 12′

1878.38	309.4	1.83	5.0...10.5	5n	β
1881.42	306.6	1.76	5 ...10	1n	Big
1884.23	306.2	1.99	...	3n	HΣ
1886.33	307.6	2.03	5.1... 9.5	8n	En
1892.24	318.7	1.62	5.0... 9.1	3n	β
1896.49	317.3	1.82	5.0... 9.5	4n	Lv
1898.61	314.5	1.90	5.0... 9.3	3n	A

Discovered with the 18½-inch. The principal star has a proper motion of 0″.073 in the direction of 210°.7 (AUWERS). The measures indicate that this is common to both components, as otherwise there would be a much larger increase in the angle, with a distance of about 2″.5 at the date of the last measures. BIGOURDAN measures two 12 m stars 228°.6 : 67″.01, and 267°.6 : 143″.15 (1881.42) 1n.

[β (X)...β²...β (3142)...β (*Pub. L. O.* II)...β (*Ast. & A.-P.* XI, 405)...Bigourdan (*Paris Obsrv.* 1883)...Lv (*A. J.* 407)...Aitken ( )...HΣ ( )...]

β 821. D.M. (32°) 2799

R.A. 16h 47m 13s
Decl. + 32° 3′

1881.43	313.6	1.21	8.4... 8.9	3n	β
1888.48	313.6	1.30	8.7... 9.5	3n	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII) ..β²...Comstock (*Pub. Washburn Obsy.* VI)...]

β 123. O. Arg. S. 16094

R.A. 16h 47m 29s
Decl. − 21° 51′

1877.42	203.5	1.67	8.5... 8.8	2n	Cin
1886.41	205.1	1.56	8.5... 8.5	1n	W
1892.48	203.9	1.57	8.4... 8.8	3n	Lv

Discovered with the 6-inch. Fixed. In S.D. 8.0 m.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Cin⁴...Wilson (Cin^m) ...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 241. *Ophiuchi* 74

R.A. 16h 48m 23s
Decl. − 21° 22′

1877.49	337.9	0.57	7.0... 7.1	2n	Cin
1878.88	345.1	0.62	7.0... 7.0	2n	Sp
1879.06	159.6	0.63	7.0... 7.2	2n	Cin
1880.47	341.0	0.7±	...	1n	β
1881.55	343.0	0.65	6.7... 6.8	3n	β
1884.38	345.0	0.5±	...	1n	W
1887.56	165.3	0.42	7 ... 7	1n	Ho
1888.56	164.2	0.6	7.2... 7.2	2n	Lv
1890.46	160.0	0.75	7.2... 7.2	3n	β
1895.63	162.1	0.71	7.0... 7.2	3n	A

Discovered with the 6-inch. Change is uncertain. Lalande 30725. In GOULD 6.8 m.

[β (V)...β (*Mon. Not.* XXXV, 31)...β¹...β³...β (3048)...β (*Pub. L. O.* II)...Sp (II)...Cin⁴...Cin⁵...Wilson (Cin^m) ...Hough (2978)...Lv⁴...Aitken (*Ast. Soc. Pac.* VII, 305)...]

β 1117. 24 *Ophiuchi*

R.A. 16h 49m 34s
Decl. − 22° 57′

1889.39	264.2	0.70	6.4... 6.5	4n	β
1889.63	235.7	...	...	1n	Ho
1890.45	264.3	0.58	...	3n	β
1893.41	269.9	0.76	6.0... 6.2	2n	W
1893.50	270.6	0.56	6.1... 6.4	2n	Lv
1897.47	267.2	0.62	6+... 6+	3n	A

Discovered with the 12-inch. It had been previously seen by HOUGH, and appears as Ho 265 of his list of new pairs subsequently published. There is no material change in either angle or distance. This star has a proper motion of 0″.027 in the direction of 265°.9 (AUWERS), and this is the movement of both stars; otherwise, it would have been discovered long before.

[β (XVI)... β (2950,3048)...β (*Pub. L. O.* II)...Hough (2977) ...Wilson ( )...Lv (*A. J.* 382)...Aitken (3465)...]

β 954. 54 *Herculis*

R.A. 16h 50m 6s
Decl. + 18 38′

1879.36	175.4	2.56	5.0 ..12.3	3n	β
1882.16	14.2	3.62	5.0...11.0	1n	OΣ
1887.17	178.1	2.81	...	5n	HΣ
1891.27	174.9	2.56	5.5...12.5	3n	β
1898.47	175.8	2.73	5 ...10.2	2n	D

Discovered with the 18½-inch. There is no relative change, but it must be a physical system, as the components have a common proper motion of 0".119 in the direction of 282°.1 (AUWERS). If the small star was fixed, the change in the position angle to 1891 would be about 25°. The measure by OΣ is noted "very uncertain."

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...OΣ (*Poulkowa Obsns.* X)...Doolittle (*Pub. Flower Obsy.* I)...HΣ ( )...]

β 955. Redhill 2542

R.A. 16h 55m 50s
Decl. + 82° 3'

1880.68	348°.0	0".54	8.2... 9.5	1*n*	β
1891.32	352.0	0.64	8.1... 9.3	3*n*	β
1898.63	351.0	0.76	8.2... 9.5	3*n*	A

Discovered with the 18½-inch. It is 11' *s* of ε *Ursae Minoris* and 2m 27s *p*.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)...Aitken ( )...]

β 822. *Herculis* 198

R.A. 16h 58m 10s
Decl. + 19° 51'

1881.56	228°.0	1".50	6.9... 11.3	3*n*	β
1885.50	215.2	1.72	...	2*n*	HΣ
1888.50	230.9	1.81	7.0... 10.0	3*n*	Com
1896.52	228.1	1.64	6.8... 11.2	3*n*	Lv

Discovered with the 15½-inch at the Washburn Observatory. The *Berlin A. G. Catalogue* gives this star a proper motion of 0".036 in the direction of 291°.0, and the measures show that this is the movement of the small star.

[β (XII)...β^4...Comstock (*Pub. Washburn Obsy.* VI)...Lv (*A. J.* 407)...HΣ ( )...]

β 357. Lalande 31091

R.A. 16h 59m 52s
Decl. + 10° 43'

1875.56	294°.7	1".15	8.3...10.0	3*n*	⊿
1876.50	298.9	1.14	7 8... 9+	1*n*	OΣ
1882.54	316.9	1.69	7 8...10	1*n*	OΣ
1885.52	295°.5	1".56	...	2*n*	HΣ
1891.49	302.5	1.08	8.4... 9.4	3*n*	β
1895.50	302.5	1.31	8.2... 9.4	3*n*	A
1896.51	298.0	1.20	8.0... 9.3	3*n*	Lv
1896.53	300.0	0.99	...	2*n*	Lew

Discovered with the 6-inch. Change uncertain.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...⊿ (I)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...Aitken (*Ast. Soc. Pac.* VII, 305)...Lv (*A. J.* 407)...Lewis (*Mon. Not.* LIX, 400)...]

β 823. Lalande 31107

R.A. 17h 0m 29s
Decl. + 0° 49'

1881.39	353°.9	1".04	8.2... 9.2	4*n*	β
1888.41	357.1	1.19	8.5... 9.5	3*n*	Com
1888.52	358.2	...	8.0... 9.3	1*n*	Lv
1889.48	359.8	1.17	8.7... 9.5	3*n*	β
1893.43	361.4	1.15	8.8...10.2	3*n*	W
1895.67	366.4	0.85	8.3... 9.4	3*n*	A
1895.71	363.3	0.97	...	5*n*	Sp
1896.49	365.3	0.95	8.0... 9.2	3*n*	Lv

Discovered with the 15½-inch at the Washburn Observatory. Direct angular motion is clearly established by the measures.

[β (XII)...β^4...β (2957)...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* VI)...Lv^4...Lv (*A. J.* 407)...Wilson ( )...Aitken (*Ast. Soc. Pac.* VII, 305)...Sp (III)...]

β 1088. μ *Draconis*

R.A. 17h 2m 51s
Decl. + 54° 38'

B and C

1889.27	190°.0	12".25	...13.0	3*n*	β
1891.30	189.7	12.20	...13.3	3*n*	β
1892.36	191.3	12.11	...13.7	3*n*	β
1895.28	190.8	12.36	...	3*n*	Bar
1898.62	190.6	12.33	...13.5	3*n*	A
1899.44	193.2	12.33	...	1*n*	β

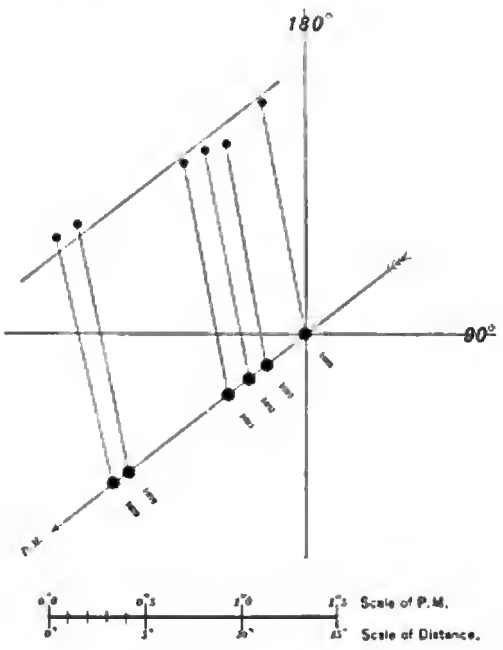
A and B (= Σ 2130 = H^4 II. 13 = Sh. 242)

1836.79	202.8	3".27	5.0... 5.1	4*n*	Σ
1854.26	188.3	3.04	...	11*n*	⊿

1858.23	185.1	2.78	...	3*n*	OΣ
1863.57	182.1	2.62	...	7*n*	J
1871.29	178.5	2.62	...	3*n*	OΣ
1877.42	169.7	2.64	...	5*n*	HI
1883.63	165.0	2.66	...	6*n*	En
1889.27	159.4	2.40	...	4*n*	*β*
1894.66	154.6	2.39	...	11*n*	Com
1898.50	149.1	2.41	...	6*n*	D

The faint star, C, was detected with the 36-inch The bright stars, A and B, have the same proper motion, according to Auwers, of 0".126 in the direction of 308°.2. With this movement of B, and the position of the companion from the measures of 1889, if C was fixed in space, its relation to B at the date of the last measures in 1898 should be 186°.2 : 12".83. It seems practically certain, from the measures taken together, that no such change in C has taken place, and that, therefore, the new star is a member of the physical system.

On the accompanying diagram the measured positions of C from the several places of B in the line of its proper motion are shown:



Proper motion of *μ* Draconis and Companion.

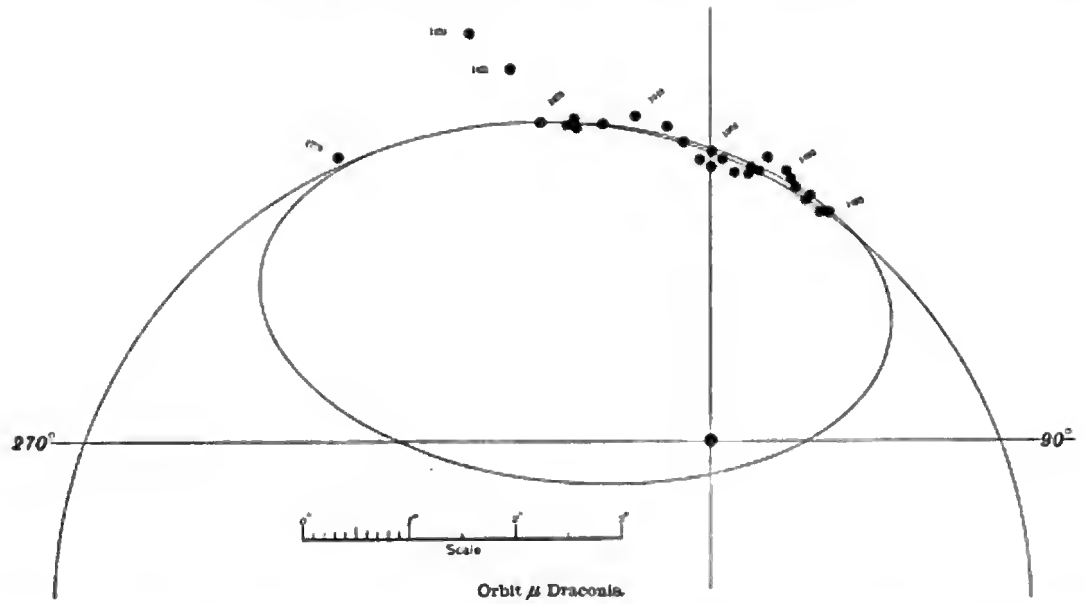
[*β* (XIV)...*β* (2875,2929,3114,3142)...*β* (*Pub. L. O.* II) (*Mon. Not.* LVII, 547)...Barnard (*A. J.* 447)...Aitken ( )...]

As a double star this is known as Σ 2130 (= H' II. 13 = Sh 242). It was discovered by Herschel I. 1779 October 17, and, as the distance was between 4" and 8", it was placed in his Class II. Both angle and distance were measured, and the latter recorded as 4".354 "mean measure" (*Phil. Trans.* 1782). In his "Synopsis" of his father's double-star observations (*Mem. R.A.S.* Vol. XXXV) Herschel II. gives this distance as 4".69, and the date a few days later than that in the original publication, and the date of the measure of the position angle as 1781.73. The latter would seem to be a mistake, since Herschel I. has only the single observation of 1779 October 19 in his first catalogue above referred to. There may be some warrant for this in the original MS., and for increasing the distance to 4".69: but the smaller distance value is used in *Herschel and South's Catalogue* of 1824, and in the early measures of Dawes and other observers. I have used here the original values of both distance and epoch.

In 1804 Herschel recognized the angular motion, and said: "The stars being of nearly equal magnitude, we can have no inducement to suppose them to be at very different distances from us." Struve made measures of it in 1819 and 1821 before the commencement of the work recorded in *Mensuræ Micrometricæ*, and South and Herschel have a single observation in 1821. After citing the previous measures, the latter observers say: "No doubt, therefore, can remain of the reality of an angular motion in this star, as announced by Sir William Herschel in 1804; and the observations here brought together prove it to have been hitherto nearly uniform, and averaging 0°.579 per annum in the direction *npsf*, or retrograde. There can be little doubt of its being a binary system—a miniature of α *Geminorum*."

Systematic work on this star was commenced by Struve in 1828, and since that time there is no lack of carefully made reliable mean results from measures on different nights down to the present time. The retrograde motion recognized by the early observers has steadily continued, accompanied with a slow diminution in the distance. According to Struve, the magnitudes of the components are 5.0 and 5.1.

On the accompanying diagram I have given a careful selection of the best measures by the principal observers for the last hundred years. The



following dates and observers are represented by complete measures of angle and distance:

1781	1*n*	H'
1820	2*n*	Σ
1821	1*n*	Sh
1828–36 (4)	13*n*	Σ
1840	6*n*	Da
1848	1*n*	Da
1855	15*n*	J
1858	3*n*	J
1863	7*n*	J
1866	6*n*	J
1868	3*n*	Du
1871	11*n*	OΣ, Du
1872	7*n*	J
1875	7*n*	Du
1876	3*n*	Jed
1877	8*n*	Hall
1879	3*n*	Jed
1883	10*n*	Per, En, Jed
1885	7*n*	Hall, Per, Jed
1886	3*n*	Jed
1888	3*n*	Maw
1889	10*n*	β, Hall, Maw
1893	7*n*	Leavenworth, Comstock
1895	10*n*	See, Collins, Comstock

It is evident that the distances in the early measures of STRUVE, and HERSCHEL and SOUTH, 1819 to 1821, are too large, or that the distance in 1781 is too small. The later measures of STRUVE appear to show that his previous measures of distance were much too large, and he seems to have considered them as not very reliable, since they are not mentioned in *Mensuræ Micrometricæ*.

One orbit has been computed for this system. BERBERICH (*Astr. Nach.* 2582), from an examination of the measures down to 1883, found a period of 648.0 years. As in all double stars as wide as this, and as easy of measurement, where the observed arc is short, the various measured positions are well represented by the apparent orbit; and, so far as the agreement between the observed and computed places is concerned, there is nothing for unfavorable criticism; but it is obvious enough from even a casual inspection of the diagram that the data are altogether insufficient for even the roughest approximation to the apparent ellipse and the elements of the real orbit. Indeed, as might be expected, the measures since 1883 are steadily leaving the computed positions. The chances are that the relative change will finally resolve itself into orbital motion; but, judging from the motion in the last hundred years, it will be a very long time before anything more than the bare fact of physical connection can be established, to say nothing about the details of that relation.

By way of showing how easily these positions are represented by orbits wholly unlike in all respects, I have given on the diagram two of the

many which could be found. So far as the observed arc is concerned, these figures are practically identical, and represent all the measures down to 1883 as well as, if not better than, the computed orbit, and the six later positions are much better represented. HERSCHEL's distance is practically perfect, and the angle requires a correction of only 2°.8, which is much less than the probable error of measures made in the last century. The ellipse with a major axis of 5".88 gives a period of about 280 years, and the circle with a diameter of 9".16 a period of 1190 years, the eccentricity in the one case being 0.84, and zero in the other. Of course an almost infinite variety of conic sections could be shown which would be equally satisfactory, so far as the measures are concerned.—*Monthly Notices R. A. S.* LVII, 547.

A few only of the measures of AB are given, all will be found in the following:

[Madler (324) (*Fixstern Systeme* I) (*Dorpat Obsns.* XI, XIII, XV)... Herschel (*Mem. R. A. S.* V)... Mitchell (Cin²)... Wrottesley (*Phil. Trans.* 1851) (*Mem. R. A. S.* XXIX)... Miller (806)... Fletcher (*Mem. R. A. S.* XXII)... *Obsns. at Bishops Obsy.*... Dawes (*Mem. R. A. S.* VIII, XIX, XXXV)... *Greenwich Obsns.* 1850... Kaiser (1519) (*Annalen der Stern-Leiden*, III)... Winnecke (1738) (*Ast. Beob. Stern. zu Berlin*, V)... *Obsns. at Barclay's Obsy.* II, III, IV... Secchi (1614) (*Cat. 1321 Stelle Doppie*) (*Serie Seconda delle misure microm. Coll. Rom.* 1863–66)... *Radcliffe Obsns.* XXII, XXVII, XXIX, XXXII... *Annals Harvard Obsy.* XIII... Doner (*Mes. Microm. Lund*, 1876)... Ball (*Dunsink Obsns.*, Part 5)... Brunnow (*Dunsink Obsns.*, Part 3)... Plummer (*Oxford Obsns.*, No. 1)... Flammarion (*Etoiles Doubles et Multiples*)... Gledhill (*Mem. R. A. S.* XLII)... Wilson and Seabroke (*Mem. R. A. S.* XLII, XLIII, XLVI, I.)... Engelmann (1674,2677)... Pritchett (*Pub. Morrison Obsy.* I)... Bigourdan (*Paris Obsns.* 1883) (*Bul. Ast.* XVIII)... Seagrave (*Sid. Mess.* II, 22)... Doberck (2092,2198,3023) (*Trans. R. I. Acad.* XXVI, XXIX)... OΣ (*Poulkowa Obsns.* IX)... J (I, II)... J (1032.1115,1474,1735,2081)... Jedrzejewicz (2369, 2772)... Goldney (2557)... Berberich (2582)... Kustner (2584)... Perrotin (2529) (*Nice Obsns.* II)... de Bolt (2753)... Tarrant (2866)... Knorre and See (*Beob. Berlin*, No. 6, 1892)... Jones (*A. J.* 312) (*Proc. Haverford Coll. Obsy.* 1891, 1892)... Hall (I, II) (*Wash. Obsns.* 1885)... Maw (*Mem. R. A. S.* L, LI, LIII)... Searle (*A. J.* 299)... Glasenapp (III)... Collins (*A. J.* 378)... Comstock (*Pub. Washburn Obsy.* X)... See (*A. J.* 359)... Lv (*A. J.* 382)... Morgan (*A. J.* 439)... Doolittle (*Pub. Flower Obsy.* I)...]

β 1118. η *Ophiuchi*

R.A. 17ʰ 2ᵐ 30ˢ
Decl. — 15° 34′

1889.39	274°.7	0".35	3.4... 3.9	4*n*	β
1890.45	272.1	0.38	...	4*n*	β
1892.40	270.0	0.36	...	3*n*	β
1896.52	259.8	0.38	4.0... 5.0	3*n*	Lv
1897.47	259.1	0.40	...	4*n*	A
1897.48	260.7	0.53	3.8... 3.8	1*n*	See
1898.55	256.7	0.52	...	3*n*	β
1898.28	250.7	0.50	3.5... 4.0	1*n*	A
1899.37	253.8	0.47	3.5... 4.1	4*n*	A

Discovered with the 36-inch. As this star has a proper motion of 0".097 in the direction of 2°.6 (AUWERS), it was certain at the time of discovery that it was a binary system, since the components must be moving together, or it would have been discovered before. So far the relative motion is not as rapid as would be expected in a pair of this class. At present the retrograde movement is about 2° per annum. It is probable that the distance is very nearly maximum.

The following are measures of two distant stars in the field:

AB and C

1898.56	142°.5	93".41	...13	1*n*	β

AB and D

1898.56	288°.6	99".78	...11.5	3*n*	β

[β (XVI)...β (2912,2956,3048,3142)...β (*Pub. L. O.* II)... Lv (*A. J.* 407)... Aitken (3465)... See (3496)... Aitken ( )...]

β 124. Lalande 31224

R.A. 17ʰ 4ᵐ 0ˢ
Decl. — 0° 36′

1874.43	263°.0	0".9±	8 ...10	1*n*	WS
1875.11	253.5	1.12	7.3...10.3	3*n*	J
1879.37	263.2	1.15	8.0...10.5	1*n*	Cin
1881.42	266.3	0.94	7.0...11.0	2*n*	β
1891.71	266.8	0.94	7.2...11.2	2*n*	β
1892.64	267.9	0.85	...	1*n*	Sp

Discovered with the 6-inch. Change is uncertain.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β⁶...β (3114)...β (*Pub. L. O.* II)...J (I)... Wilson and Seabroke (*Mem. R. A. S.* XLIII)... Cin³... Sp (III)...]

β 956. O. Arg. S. 16420

R.A. 17h 4m 10s
Decl. −26° 33′

1880.51	163.1	0.63	8.0 . . . 9.7	2n	β
1893.49	161.1	0.76	8.0 . . . 8.5	1n	W
1897.65	163.3	0.58	7.5 . . . 8.5	1n	See

This difficult pair was suspected with the 6-inch in 1873 at the time of the discovery of β 125, and referred to in the note to the latter pair. It proved to be a very difficult object to verify, although it was examined many times with both the 6 and 18½-inch refractors. Finally in 1880 it was fairly well seen and measured with the larger aperture. This star is 3m 49s *p* and 8′ *s* of the well-known pair, 36 *Ophiuchi*. β 125 is 20′ *s*.

[β (XIII) . . . β3 . . . β (*Mon. Not.* XXXIV, 63) . . . See (3496) . . . Wilson ( ) . . .]

β 125. B.A.C. 5789

R.A. 17h 4m 43s
Decl. −26° 53′

1877.42	62.9	1.74	7.2 . . . 11.0	2n	Cin
1880.51	68.3	1.56	7.9 . . . 10.9	2n	β
1889.47	61.3	1.48	7.9 . . . 10.0	3n	β
1897.65	67.1	1.65	6.6 . . . 10.2	2n	See

Discovered with the 6-inch. Further measures are necessary to show whether or not there is any relative motion. It is 3m 16s *p* and 28′ *s* of 36 *Ophiuchi*. β 956 is 20′ *n*.

[β (III) . . . β (*Mon. Not.* XXXIV, 59) . . . β3 . . . β (2957) . . . β (*Pub. L. O.* II) . . . Cin4 . . . See (3496) . . .]

β 1247. Lalande 31296

R.A. 17h 7m 3s
Decl. −9° 9′

1891.48	345.5	1.62	8.0 . . . 10.3	4n	β
1897.60	339.6	1.39	7+ . . . 10+	3n	A

Discovered with the 36-inch.

[β (XVIII) . . . β (3113) . . . β (*Pub. L. O.* II) . . . Aitken (3465) . . .]

β 282. S.D. (14°) 4585

R.A. 17h 8m 31s
Decl. −14° 27′

1875.41	154.1	4.23	6.7 . . . 11.8	3n	⊿
1879.55	153.2	3.31	7.5 . . . 11.0	1n	Cin
1879.81	154.8	3.94	6.2 . . . 11.6	3n	β
1880.44	153.1	4.25	6.0 . . . 10.5	1n	Cin
1881.42	151.7	4.41	6.6 . . . 11.1	3n	β
1889.42	151.9	4.31	6.3 . . . 11.3	3n	β
1896.57	153.7	4.28	. . .	2n	Hu

Discovered with the 18½-inch. Evidently unchanged. This star, considering its brightness, is singularly missing in some of the star catalogues covering this region. Magnitude in LAMONT 5, GOULD 6.3, and S.D. 6.4. The Cincinnati observers thought the principal star was a close pair. I have examined it many times under favorable conditions with apertures of 15½, 18½, and 36 inches, and am satisfied that it is not double.

[β (V) . . . β (*Mon. Not.* XXXV, 31) . . . β3 . . . β4 . . . β (2957) . . . β (*Pub. L. O.* II) . . . Cin5 . . . Cin6 . . . ⊿ (1) . . . Hussey (*A. J.* 397) . . .]

β 957. Lalande 31341

R.A. 17h 8m 58s
Decl. −10° 10′

1880.16	203.6	0.58	7.9 . . . 7.9	3n	β
1887.74	194.5	0.4±	. .	5n	Sp
1888.54	199.5	0.5±	8.0 . . . 8.0	1n	Lv
1889.50	201.7	0.47	8.2 . . . 8.4	3n	β

Discovered with the 18½-inch. Apparently without change.

[β (XIII) . . . β3 . . . β (2957) . . . β (*Pub. L. O.* II) . . . Sp (III) . . . Lv1 . . .]

β 958. Lalande 31344

R.A. 17h 9m 25s
Decl. −19° 12′

1880.52	221.0	1.38	8.3 . . . 8.8	2n	β
1888.45	216.2	1.37	8.3 . . . 9.2	1n	Lv
1892.39	216.9	1.38	8.3 . . . 8.7	3n	β
1897.66	212.6	1.61	8.5 . . . 9.1	1n	See
1898.44	213.6	1.66	8.7 . . . 9.0	3n	A

Discovered with the 18½-inch. Without sensible change.

[β (XIII)...β¹...β (3142)...β (*Pub. L. O.* II)...Lv¹...See (3496)...Aitken ( )...]

β 44. D.M. (28°) 2697

R.A. $17^h\ 9^m\ 12^s$
Decl. $+28°\ 57'$

1874.98	20°.9	5".51	7.8... 9.5	2*n*	OΣ
1875.01	18.6	5.33	9.2...10.5	4*n*	J
1892.48	19.2	5.54	8.4... 9.5	3*n*	Lv

Discovered with the 6 inch. Unchanged.

[β (I)...β (*Mon. Not.* XXXIII, 351)...OΣ (*Poulkova Obsns.* X)...J (I)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 1119. B.A.C. 5820

R.A. $17^h\ 9^m\ 40^s$
Decl. $-30°\ 2'$

1889.40	355°.8	0".75	7.0... 7.6	3*n*	β
1897.60	357.5	0.54	...	3*n*	A
1897.66	353.7	0.56	7.5... 8.2	1*n*	See

Discovered with the 12-inch.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3465)...See (3496)...]

β 416. *Scorpii* 185

R.A. $17^h\ 10^m\ 47^s$
Decl. $-34°\ 51'$

A and B

1876.52	240°±	1".8±	6.0... 8.0	1*n*	β
1877.53	222.6	1.80	7.0... 8.0	1*n*	Cin
1877.64	224.4	1.97	7 ... 9	1*n*	Rus
1888.72	147.5	1.89	6.0... 7.5	1*n*	β
1889.43	134.1	1.35	6.4... 7.5	3*n*	β
1889.63	131.9	0.97	6 ... 8.5	1*n*	Pol
1890.60	122.0	0.82	...	2*n*	Sel
1891.53	82.3	0.51	6.9... 7.6	3*n*	β
1892.38	24.4	0.58	6.0... 8.3	4*n*	β
1893.55	348.3	0.71	...	5*n*	Sel
1894.56	334.5	1.30	...	5*n*	Bar
1894.57	331.8	0.88	...	7*n*	Sel
1895.60	321.7	0.91	...	2*n*	Com
1895.62	322.2	1.43	6.0... 7.6	3*n*	Sel
1895.74	321.4	0.99	...	1*n*	See
1896.44	314.8	1.45	...	3*n*	A
1896.46	315.4	1.61	...	3*n*	Scott
1896.59	315.8	1.87	6.0... 7.2	4*n*	Sel
1896.60	314.9	1.26	...	1*n*	Com
1897.38	307.0	1.69	7.1... 8.2	1*n*	See
1897.46	309.1	2.00	...	3*n*	A
1897.47	308.8	1.80	...	5*n*	Sc
1897.47	310.2	1.86	...	4*n*	Lehman
1898.35	303.8	1.99	6.5... 7.3	4*n*	A
1899.38	300.2	1.83	6.4... 7.1	4*n*	A

A and C (= H 4935)

1837	130°±	...	...	1*n*	H
1876	130±	...	...10	1*n*	β
1877.64	132.4	...	...	1*n*	Ru
1889.43	128.6	31".03	...10.5	3*n*	β
1891.53	128.8	30.52	...12	3*n*	β
1892.36	129.4	30.55	...12	2*n*	β
1894.61	129.4	30.01	...	1*n*	Bar
1895.58	130.1	30.50	...	1*n*	Com
1897.38	129.3	29.98	...12.8	1*n*	See
1898.41	130.4	30.22	...11.2	2*n*	A

The duplicity of the principal star of the wide pair, $H\frac{I}{A}1935$, was discovered with the 6-inch. This is now known to be one of the most interesting and remarkable systems in the heavens. In the twenty-two years following the discovery of the close pair the companion has passed over an arc of about 300°, and a whole revolution will soon be completed. Several orbits have been computed. The dates in the first column give the last measures used.

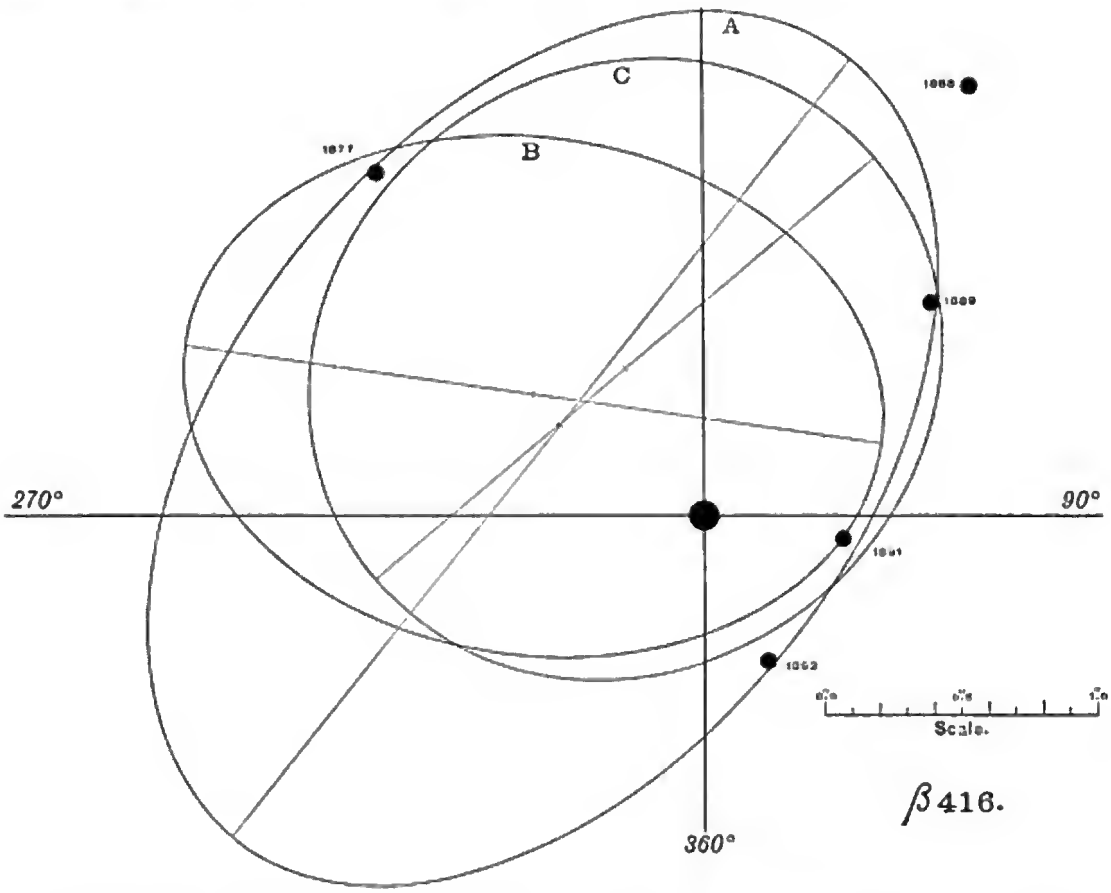
1892	Gore	34.48 years		*Mon. Not.* LIII, 335
1892	Glasenapp	34.85	"	*Ast.&A.-P.* XII, 402
1892	Burnham	24.7	"	*Pub. L. O.* II, 247
1893	Glasenapp	32.23	"	*Proc. Soc. N. S. Wales*, June, 1894
1895	See	33.0	"	*Evolution of the Stellar Systems*, I

The first three orbits, which are based upon the same measures, are shown on the accompanying diagram (marked respectively A, B, and C repro-

duced from *Pub. L. O.* II, pp. 245, 247). It will be seen that the first ellipse best represents the later measures.

This system is of additional interest by reason of its large proper motion of 1".15 in the direction of 98°.1 (PORTER). This movement and the rapid angular motion in connection with the comparatively large apparent distance between the components, suggests the possibility of this system having a considerable parallax. This should be investigated by observers in the southern hemisphere.

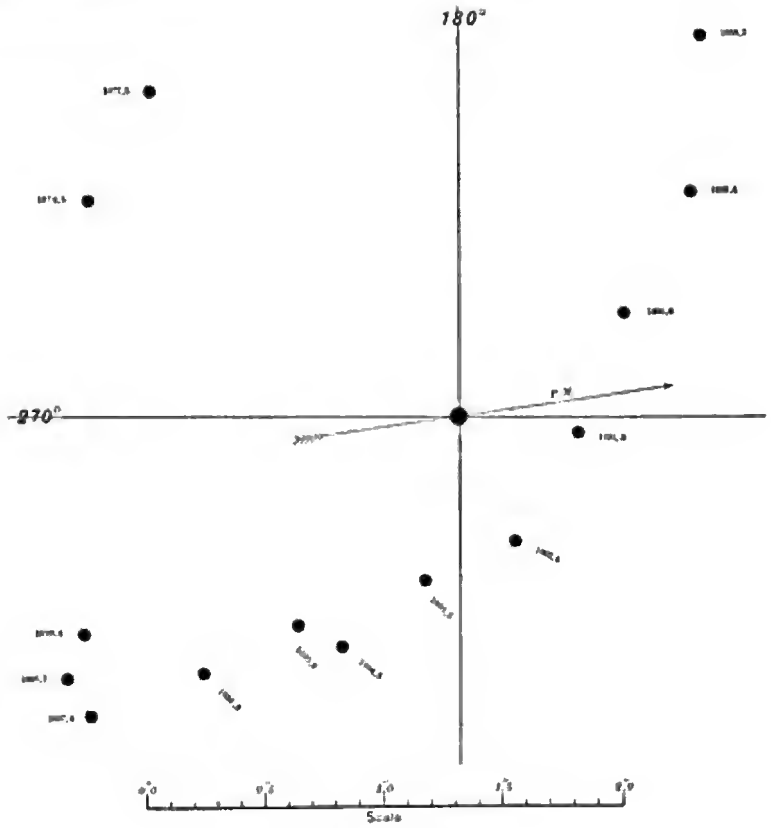
In Fig. 2 I have given the principal measured positions down to 1899. While the general form of the apparent orbit is fairly well indicated, an investigation of this time could give only a provisional value. A revolution will soon be completed, and then a reliable determination of the elements can be made.



The distant star, noted by HERSCHEL at the Cape of Good Hope, was not measured by him, and the angle only estimated from a diagram. The foregoing are all the measures I have found of this star. The measures since 1889 show beyond question that this star is moving in space with the close pair, and that the three form a triple system. SEE measures a 13.2 m star 86°.1 : 55".42 (1897-38) 1*n*.

The principal star is B.A.C. 5825 (= LACAILLE 7215). The different estimates of magnitudes are not very accordant; in B.A.C. 6; GOULD 6.1; YARNALL 7.0; Cape 7.6.

[β (VII)...β (2103,2057,3114,3142)...β (*Pub. L. O.* II)...β (*Sid. Mess.* X, 439) (*Ast. & A.-P.* XII, 792)...Russell (*Pub. Sydney Obsy.* 1871-81)...Cin^{i}...Pollock (*Pub. Sydney Obsy.* 1891) (*Mem. R. A. S.* L)...Sellors (3154,3240,3274, 3303,3369)... Barnard (*A. J.* 447)... Comstock (*Pub. Washburn Obsy.* X)...See (*A. J.* 359,372,378)...See (3496) ...Lehman (*Ast. Soc. Pac.* IX, 141)...Everett (*Mon. Not.* LVI, 404)...Scott (*Brit. Ast. Asso.* VIII, 66) (*Mon. Not.* LIX, 427)...Innes (*A. J.* 385) (*Mon. Not.* LVIII, 90)... Aitken (3396,3465,3585)...Aitken ( )...]



β 416. *Fig. 2.*

β 1200. Lalande 31421

R.A. $17^h\ 11^m\ 5^s$
Decl. $+14^\circ\ 49'$

1890.44	12°.6	1".42	7.8...12.2	3*n*	β
1896.46	14.1	1.21	...	2*n*	Lew

Discovered with the 36-inch. The *p* of two 8 m stars, same declination, and 33" apart; near *a Herculis*.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...]

β 126. Piazzi XVII. 43

R.A. $17^h\ 12^m\ 51^s$
Decl. $-17^\circ\ 38'$

A and B

1875.11	261°.3	1".74	6.4... 7.5	5*n*	J
1877.41	260.6	1.58	6.7... 8.0	2*n*	Cin
1879.27	260.8	1.77	60... 7.0	1*n*	Cin
1879.54	261.3	1.24	6.5... 8.5	2*n*	β
1879.58	261.9	1.81	6.2... 7.5	4*n*	Sp
1884.41	261.5	1.94	7.0... 8.2	2*n*	W
1887.69	261.5	1.59	6.5... 8.0	1*n*	Ho
1888.54	263.4	1.89	6.2... 8.3	2*n*	Lv
1890.50	262.8	2.20	6.1... 7.4	2*n*	Gl
1892.37	262.0	1.67	6.2... 8.5	3*n*	β
1897.29	261.0	2.20	...	2*n*	D
1897.45	262.4	1.66	...	2*n*	Sc

A and C

1879.27	140°.4	11".59	...10.0	1*n*	Cin
1879.54	139.7	11.49	...11.7	2*n*	β
1887.69	138.2	11.12	...12	1*n*	Ho
1892.37	138.9	11.59	...12.0	3*n*	β

The close pair was discovered with the 6-inch, and the third star subsequently added with the 18½-inch. The measures show no change in

either companion. This is a naked-eye star in *Ophiuchus;* GOULD 6.1 m. B.A.C. 5839.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β^1...β (3142)...β (*Pub. L. O.* II)...J (I)...J (2086)...Cin^4...Cin^5...Lv^1... Wilson (Cin^{22})...Sp (II)...Hough (2978)...Glasenapp (I)...Scott (*Brit. Ast. Asso.* VIII, 66)...Doolittle (*Pub. Flower Obsy.* I)...]

β 629. D.M. (32°) 2883

R.A. $17^h\ 13^m\ 0^s$
Decl. $+32°\ 13'$

1878.40	345°.8	0".99	8.3... 9.0	2*n*	β
1890.62	340.9	1.05	...	1*n*	Sp
1891.31	343.8	1.01	8.5... 8.8	3*n*	β
1892.39	343.9	1.02	8.4... 8.7	3*n*	β
1895.56	343.8	0.95	...	1*n*	Sp
1898.65	344.1	0.97	..	2*n*	Bow
1898.70	341.1	1.20	...	2*n*	Bry

Discovered with the 18½-inch. No sensible motion.

[β (X)...β^1...β (3114,3142) (*Pub. L. O.* II)...Sp (III)... Bowyer and Bryant (*Mon. Not.* LIX, 400)...]

β 127. Lalande 31154

R.A. $17^h\ 13^m\ 25^s$
Decl. $-27°\ 13'$

1876.51	95°.3	5".26	8.2... 9.0	2*n*	Cin
1877.53	93.8	5.16	8.5... 9.5	1*n*	Cin
1879.47	93.7	4.85	8.0... 8.5	1*n*	Cin
1890.42	97.1	4.91	8.8... 9.6	2*n*	Gl
1896.52	86.4	5.27	...	2*n*	Sc
1897.49	93.2	4.92	7.8... 8.7	1*n*	Sce
1898.47	93.0	5.04	8.2... 9.5	3*n*	A

Discovered with the 6-inch. Apparently unchanged.

β (III)...β (*Mon. Not.* XXXIV, 59)...Cin^3...Cin^4...Cin^5... Glasenapp (I)...Scott (*Brit. Ast. Asso.* VIII, 66)...Sce (3496)...Aitken (3585)...]

β 45. W° XVII. 315

R.A. $17^h\ 13^m\ 29^s$
Decl. $+32°\ 37'$

1873.47	289°.3	5".04	8.0... 8.5	1*n*	OΣ
1874.43	287.0	4.84	9.0... 9.5	1*n*	WS
1875.05	289.9	4.83	9.7...10.3	4*n*	J
1892.40	289.8	4.98	8.6... 8.8	2*n*	β

Discovered with the 6-inch. No relative motion.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3142)...β (*Pub. L. O.* II)...J (I)...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...OΣ (*Poulkowa Obsns.* X)...]

β 628. W° XVII. 359

R.A. $17^h\ 13^m\ 55^s$
Decl. $+32°\ 47'$

1878.41	365°.6	0".54	9.0... 9.5	1*n*	β
1889.69	358.9	0.4±	...	1*n*	Sp
1892.30	358.6	0.52	8.7... 9.3	3*n*	β
1892.64	362.9	0.5±	...	1*n*	Sp
1895.51	361.5	0.35±	...	1*n*	Sp
1898.71	354.2	0.46	...	1*n*	Br

Discovered with the 18½-inch. This pair, β 45, β 629, and β 630 are all in the same vicinity, and near 68 *Herculis* (OΣ 328).

[β (X)...β^1...β (3142)...β (*Pub. L. O.* II)...Sp (III)...Brown ( )...]

β 630. D.M. (32°) 2891

R.A. $17^h\ 14^m\ 46^s$
Decl. $+32°\ 28'$

1878.40	225°.4	1".66	8.7...10.7	2*n*	β
1892.33	224.8	1.45	8.5... 9.6	3*n*	β
1898.65	225.1	1.42	...	2*n*	Bow
1898.71	221.9	1.55	...	2*n*	Bry

Discovered with the 18½-inch. Apparently no change.

[β (X)...β^1...β (3142)...β (*Pub. L. O.* II)...Bowyer and Bryant (*Mon. Not.* LIX, 400)...]

β 959. *Ophiuchi* 185

R.A. $17^h\ 16^m\ 9^s$
Decl. $+5°\ 7'$

1879.54	254°.7	3".87	7.0...10.0	1*n*	Cin
1879.88	258.7	3.26	7.1...12.0	5*n*	β
1891.48	257.3	3.15	7.2...11.7	5*n*	β
1898.67	256.0	3.53	...	2*n*	Br

Discovered with the 18½-inch. There is no relative motion. LALANDE 31588.

[β (XIII)...β^1...β (3114)...β (*Pub. L. O.* II)...Cin^5...Brown ( )...]

β 1248. D.M. (4°) 3406

R.A. 17h 16m 31s
Decl. + 4° 29′

1891.46	165°.4	8″.49	8.0 ... 9.3	3*n*	β
1897.57	164.4	8.08	8 ... 10	2*n*	A

Discovered with the 36-inch.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Aitken (3465)...]

β 242. Lalande 31610

R.A. 17h 17m 21s
Decl. — 11° 35′

A and B

1875.92	68°.9	0″.96	8.2 ... 9.0	5*n*	J
1879.60	73.6	0.92	8.0 ... 9.0	3*n*	Sp
1888.50	74.0	0.99	8.0 ... 9.3	1*n*	Lv
1892.48	70.9	0.99	8.2 ... 8.7	3*n*	Lv
1898.63	73.4	0.83	...	1*n*	Br

AB and C

1876.01	63°.4	8″.90	... 11.0	4*n*	J
1888.50	64.6	9.66	... 11.2	1*n*	Lv
1892.48	62.0	9.04	... 11.0	1*n*	Lv
1898.63	62.5	9.62	...	1*n*	Br

AB and D

1876.01	63°.8	47″.46	... 10.4	4*n*	J
1892.48	64.8	47.83	... 10.0	1*n*	Lv
1898.63	63.6	47.92	...	1*n*	Br

Discovered with the 6-inch. The measures show no change in any of the companions.

[β (V)...β (*Mon. Not.* XXXV, 31)...J (1)...Sp (II)...Lv[1]...Lv (*A. J.* 278) (*Proc. Haverford Col. Obsy.* 1892)...Brown ( )...]

β 1284. D.M. (15°) 3173

R.A. 17h 17m 38s
Decl. + 15° 1′

1884.61	180°±	1″.5±	8 ... 11		β
1896.53	182.2	1.20	8.0 ... 14	1*n*	Lew
1899.42	180.1	1.23	8.3 ... 11.3	3*n*	β

This pair was discovered with the 18½-inch August 11, 1884, but not included in my catalogues of that time. It was looked for with the 36-inch in 1891 and not found, but it now appears that the declination used was 10° too small. In the measures by Lewis (*Mon. Not.* LIX, 400) this is called β 46. There is no indication of change.

β 46. W[1] XVII. 296

R.A. 17h 18m 7s
Decl. + 13° 31′

1874.43	192°±	2″.7±	8 ... 12	1*n*	WS
1875.01	203.0	2.15	7.7 ... 10.9	4*n*	J
1883.68	201.1	2.00	7.5 ... 11.0	2*n*	Ho
1892.49	202.6	1.91	7.9 ... 11.2	4*n*	Lv
1894.53	203.2	2.15	...	1*n*	Lew
1898.64	205.4	1.98	...	2*n*	Br

Discovered with the 6-inch. Relatively fixed. It is the *p* star of a small equilateral triangle; the *f* star is Σ 2159.

[β (I)...β (*Mon. Not.* XXXIII, 351)...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...J (1)...Hough (2978)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Lewis (*Gr. Obsns.* 1894)...Brown ( )...]

β 128. B.A.C 5879

R.A. 17h 19m 24s
Decl. — 26° 14′

1876.56	327°.3	3″.66	8.0 ... 10.0	1*n*	Cin
1877.50	324.5	4.10	7.5 ... 9.7	2*n*	Cin
1891.56	328.0	4.04	7.7 ... 10.3	3*n*	β
1897.68	322.8	3.97	7.2 ... 10.2	2*n*	See

Discovered with the 6-inch. Probably fixed. It had been previously seen by the Harvard observers, but published long after β (III).

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (3114)...β (*Pub. L. O.* II)...Cin[3]...Cin[4]...*Annals Harvard Obsy.* XIII...See (3496)...]

β 1249. Rumker 5837

R.A. 17h 19m 30s
Decl. + 53° 58′

A and B

1891.43	80°.1	0″.44	8.8 ... 9.0	3*n*	β
1897.71	82.3	0.46	...	1*n*	A
1898.71	82.2	0.49	...	1*n*	Br

AB and C

1891.41	74°.3	62″.46	8.7 ... 8.9	3*n*	β
1898.71	74.6	63.66	...	1*n*	Br

Discovered with the 12 inch. A and C are respectively D.M. (53°) 1938 and D.M. (54°) 1875.

[β (XVIII)...β (3113).. β (*Pub. L. O.* II)...Aitken (*A. J.* 429) ...Brown ( )...]

β 1250. W° XVII. 559

R.A. 17h 20m 19s
Decl. + 30° 52′

1877.26	57°.6	1″.93	10.3...10.8	3*n*	J
1884.65	60.2	1.41	8.7... 8.7	2*n*	Ho
1891.72	63.7	2.02	9.4... 9.5	2*n*	β
1896.99	68.9	2.23	...	2*n*	Lew
1897.58	67.5	1.84	...	2*n*	Bow
1897.71	64.8	1.99	...	3*n*	A
1898.70	64.2	2.26	...	2*n*	Bry
1898.70	65.7	2.18	...	1*n*	Lew

Discovered with the 6-inch May 31, 1876, but not included in my catalogues of new pairs published at that time. It is the *s* star of a small equilateral triangle, all in the field. The magnitude in D.M. is 8.5.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...J (I, p. 347)... Ho (2078)...Aitken (*A. J.* 429)...Lewis, Bryant and Bowyer (*Mon. Not.* LIX, 400)...]

β 129 = β 1120. Piazzi XVII. 100

R.A. 17h 21m 14s
Decl. — 25° 24′

1877.41	100°.2	0″.96	7.5... 8.0	1*n*	Cin
1879.34	98.8	1.09	8.0... 8.0	1*n*	Cin
1880.59	279.4	1.10	7.5... 8.0	3*n*	Sp
1889.14	100.0	0.93	7.0... 7.0	3*n*	β
1890.50	103.3	...	7.2... 8.0	2*n*	Gl
1893.65	100.2	0.86	7½... 7½	2*n*	Sel
1897.57	99.0	0.93	7 ... 7+	3*n*	A
1897.65	106.4	1.02	8 ... 8.4	1*n*	See

Discovered with the 6-inch, and inadvertenty put as new in β (XVI). Apparently without change. This is B.A.C. 5896.

[β (III, XVI)...β (*Mon. Not.* XXXIII, 437)...β (2956). β (*Pub. L. O.* III). Cin4...Cin5. Sp (II)...Glasenapp (1)... Sellors (3240)...Aitken (3465)...See (3496)...]

β 1089. W° XVII. 387

R.A. 17h 23m 22s
Decl. — 5° 48′

1888.64	365°.2	0″.95	6.8...11.0	3*n*	β
1897.52	354.6	0.92	7.0...11.0	3*n*	A

Discovered with the 12-inch. There may be a change in the angle. Lalande 31816.

[(β XV)...β (2929)...β (*Pub. L. O.* II)...Aitken (3465)...]

β 1201. O. Arg. N. 17213

R.A. 17h 26m 37s
Decl. + 67° 52′

1890.49	338°.2	0″.43	7.8... 7.8	3*n*	β
1898.62	340.4	0.43	7.9... 8.0	3*n*	A

Discovered with the 36-inch.

[β (XVII)...β (3047]...β (*Pub. L. O.* II)...Aitken (3585)...]

β 1090. β *Draconis*

R.A. 17h 27m 43s
Decl. + 52° 23′

1889.26	13°.4	3″.07	3 ...14.0	4*n*	β
1890.34	12.8	4.18	...13.8	3*n*	β
1891.31	12.3	4.06	...14.5	3*n*	β
1892.32	13.7	4.04	...13.7	3*n*	β
1898.31	12.2	4.27	...14.0	4*n*	β

The minute attendant to β *Draconis* was discovered with the 36-inch. It is beyond the reach of all but the largest refractors. Auwer's latest value of the proper motion of the bright star is 0″.0196 in the direction of 290°.9. This movement is small, but if the small star was fixed in space, it would increase the position-angle 2°.5 in the interval between 1889 and 1898. The measures do not seem to indicate any such change in the direction of the companion, and the probabilities are that it is moving with the primary.

[β (XV)...β (2929,3038,3114,3142)...β (*Pub. L. O.* II)...]

β 1121. D.M. (12°) 3264

R.A. 17h 31m 52s
Decl. + 12° 36′

1889.14	240°.1	0″.71	8.5... 9.0	3*n*	β
1892.64	242.4	0.69	...	6*n*	Sp
1895.67	236.0	0.61	8.4... 9.5	3*n*	A
1897.00	248.0	0.66	...	2*n*	Lew
1897.56	244.2	0.73	...	2*n*	Bow
1897.71	240.8	0 64	...	3*n*	A

Discovered with the 36-inch. Change uncertain. This is 2m 30s *f* and 2′.5 *s* of α *Ophiuchi*.

[β (XVI)...β (2956)...β (*Pub. L. O* II)...Sp (III)...Aitken (*Ast. Soc. Pac.* VII, 305) (*A. J.* 429)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...]

β 960. Lalande 32122

R.A. 17h 32m 3s
Decl. — 1° 5′

1880.53	294.9	3.18	8.4...11.1	4*n*	β
1891.56	301.2	2.98	8.3...12.4	3*n*	β
1898.52	297.7	3.44	8 0...11.8	3*n*	A
1898.64	294.2	3.54	...	2*n*	Br

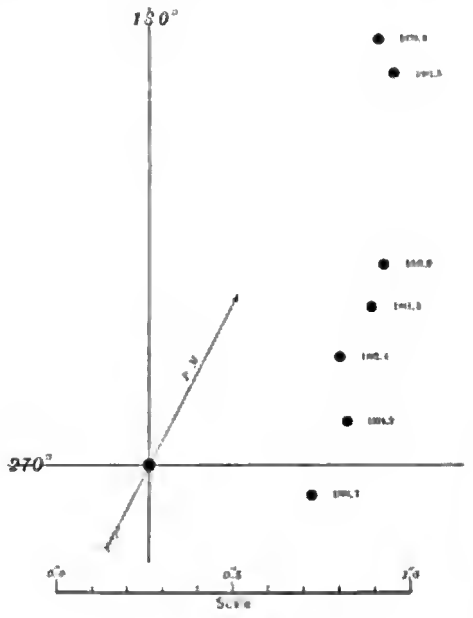
Discovered with the 18½-inch.

[β (XIII)...β²...β (3114)...β (*Pub. L. O.* II)...Aitken (3585)...Brown ( )...]

β 962. 26 *Draconis*

R.A. 17h 33m 45s
Decl. + 61° 58′

1879.39	148.9	1.31	5.5...11.0	1*n*	Cin
1879.97	151.8	1.37	5.5...10.1	4*n*	β
1881.53	148.1	1.31	5.8...10.2	3*n*	β
1889.42	130.1	0.95	...11.0	4*n*	β
1890.37	131.5	0.81	...	3*n*	β
1891.33	125.7	0.78	...11.6	3*n*	β
1892.41	119.9	0.62	...	2*n*	β
1894.19	102.7	0.58	...	1*n*	Bar
1898.70	79.7	0.47	...12.0	1*n*	A



26 Draconis. β 962.

Discovered with the 18½-inch. The principa star has a proper motion of 0″.583 in the direction of 152°.7 (*Bonn Observations*), and it was therefore certain at the time of my second set of measures in 1881, that this was a binary system from the common proper motion of the components. The distance has been steadily decreasing, and it is now (1898) an extremely difficult pair. This is principally due to the great difference in the magnitudes of the stars. It will probably be a very difficult pair to measure for some years. The several positions are shown on the accompanying diagram. Of course it is impossible at this time to say anything about the probable period.

[β (XIII)...β²...β⁴...β (2057, 3048, 3114, 3142)...β (*Pub. L. O.* II)...β (*Sid. Mess.* VIII, 356)...Cin⁵...Barnard (*A. J.* 447)...Aitken ( )...]

β 631. *Ophiuchi* 155

R.A. 17h 33m 47s
Decl. — 0° 35′

1879.55	73.0	0.40	7.0... 7.0	4*n*	β	
1883.34	81.2	0.42	7.0... 7.0	4*n*	Sp	
1884.63	60.0	0.40	...	3*n*	Sp	
1886.65	65.8	0.36	...	7*n*	En	
1887.88	65.3	0.37	... 8.2	2*n*	Sp	
1888.50	57.2	0.43	7.0... 7.0	2*n*	Lv	
1891.58	67.2	0.36	7.5... 7.6	3*n*	β	
1895.68	69.8	0.37	...	1*n*	Lew	
1896.69	33.3	0.97	...	1*n*	Dy	
1898.47	244.3	0.57	7.2.. 7.2	2*n*	Doo	
1898.54	244.0	0.42	7.0... 7.3	2*n*	β	

Discovered with the 18½-inch. A binary in slow retrograde motion. In GOULD 6.4m. Lalande 32200.

[β (X)...β⁶...β³...β (3114)...β (*Pub. L. O.* II)...Sp (II app)...Sp (III)...Engelmann (2786)...Lv⁴....Lv (*Sid. Mess.* VIII, 77)...Lewis and Dyson (*Mem. Not.* LVI, 359; LIX, 400 (*Greenwich Obsns.* 1895)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 961 = β 963. Lalande 32206

R.A. 17h 33m 32s
Decl. + 3° 28′

1880.65	141.4	8.00	6.9...11.5	7*n*	β
1892.37	141.6	8.13	6.9...11.8	3*n*	β

Discovered with the 18½-inch. Two minute stars, more distant, in the same quadrant. In GOULD 7.1 m.

[β (XIII)...β^1...β (3142)... β (*Pub. L. O.* II)...]

β 1251. B.A.C. 5991

R.A. 17h 36m 35s
Decl. + 16° 1'

1884.61	90°±	1".2±	6.0... 9.0	1*n*	β
1891.56	79.0	1.37	6.0...11.5	3*n*	β
1896.51	84.9	1.25	...	1*n*	Lew
1897.58	65.2	1.23	6 ...11+	3*n*	A
1898.48	71.5	1.42	6.2...10.0	3*n*	D
1898.67	69.1	1.41	...	1*n*	Br

This pair was discovered with the 18½-inch at Chicago, but not included in any of the catalogues of new pairs issued at that time. This is a naked-eye star in *Ophiucus;* in D.M. 5m; HEIS 6m; Harvard 5.7m. The *Berlin A. G. Catalogue* gives the principal star a proper motion of 0".121 in the direction of 350°.4 (PORTER 0".115 in 360°.0). The relative change appears to be small, but it is certain that the two stars have a common proper motion and form a physical system.

[β (XVIII)...β (3113)... β (*Pub. L. O.* II)...Aitken (3465)... Lewis (*Mon. Not.* LIX, 400)...Doolittle (*Pub. Flower Obsy.* I)...Brown ( )...]

β 824. D.M. (—1°) 3400

R.A. 17h 42m 41s
Decl. — 1° 50'

1881.40	350°.9	0".67	8.5... 8.6	3*n*	β
1888.54	349.4	0.69	8.8... 8.9	4*n*	Com
1898.67	351.3	0 63	...	1*n*	Br

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^1...Comstock (*Pub. Washburn Obsy.* VI)...Brown ( )...]

β 358. W^s XVII. 1374

R.A. 17h 43m 10s
Decl. + 34° 32'

1879.37	202°.8	4".29	8.2... 9.5	2*n*	Cin
1892.39	206.1	4.22	8.5...10.5	1*n*	β

Discovered with the 6-inch.

[β (VI)...β_2(2062, 3142)...β (*Pub. L. O.* II)...Cin^5...]

β 632. Lalande 32600

R.A. 17h 43m 32s
Decl. + 31° 19'

A and B

1877.97	343°.6	5".46	6.3...12.5	1*n*	β
1882.53	344.0	5.48	7.0...12.0	1*n*	Ho
1892.52	344.5	5.25	7.0...12.5	1*n*	Ho
1899.39	343.9	5.46	...12.7	2*n*	β

A and C (= OΣ 336 *rej.*)

1843.31	164°.0	44".66	...	1*n*	Ma
1866.86	164.9	43.16	6.3...10.3	3*n*	J
1877.97	164.9	42.80	...	1*n*	β
1892.52	164.5	...	...10	1*n*	Ho
1899.39	164.2	42.44	...	3*n*	β

The faint companion to the principal star of this wide pair was detected with the 18½-inch. The three stars seem to be relatively fixed. The magnitude in D.M. is 6.5. All the measures of AC are given.

[β (X)...β^1...Hough (2078, 3234)...J (I)...Madler (*Dorpat Obsns.* XI)...]

β 1122. Cord. G. C. 24248

R.A. 17h 44m 38s
Decl. — 28° 27'

B and C

1889.39	175°.2	1".31	10.4...10.9	3*n*	β
1897.61	170.6	1.47	...	3*n*	A

A and BC (= Howe)

1877.57	10°.3	6".39	8.0...10.0	1*n*	Cin
1880.44	8.7	6.54	8.5... 9.8	2*n*	Cin
1889.39	9.6	6.46	8.7...	3*n*	β
1897.60	10.4	6.41	8 ...12+	2*n*	A

A and D

1897.61	357°.0	12".30	...12+	2*n*	A

The duplicity of HOWE'S companion was discovered with the 12-inch. There seems to be no change in its position with reference to the principal star. The fourth star, D, was added by AITKEN with the 12-inch.

[β (XVI)... β (2956)... β (*Pub. L. O.* II)...Cin^4...Cin^5... Aitken (3466)...]

β 1123. Cord. G. C. 24262

R.A. 17h 45m 20s
Decl. — 34° 42′

1889.48	212°.8	0″.58	7.4 . . . 7.8	4*n*	β
1897.64	220.4	0.27	6.9 . . . 7.2	2*n*	See
1898.49	207.6	0.45	7.2 . . . 7.2	2*n*	A

Discovered with the 12-inch. In the large cluster, *Messier* 7.

[β (XVI) . . . β (2956) . . . β (*Pub. L. O.* II) . . . See (3496) . . . Aitken (3585) . . .]

β 964. Radcliffe 3775

R.A. 17h 47m 39s
Decl. + 48° 26′

1879.27	329°.2	0″.97	7.5 . . . 12.5	1*n*	β
1893.67	328.9	1.02	7.5 . . . 11.8	2*n*	W

Discovered with the 18½-inch.

[β (XIII) . . . β¹ . . . Wilson ( ) . . .]

β 130. 90 *Herculis*

R.A. 17h 49m 24s
Decl. + 40° 2′

1875.52	123°.0	1″.82	5.9 . . . 9.2	6*n*	J
1879.47	118.6	1.76	. . .	1*n*	β
1879.56	121.6	1.74	6.0 . . . 9.2	2*n*	OΣ
1881.46	122.2	1.90	6.0 . . . 9.7	4*n*	β
1886.08	130.0	1.78	6.0 . . . 10.3	6*n*	En
1888.42	123.3	1.67	5.7 . . . 9.0	3*n*	T
1889.67	121.5	1.63	. . .	4*n*	Maw
1898.47	121.8	1.70	5.5 . . . 7.7	2*n*	D

Discovered with the 6-inch; a beautiful pair, even with a small aperture. The components have a striking difference in color—*golden* and *blue*. The bright star has a proper motion of 0″.064 in the direction of 5°.1 (Auwers). If the small star was fixed in space, the movement of A during the interval covered by the measures would increase the position-angle of the companion 27°.4 and its distance 1″. The measures show no sensible change, and there is little doubt of its being a physical system.

[β (II) . . . β (*Mem. Not.* XXXIII, 437) . . . β¹ . . . β¹ . . . OΣ (*Pond. Anon. Obsns.* X) . . . . J (I) . . . J (2086) . . . Engelmann (2780) . . . Tarrant (2991) . . . Maw (*Mem. R. A. S.* L, 75) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 417. Lalande 32939

R.A. 17h 52m 13s
Decl. + 39° 27′

1877.37	270°.2	1″.58	8.1 . . . 10.0	4*n*	J
1889.66	270.9	1.43	. . .	3*n*	Maw
1898.65	273.1	1.54	. . .	2*n*	Br

Discovered with the 6-inch. In the field with Σ 2246.

[β (VII) . . . β (2103) . . . Maw (*Mem. R. A. S.* L, 75) . . . Brown ( ) . . .]

β 633. γ *Draconis*

R.A. 17h 53m 49s
Decl. + 51° 30′

A and B

1878.38	152°.1	20″.88	2.4 . . . 13.0	2*n*	β
1879.80	151.6	20.94	. . . 13.2	2*n*	β
1889.25	151.3	21.10	. . . 12.5	3*n*	β
1898.30	151.3	20.92	. . . 13.2	2*n*	β

A and C

1878.38	227°.1	47″.89	. . . 12.5	1*n*	β
1898.34	230.2	45.73	. . . 13.5	1*n*	β

A and D

1878.38	13°.7	56″.68	. . . 12.5	1*n*	β
1898.34	10.4	57.33	. . . 13.0	1*n*	β

A and E

1898.30	234°.8	97″.54	. . . 11.5	2*n*	β

A and F

1879.27	116°.3	124″.77	. . . 10.8	1*n*	β
1898.27	116.5	125.52	. . . 11.5	1*n*	β

A and G

1898.27	28°.0	139″.24	. . . 11.5	1*n*	β

The minute companion to γ *Draconis* was discovered with the 18½-inch. This star has a proper motion of 0″.028 in the direction of 214°.6 (Auwers). This is very nearly in the direction of B, and, in the twenty years covered by the measures, should diminish the distance of that star 0″.5 if it is not moving with the large star. The measures do

not show any change in the distance, and the two are probably moving together.

[β (x)...β^1...β^2...β (*Ast. & A.-P.* XIII, 1).. β (2930)...β (*Pub. L. O.* II)...]

β 283. B.A.C. 6088

R.A. $17^h\ 54^m\ 38^s$
Decl. $-22°\ 47'$

A and B

1878.86	239°.3	8".05	6.0...12.5	3*n*	β
1892.39	238.6	8.17	6.0...13.0	2*n*	β
1895.54	237.7	8.45	6.1...13.0	3*n*	A

A and C

1892.39	34°.4	14".10	...14	1*n*	β

The nearest companion was discovered with the 18½-inch, and the other added with the 36-inch. This is a naked-eye star in *Sagittarius*, about 15′ *n* of the trifid nebula.

[β (v)...β (*Mem. Not.* XXXV, 31)...β^1...β^2...β (3142)... β (*Pub. L. O.* II)....Aitken (*Ast. Soc. Pac.* VII, 305)...]

β 1124. 67 *Ophiuchi*

R.A. $17^h\ 54^m\ 38^s$
Decl. $+\ 2°\ 56'$

A and B

1889.39	195°.6	6".79	5 ...14.8	3*n*	β
1898.54	195.8	6.72	...	1*n*	β

C and D (= β 634)

1878.57	129°.2	8".46	9.0...13.0	1*n*	β
1889.40	129.6	8.40	8.3...11.5	2*n*	β
1898.54	128.7	8.16	...	1*n*	β

A and C (= Sh 255)

1823.41	143°.1	55".23	5.6... 9	1*n*	Sh
1849.94	142.7	54.47	4.2... 8.0	3*n*	OΣ
1875.59	142.8	54.83	4.2... 7.6	4*n*	J
1878.57	143.0	54.70	5.6... 9.0	1*n*	β
1886.34	142.9	54.29	4.4... 8.1	7*n*	En
1889.40	143.6	54.54	...	2*n*	β

A and E

1878.57	179°.8	45".94	...12	1*n*	β
1898.54	178.0	45.66	...	1*n*	β

The companion to A was discovered with the 36-inch, and the companion to C with the 18½-inch. The wide stars AC = H V1. 2 = Sh 255 = OΣ (app) 162. These stars appear to be relatively fixed. The principal star has a small proper motion, 0".027 in the direction of 257°.5 (AUWERS). The measures of B hardly cover a sufficient time to show whether or not that star is moving with the primary.

[β (x, XVI)...β^1...β (2956)...β (*Pub. L. O.* II)...]

The principal measures of AC are given. The following relate to the old components:

[J (I)...Engelmann (2786)....*Annalen Königsberg Sternwarte* XVII...Powell (*Mem. R. A. S.* XXV)...*Radcliffe Obsns.* XXI, XXXVIII...OΣ (*Poulkova Obsns.* X, p. 36)...]

β 47. Lalande 32978

R.A. $17^h\ 54^m\ 52^s$
Decl. $-10°\ 14'$

1875.74	268°.3	1".84	8.9...10.9	4*n*	J
1891.61	273.8	1.37	8.0...10.8	3*n*	β
1893.82	273.0	1.46	...	5*n*	Sp
1895.63	277.1	1.46	8.0...10.4	3*n*	A
1896.55	273.2	1.64	8.1...10.8	3*n*	Lv

Discovered with the 6-inch. It is a difficult pair with that aperture.

[β (1)...β (*Mem. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...J (1)...Sp (III)...Aitken (*Ast. Soc. Pac.* VII, 305) ...Lv (*A. J.* 407)...]

β 1202. D.M. (3°) 3564

R.A. $17^h\ 55^m\ 33^s$
Decl. $+\ 3°\ 32'$

A and B

1890.48	353°.1	0".74	8.2... 9.3	3*n*	β
1892.65	356.8	0.65	...	2*n*	Sp
1895.56	362.5	0.60	...	1*n*	Sp
1897.73	346.3	0.82	...	3*n*	A
1899.26	355 8	0.58	8.5... 9.0	1*n*	β

C and D

1890.48	93°.2	3".91	9.4...11.3	3*n*	β
1899.26	94.6	3.87	9.5...11.5	1*n*	β

AB and C

1890.47	28°.2	103".87	...	4*n*	β
1899.26	28.1	103.85	...	1*n*	β

AB and E

1890.47	138°.5	90".32	8.7 ... 8.5	4*n*	β
1899.26	138.2	90.14	... 8.5	1*n*	β

Discovered with the 36 inch. A and E are respectively Lamont 2849 and 2852, but the declination of the latter should be 1′ more. There is a 13m star, from C, 145°.0 ; 15".8.

[β (XVII)...β (3048)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429) ...Sp (III)...]

β 1125. 68 *Ophiuchi*

R.A. 17h 55m 40s
Decl. + 1° 19′

1889.39	14°.9	1".01	5.1 ... 9.9	5*n*	β
1890.47	19.7	0.91	5.0 ... 8.7	3*n*	β
1892.37	22.0	0.89	5.0 ... 9.2	4*n*	β
1894.13	14.9	0.78	...	4*n*	Sp
1897.51	10.5	0.99	5.0 ...10.0	3*n*	A
1898.52	15.3	0.86	... 9.0	3*n*	β
1898.53	16.6	1.02	5.2 ...10.0	3*n*	A

Discovered with the 36-inch. The proper motion of the large star is very small, 0".012 in the direction of 256°.6 (AUWERS). The relative change is slow, but there is not much doubt of these stars forming a physical system.

SCHIAPARELLI finds the principal star a close pair, and from a single measure gives, 320°.0 : 0".3± (1892.66). There are no other observations of this, and I have had no opportunity to examine it under sufficiently favorable conditions since receiving recently the measures of Sp. It would seem to be a triple of extraordinary interest.

[β (XVI)...β (2056,3048,3142)...β (*Pub. L. O.* II)...Aitken (3466,3585)...]

β 635. D.M. (1°) 3565

R.A. 17h 56m 41s
Decl. + 1° 37′

A and B

1878.07	114°.5	1".58	9.0 ...10.0	2*n*	β
1891.55	116.3	1.40	9.4 ...11.4	2*n*	β
1898.50	117.7	1.56	9.2 ...10.5	3*n*	A
1898.65	116.7	1.49	...	2*n*	Br

A and C

1891.55	121°.8	69".31	... 8.1	2*n*	β
1898.50	122.2	69.41	... 9.5	3*n*	A
1898.65	122.1	69.20	...	2*n*	Br

Discovered with the 18½-inch. There may be some change in the angle of AB. C is D.M. (1°) 3566. The magnitudes of A and C in the D.M. are respectively 9.0 and 8.7.

[β (8)...β"...β (3114)...β (*Pub. L. O.* II.)...Aitken (3585)... Brown ( )...]

β 1126. Yarnall 7599

R.A. 17h 56m 53s
Decl. — 24° 15′

A and B

1889.40	55°.6	0".63	8.7 ... 9.5	4*n*	β
1899.51	58.3	0.67	8.1 ... 9.5	2*n*	A

AB and C (= H 5009)

1837.70	20°.8	2".±	10 ...12	1*n*	H
1879.47	19.7	3.89	8.0 ... 9.0	1*n*	Cin
1880.58	19.9	3.86	9.0 ... 9.5	1*n*	Cin
1889.40	23.3	4.05	... 9.6	4*n*	β
1899.51	21.2	3.87	8.2 ... 9.5	4*n*	A

The principal star of H 5009 was found to be a close pair with the 36-inch. This is in the cluster, *Messier* 8, and is described by HERSCHEL as "the star *y* in the monograph of M 8" (*Cape Observations*). The above are all the measures of C.

[β (XVI]...β (2056)...β (*Pub. L. O.* II)...Cin5...Cin6... Aitken ( )...]

β 825. Lalande 33157

R.A. 17h 58m 20s
Decl. + 25° 22′

A and B

1881.37	197°.7	11".41	8.4 ...13.0	3*n*	β
1888.66	193.1	11.52	8.0 ...11.7	2*n*	Com
1889.47	194.6	11.20	...11.5	3*n*	β
1891.44	194.8	11.46	...13.0	2*n*	β
1898.38	194.1	11.85	8.0 ...12.0	5*n*	D

A and C (= Σ 2268 = S 699)

1829.70	218°.2	18".13	8.0...	9.0	2*n*	Σ
1866.52	214.0	19.32	8.1...	9.0	6*n*	J
1881.37	212.5	20.08	8.4...	8.8	3*n*	*β*
1889.47	211.6	20.00	8.5...	8.8	4*n*	*β*
1891.44	211.4	20.24	8.3...	8.5	2*n*	*β*
1898.38	210.7	20.63	...		5*n*	D

B and C

1891.44	232°.2	9".82	...	2*n*	*β*
1898.48	231.0	9.30	...	3*n*	D

The faint star nearly midway between the components of Σ 2268 was discovered with the 15½-inch at the Washburn Observatory. The change in AC is evidently due to the proper motion of one of these stars. Assuming that this is the principal star, the measures give a movement of about 0".05 in the direction of 350°.

[*β* (XII)...*β*^{6}...*β* (2957,3114)...*β* (*Ast. & A.-P.* XIII, 17)...*β* (*Pub. L. O.* II'... Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* I)...]

A few of the measures of AC are given. All will be found by the following references:

Madler (*Fixstern-Systeme* I) (*Dorpat Obsns.* XI, XIII, XV)... J (II)...J (1572)...Sp (II)...Bigourdan (*Paris Obsns.* 1883)...Gledhill, Wilson and Seabroke (*Mem. R. A. S.* XLII, XLVIII)...Pritchett (*Pub. Morrison Obsy.* I)...Glasenapp (IV)...]

β 1127. Groombridge 2500

R.A. 17^{h} 58^{m} 59^{s}
Decl. + 11° 14'

1889.53	144°.7	0".80	7.8...	9.7	3*n*	*β*
1895.65	147.4	0.86	7.8...	10.2	3*n*	A
1897.71	130.5	0.88	...		3*n*	A
1897.75	147.0	0.57	...		1*n*	Lew
1898.61	139.6	0.74	...		1*n*	Bow
1898.70	135.6	0.76	...		1*n*	Lew

Discovered with the 12-inch. Change is still uncertain. The magnitude in D.M. is 6.5, and in RADCLIFFE 7.2.

[*β* (XVI)...*β* (2956)...*β* (*Pub. L. O.* II)...Aitken (*A. J.* 429) (*Ast. Soc. Pac.* VII, 305)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...]

β 243. O. Arg. S. 19762

R.A. 18^{h} 0^{m} 55^{s}
Decl. − 22° 17'

A and B

1878.58	125°.8	0".84	8.0...	8.7	2*n*	Cin
1881.58	123.3	0.76	8.2...	8.2	3*n*	*β*
1897.65	124.1	0.52	7.9...	8.3	1*n*	See
1898.52	125.4	0.92	7.9...	8.0	3*n*	D

A and C

1898.52	56°.5	40".17	...	9.0	3*n*	D

Discovered with the 6-inch. Evidently unchanged.

[*β* (V)...*β* (*Mon. Not.* XXXV, 31)...*β*^{4}...Cin^{4}...Cin^{5}...See (3496)...Doolittle (*Pub. Flower Obsy.* I)...]

β 244. Lalande 33188

R.A. 18^{h} 1^{m} 1^{s}
Decl. − 27° 53'

1876.56	261°.1	2".06	8.0...	9.0	1*n*	Cin
1877.55	255.5	2.22	8.0...	9.0	2*n*	Cin
1880.58	257.3	2.01	...		1*n*	Cin
1881.59	258.2	2.03	8.0...	9.8	3*n*	*β*
1892.54	257.9	2.04	8.0...	10.3	2*n*	Lv
1897.63	257.6	2.38	7.0...	9.0	3*n*	See

Discovered with the 6-inch. Probably fixed.

[*β* (V)...*β* (*Mon. Not.* XXXV, 31)...*β*^{3}...Cin^{3}...Cin^{4}...Cin^{6}...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... See (3496)...]

β 418. O. Arg. N. 17817

R.A. 18^{h} 1^{m} 28^{s}
Decl. + 64° 26'

1879.29	227°.9	14".33	8.2...	12.0	1*n*	*β*
1893.44	228.4	14.60	8.0...	12.2	3*n*	W
1899.32	227.8	14.60	8.5...	11.5	1*n*	*β*

Discovered with the 6-inch. No sensible change. There is an error of 180° in the angle as printed in *β* (VII).

[*β* (VII)...*β* (2103)...*β*^{3}...Wilson ( )...]

β 636. Lalande 33280

R.A. 18h 2m 4s
Decl. + 2° 12′

A and B

1878.62	127.0	4.92	7.0...12.2	2n	β
1885.51	127.9	5.12	...	2n	HΣ
1892.55	123.2	4.60	7.5...12.0	2n	Ho
1898.31	124.0	4.70	7.2...13.0	2n	β
1898.52	123.6	4.73	7.2...12.0	5n	D
1898.67	126.0	4.66	...	1n	Br

A and C

1898.34	99.8	15.08	...14	1n	β

Discovered with the 18½-inch; the distant star with the 40-inch.

[β (X)...β¹...Hough (3231)...Doolittle (*Pub. Flower Obsy.* I)...HΣ ( )...Brown ( )...]

β 826. D.M. (9°) 3566

R.A. 18h 2m 5s
Decl. + 9° 45′

1881.57	341.1	0.60	9.6... 9.7	3n	β
1893.52	333.2	0.59	9.8... 9.9	2n	Lv
1893.57	150.9	0.78	9.5... 9.6	1n	W
1896.70	331.5	0.71	9.5... 9.5	2n	A

Discovered with the 15½-inch at the Washburn Observatory. Change is doubtful. There is a 7m star 5′.3 n.

[β (XII)...β¹...Lv (*A. J.* 382)...Wilson ( )...Aitken (3396)...]

β 245. *Sagittarii* 46

R.A. 18h 2m 21s
Decl. − 30° 45′

1868.67	366.6	4.17	6 ... 8.5	1n	Hd
1874.50	354.8	3.5±	6.0...10.0	4n	β
1877.53	352.1	4.02	6.0... 9.0	1n	Cin
1888.53	361.9	4.11	6.0... 8.5	1n	Lv
1890.65	351.8	2.99	6 ... 8	1n	Sel
1892.52	353.3	3.98	6.4... 8.9	2n	Lv
1893.66	350.4	3.87	6 ...10	3n	Sel
1894.58	352.7	3.93	...	4n	Sc
1897.50	353.6	4.67	6.1... 9.5	1n	See

Discovered with the 6-inch. The subsequently published observations of the Harvard Observatory show that it had been seen there previously. There is probably no change. This star is B.A.C. 6145.

β (V)...β (*Mon. Not.* XXXV, 31)...*Annals Harvard Obsy.* XIII ...Cin⁴...Lv⁴...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Sellors (3154,3240)...Scott (*Brit. Ast. Assn.* VI, 249)...See (3496)...]

β 759. Cord. G. C. 24739

R.A. 18h 3m 49s
Decl. − 39° 22′

A and B

1887.30	122.0	2.13	8.5... 9.0	3n	Pol
1889.40	121.4	1.81	8.9... 9.1	3n	β
1896.65	119.7	1.76	8.3... 9.2	3n	See

A and C (= H 5028)

1835.5	152.5	15±	9 ... 9	2n	H¹
1886.60	148.7	15.27	... 9	1n	Pol
1889.40	147.3	14.92	... 9.0	3n	β
1896.67	149.7	15.43	... 9.5	1n	See

The duplicity of the principal star of HERSCHEL's pair was discovered with the 6-inch at Mt. Hamilton in 1879. C is Cord. G. C. 24740.

[β (XI)...β¹...β (2057)...β (*Pub. L. O.* II)...Pollock (*Pub. Sydney Obsy.* 1891) (*Mon. Not.* XLVII, 473) (*Mem. R. A. S.* L)...See (3496)...Herschel (*Cape Obsns.*)...]

β 637. W° XVIII, 28

R.A. 18h 3m 54s
Decl. + 3° 6′

1878.64	195.2	7.26	6.5...12.5	1n	β
1885.54	193.1	6.96	...	3n	HΣ
1891.64	194.9	7.33	6.4...12.1	2n	β
1898.51	194.4	7.01	7.0...13.2	3n	β
1898.52	191.8	7.55	6.0...12.2	2n	D

Discovered with the 18½-inch. The principal star has a considerable proper motion:

Boss	0.185 in 166.0
Porter	0.179 in 180.0

It is obvious from the measures that the companion is moving with it, as otherwise in the time

covered by the measures the position-angle would be 13°.6 more and the distance 3″.3 less than at the date of the first measures in 1878. The magnitude in ARGELANDER and HEIS is 6; GOULD 6.2.

[β (x)...β²...β (3114)...β (*Pub. L. O.* II)...HΣ ( )... Doolittle (*Pub. Flower Obsy.* I)...]

β 132. B.A.C. 6158

R.A. 18ʰ 4ᵐ 7ˢ }
Decl. − 19° 52′ }

	°	″			
1875.02	240.1	0.78	6.8... 7.2	4n	Δ
1875.91	238.9	0.75	6.8... 7.2	3n	Sp
1877.41	230.4	...	7.0... 7.0	2n	Cin
1881.58	237.0	0.79	7.3... 7.3	3n	β
1887.53	229.4	0.64	...	2n	Sp
1888.49	233.2	1.01	7.7... 8.1	2n	Lv
1891.51	230.5	0.83	7.3... 7.3	3n	β
1892.52	227.8	0.89	7.2... 7.3	2n	Lv
1892.64	228.7	1.00	6.7... 7.0	2n	T
1895.54	222.4	0.77	7.0... 7.3	3n	A
1896.50	224.5	0.94	7.0... 7.2	3n	Lv
1897.60	224.0	...	...	2n	Sc

Discovered with the 6-inch. The measures appear to show slow retrograde motion.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β⁴...β (3114)...β (*Pub. L. O.* II)...Δ (I)...Δ (2086)...Sp (2133)...Sp (II, app.) ...Cin⁴...Sp (III)...Lv¹...Lv (*A. J.* 278, 407) (*Proc. Haverford Coll. Obsy.* 1892)...Tarrant (3186)...Aitken (*Ast. Soc. Pac.* VII, 305)...Scott (*Mon. Not.* LIX, 427)...]

β 638. D.M. (2°) 3516

R.A. 18ʰ 4ᵐ 19ˢ }
Decl. + 2° 34′ }

B and C

	°	″			
1878.62	10.5	1.71	9.0...11.8	2n	β
1893.50	5.5	1.48	9.2...12.2	4n	Lv
1898.50	7.3	1.77	9.2...11.4	4n	D
1898.67	6.3	1.75	...	1n	Br

A and B (= Σ 2287 *rej.*)

	°	″			
1863.63	150.8	22.22	...	1n	Hl
1878.62	152.0	22.33	9.0...	1n	β
1893.35	153.0	22.07	9.0...	1n	W
1893.51	152.0	21.86	8.4...	3n	Lv
1898.50	151.4	22.01	9.4...	4n	D
1898.67	151.8	22.40	...	1n	Br

The wide pair was rejected by Σ in *Mensurae Micrometricae*. The smaller component was found to be double with the 18½-inch. The measures show no change. The above are all the measures of AB.

[β (x)...β¹...Lv (*A. J.* 382)...Doolittle (*Pub. Flower Obsy.* I) ...Hall (*Wash. Obsns.* 1863) (I, p. 134)...Wilson ( ) ...Brown ( )...]

β 292. μ *Sagittarii*

R.A. 18ʰ 6ᵐ 35ˢ }
Decl. − 21° 5′ }

A and C

	°	″				
1878.51	118.7	25.20		...	1n	β
1892.57	117.4	23.73		...13	1n	Ho
1897.73	120.7	25.98		...14	1n	See
1899.55	119.0	25.92		...13.5	1n	β

A and B (= H 5035)

	°	″				
1836.50	259.9	16.08		...	1n	Lam
1877.66	258.4	17.23	4	...10.0	3n	Cin
1878.42	259.2	16.91		...	1n	β
1879.37	257.7	16.66		...11.0	1n	β
1879.48	258.0	16.80	4	...12.0	1n	Cin
1880.53	259.3	17.12	5	... 9.0	1n	Cin
1892.56	258.6	17.12	4.5	...11.2	2n	Lv
1892.57	257.8	16.37	5	...11.0	1n	Ho
1897.71	258.1	17.24	6	...12.5	3n	See

A and D (= H 2822)

	°	″				
1830	313.8	45±		...10	1n	H²
1847.3	312.9	48.57		...		Jac
1879.36	312.1	48.32		... 9.5	1n	β
1890.46	312.0	48.70		... 9.5	2n	Gl
1892.56	312.8	48.63		... 9.5	1n	Lv
1892.57	311.9	48.78		...10	1n	Ho

A and E

	°	″				
1830	115.2	40±		...10	1n	H²
1847.3	115.4	50.54		...		Jac
1879.36	115.4	50.13		... 9.5	1n	β
1890.46	114.6	49.43		... 9.6	2n	Gl
1892.56	116.0	49.96		... 9.7	1n	Lv
1892.57	114.8	50.02		...10	1n	Ho

The faint star C, between A and E, was noted with the 26-inch at Washington. The bright star has a proper motion of 0″.019 in the direction of

272°.9 (Auwers). This is too small to say with certainty whether or not the companions have the same movement.

[β (v)...β (*Mon. Not.* xxxv, 31)...β^1...β^1...Ho (3234)... See (3496)...Jacob (*Mem. R. A. S.* xvii)...Lamont (*Analen Konigsberg Sternwarte* xviii)...Cin^4...Cin^5... Cin^6...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ...Wilson and Seabroke (*Mem. R. A. S.* xlii, xliii) ...Glasenapp (1)...]

β 131. Lalande 33443

R.A. 18h 6m 42s
Decl. — 15° 38′

A and B

1875.01	278°.5	2″.71	7.2... 9.2	4*n*	Δ
1877.41	277.8	2.66	7.5...10.0	1*n*	Cin
1880.45	278.0	2.63	7.8... 9.8	1*n*	Lv
1880.53	279.7	2.58	8.0... 9.5	2*n*	β
1880.58	279.6	2.71	...	1*n*	Cin
1892.53	280.2	2.76	8.0... 9.5	2*n*	Lv
1892.57	278.5	2.60	7.5...10	1*n*	Ho
1898.63	279.4	2.80	7.3...10.0	3*n*	Cg

A and C

1880.53	278°.7	7″.13	...11.6	2*n*	β
1892.57	278.5	7.02	...13	1*n*	Ho
1898.63	283.7	7.40	...12.2	2*n*	Cg

The close pair was discovered with the 6-inch, and in measuring that, the third star C was added with the 18½-inch. So far there is no evidence of change.

[β (III)...β (*Mon. Not.* xxxiv, 59)...β^1...Δ (1)...Δ (2086) ...Cin^4...Cin^5...Lv^3...Lv... (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Hough (3234)... Cogshall ( )...]

β 286. 16 *Sagittarii*

R.A. 18h 8m 4s
Decl. — 20° 25′

1878.57	218°.5	5″.67	6.0...13.0	3*n*	β
1891.63	216.0	6.03	6.0...12.0	2*n*	β
1897.73	217.2	6.22	6.0...14.9	1*n*	See
1898.66	213.5	5.93	6.2...13.2	3*n*	Bd

Discovered with the 26-inch at the Naval Observatory. Auwers gives the proper motion of A 0″.029 in the direction of 241°. If the small star was fixed in space, the effect of the movement would be to decrease the distance of B. The reverse of this appears to be shown by the measures, and it is probable that the components are moving together.

[β (v)...β (*Mon. Not.* xxxv, 31)...β^1...β (3114)...β (*Pub. L. O.* 11)...See (3496)...Boothroyd ( )...]

β 1091. Lalande 33592

R.A. 18h 8m 35s
Decl. + 38° 34′

1888.78	38°.1	0″.53	8.6... 8.6	2*n*	β
1896.69	25.4	0.66	...	1*n*	Lew
1898.60	29.8	0.45	8.4... 8.4	5*n*	A

Discovered with the 12-inch. Change in the angle is probable.

[β (xv)...β (2929)...β (*Pub. L. O.* 11)...Lewis (*Mon. Not.* lix, 400)...Aitken (3585)...]

β 284. Lalande 33525

R.A. 18h 9m 13s
Decl. — 19° 2′

A and B

1890.51	358°.2	19″.22	7.3...10.5	2*n*	Gl
1891.63	359.8	17.96	7.2...10.9	2*n*	β
1898.67	359.3	17.84	7.3...11.0	3*n*	Cg

A and C

1891.63	87°.0	31″.29	...10.8	2*n*	β
1898.67	86.6	29.75	...10.8	3*n*	Cg

A and *a*

1891.63	199°.7	11″.95	...11.0	2*n*	β
1898.67	199.6	11.83	...11.5	3*n*	Cg

A and *b*

1891.63	66°.6	22″.09	...10.8	2*n*	β
1898.67	66.1	21.15	...10.8	3*n*	Cg

B and *c*

1891.63	328°.9	5″.04	...11.9	2*n*	β
1898.67	327.2	5.03	.. 11.5	3*n*	Cg

These faint companions were noted with the 18½-inch. GLASENAPP measures from A three more distant stars:

1890.51	192.°1	57.″32	...8.8	2*n*
1890.51	179.6	76.01	...8.9	2*n*
1890.51	268.5	138.87	...9.6	2*n*

COGSHALL measures a 13.5 m star from A, 102.°9 : 17.″53 (1898.67) 1*n*.

[β (v)...β (*Mon. Not.* XXXV, 31)...β (3114)...β (*Pub. L. O.* II)...Glasenapp (1)...Cogshall ( )...]

β 285. O. Arg. N. 17953

R.A. 18ʰ 9ᵐ 26ˢ
Decl. −25° 3′

A and B

1874.66	317.°2	1.″5±	8.0...11.0	1*n*	β
1877.59	316.4	1.47	8.5...10.0	1*n*	Cin
1880.47	315.7	1.75	8.8... 9.7	1*n*	β
1880.60	324.2	...	8.0...10.0	1*n*	Cin
1893.55	319.1	1.57	7.5... 9.8	1*n*	Lv
1893.70	316.1	1.61	9.0...11.0	1*n*	W
1897.67	321.4	1.49	8.2...10.0	1*n*	See
1898.68	318.3	1.51	8.2...10.7	1*n*	Bd
1898.75	318.6	1.63	... 9.8	3*n*	D

C and D

1880.47	20.°7	1.″65	9.5...10.5	1*n*	β
1893.70	16.9	2.24	9.5...11.5	1*n*	W
1897.67	21.7	1.31	9 ...12	1*n*	See
1898.68	18.8	2.32	...11.7	1*n*	Bd
1898.75	18.0	1.99	...11.1	3*n*	D

A and C

1880.47	141.°0	59.″66	...	1*n*	β
1890.50	140.8	60.41	8.2... 8.7	2*n*	Gl
1893.70	141.0	60.05	...	1*n*	W
1898.68	140.5	59.76	8.2... 9.0	2*n*	Bd
1898.75	141.1	60.15	8.3... 8.8	3*n*	D

C and E

1893.70	115.°6	30.″72	...12.0	1*n*	W

This pretty quadruple was discovered with the 18½-inch. C is O. Arg. N. 17954.

[β (v)...β (*Mon. Not.* XXXV, 31)...β¹...Cin⁴...Cin⁶...Lv (*A. J.* 382)...Wilson ( )...See (3396)...Doolittle (*Pub. Flower Obsy.* 1)...Boothroyd ( )...Glasenapp (1)...]

β 760. η *Sagittarii*

R.A. 18ʰ 9ᵐ 30ˢ
Decl. −36° 48′

A and B

1879.67	99.°9	2.″83	3 ...11.5	2*n*	β	
1886.71	99.5	4.36	4 ...11	1*n*	Pol	
1889.41	107.0	3.51	...11.4	4*n*	β	
1895.72	99.2	3.60	5 ... 9.9	3*n*	Sel	
1896.46	101.2	3.65	3.4...11+	2*n*	A	
1897.38	105.3	3.87	3.5...10	2*n*	See	

A and C

1896.48	276.°2	33.″34	...13+	2*n*	A

A and D

1879.66	302.°2	94.″38	...	2*n*	β
1889.41	302.8	93.22	...10	2*n*	β
1896.47	303.8	93.14	...	3*n*	A

Discovered with the 6-inch at Mt. Hamilton in 1879. The measures at that time are subject to error in distance. There is probably no material change in the close star. The bright star has a proper motion of 0.″126 in the direction of 288.°4, according to the *Second Washington Catalogue*, and B appears to be moving with it. If fixed in space, the distance at the last measures would be 2.″2 more than at the time of discovery. The faint star, C, was noted by AITKEN with the 36-inch. The proper motion of A substantially accounts for the change in the position of the distant star, D.

[β (XI)...β¹...β (2957)...β (*Pub. L. O.* II)...Pollock (*Pub. Sydney Obsy.* 1891) (*Mon. Not.* XLVII, 473) (*Mem. R. A. S.* L)...Aitken (3396)...Sellors (3369)...See (3496)...]

β 246. Cord. G. C. 24920

R.A. 18ʰ 10ᵐ 34ˢ
Decl. −19° 43′

1875.49	108.°6	0.″42	8.0... 8.0	6*n*	β
1877.57	101.4	...	8.0... 8.2	1*n*	Cin
1878.52	107.0	...	8.0... 8.5	1*n*	Cin
1880.47	102.9	0.49	7.8... 7.8	1*n*	β
1881.59	110.0	0.47	8.1... 8.1	3*n*	β
1881.61	117.3	0.47	8.0... 8.0	3*n*	Sp
1891.63	105.6	0.51	8.2... 8.2	2*n*	β
1898.67	107.9	0.51	8.0... 8.5	1*n*	Cg

This difficult pair was discovered with the 6-inch. There is no evidence of relative motion. The magnitude in GOULD is 7½.

[β (v)...β (*Mon. Not.* xxxv, 31)...β^3...β^4...β (3114)...β (*Pub. L. O.* II)...β (I)...Cin^4...Cin^5...Sp (II)...Cogshall ( )...]

β 463. S.D. (16°) 4797

R.A. $18^h\ 10^m\ 44^s$
Decl. $-16°\ 54'$

1876.61	100°±	1.3±	9.0... 9.3	1*n*	β
1888.71	104.2	2.18	10.0...11.0	4*n*	Com
1896.50	101.3	2.22	9.0... 9.8	3*n*	Lv

Discovered with the 6-inch.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...Comstock (*Pub. Wash. Obsy.* VI)...Lv (*A. J.* 407)...Glasenapp (II)...]

β 299. Lalande 33598

R.A. $18^h\ 10^m\ 48^s$
Decl. $-18°\ 51'$

A and B (= Sh 263)

1823.53	12°.1	54".30	7 ...10	2*n*	Sh
1879.46	11.5	54.32	7.0... 8.5	1*n*	Cin
1891.64	12.4	53.69	6.9... 7.7	2*n*	β
1899.55	12.6	54.16	...	1*n*	β

B and *c*

1891.64	131°.9	10".44	...13.5	2*n*	β

A and *f*

1891.65	66°.0	29".42	...13.5	2*n*	β

A and *h*

1891.65	327°.9	22".04	...	1*n*	β

A and *e*

1891.65	22°.1	22".20	...	1*n*	β

e and *d*

1891.65	125°.3	7".11	12.9...12.9	2*n*	β
1899.55	124.1	8.27	12.5...12.8	1*n*	β

g and *h*

1891.65	317°.4	8".39	13.0...13.5	1*n*	β

The faint stars near this wide pair of SOUTH and HERSCHEL were noted with the Washington 26-inch. All the measures of AB are given.

[β (v)...β (*Mon. Not.* xxxv, 31)...β (3114)...β (*Pub. L. O.* II)...Cin^5...]

β 639. Lalande 33642

R.A. $18^h\ 11^m\ 40^s$
Decl. $-18°\ 40'$

A and B

1878.66	155°.3	0".57	7.2... 7.7	2*n*	β
1883.12	137.9	0.35	7.5... 7.5	2*n*	Sp
1891.65		Single 19-inch			β
1892.36		Single 36-inch			β
1898.50		Elongated 355° ?		2*n*	D
1898.58		Uncertain		1*n*	A
1899.49	210° ?	Less than 0".1		2*n*	A

C and D (= β 300)

1891.65	325°.5	8".30	....13.5	2*n*	β
1898.50	322.4	7.55	...13.7	2*n*	D
1899.20	323.3	8.07	7.0...13.8	3*n*	A

AB and C (= Sh 264)

1823.45	52°.6	16".42	7 ... 8	1*n*	Sh
1862.72	51.5	16.83	7.2... 8.7	1*n*	Hl
1877.60	52.2	17.37	7.2... 8.0	2*n*	Cin
1878.66	51.7	17.30	... 8.0	2*n*	β
1879.27	51.4	17.40	6.0... 8.0	1*n*	Cin
1883.29	51.3	17.15	... 8.0	3*n*	Sp
1890.50	51.2	16.67	7.2 .. 7.7	2*n*	Gl
1891.65	52.4	17.21	7.1... 7.7	2*n*	β
1893.58	52.5	16.95	...	2*n*	Sc
1898.49	52.0	17.31	6.9... 7.7	3*n*	D
1899.03	52.0	17.27	6.9... 7.0	2*n*	A

The faint star, D, was detected with the Washington 26-inch in 1874, and subsequently the principal star of the wide pair was found to be a close pair with the 18½-inch. If the distance in 1874 had not been less than at the time of discovery in 1878, I could hardly have missed it with the larger instrument. It is evidently in rapid motion. It was an easy pair in 1878, and entirely beyond the reach of the 36-inch under fine conditions in 1892.

The foregoing are all the measures of the SOUTH and HERSCHEL pair. These stars are evidently fixed.

[β (v, x)...β (*Mon. Not.* xxxv, 31)...β[1]...β (3114.3142)... β (*Pub. L. O.* II)...β (*A. J.* 271)...Sp (II)...Doolittle (*Pub. Flower Obsy.* I)...Aitken ( )...Hall (*Wash. Obsns.* 1862)...Cin[a]...Cin[b]...Glasenapp (I) (*A. J.* 241) ...Scott (*Brit. Ast. Assn.* v, 75; vi, 250)...]

β 1274. B.A.C. 6216

R.A. 18h 12m 35s
Decl. + 56° 33'

B and C

1892.37	147.1°	0.88"	9.8...10.6	3n	β
1898.63	146.2	1.16	10.7...11.6	4n	A

B and D

1878.85	5.0°	5.63"	11.0...11.2	2n	β
1892.37	8.5	5.03	...10.4	3n	β
1898.63	8.2	5.01	...10.8	4n	A

A and B

1878.85	239.5°	96.08"	7.0...	2n	β
1892.35	239.1	95.61	6.4...	2n	β
1898.62	239.4	96.10	6.0...	3n	A

The wide double companion BD was noted with the 18½-inch in 1878, and the brighter of the two found to be a close pair with the 36-inch in 1892.

[β (xix)...β (3141)...β (*Pub. L. O.* II)...β[1]...β[2]...Aitken (3585)...]

β 48. Lalande 33729

R.A. 18h 13m 55s
Decl. — 19° 43'

1874.86	360.0°	2.33"	8.0...10.0	3n	Δ
1877.58	358.7	2.17	8.0... 9.5	1n	Cin
1880.58	360.6	2.36	9.0... 9.5	1n	Cin
1886.30	358.8	2.51	9.0... 9.0	1n	LM
1892.56	360.2	2.17	8.2...10.2	1n	Lv
1898.72	362.5	2.26	8.0...10.7	3n	Bd

Discovered with the 6 inch. Without change.

[β (II)...β (*Mon. Not.* xxxiii, 351)...Δ (I)...Cin[a]...Cin[b]... LM...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) .. Boothroyd ( )...]

β 1252. Lalande 33818

R.A. 18h 15m 55s
Decl. — 11° 55'

1876.70	182.4°	1.21"	8.0... 9.0	3n	Δ
1891.46	182.7	1.23	8.4... 9.1	3n	β
1898.49	181.3	1.29	8.4... 9.7	3n	D

Discovered with the 18½-inch June 22, 1875, but inadvertently omitted from my published catalogues of that time. There seems to have been no change.

[β (xviii)...β (3113)...β (*Pub. L. O.* II)...Δ (I, p. 347)... Doolittle (*Pub. Flower Obsy.* I)...]

β 640. *Herculis* 443

R.A. 18h 16m 3s
Decl. + 27° 28'

1878.91	346.2°	2.37"	7.5...12.2	2n	β
1884.91	340.6	2.49	...	3n	HΣ
1892.38	341.1	2.20	8.0...11.5	1n	β
1893.66	338.4	2.38	7 ...13	1n	Ho

Discovered with the 18½-inch. Later measures are needed. Lalande 33880.

[β (x)...β[1]...β[2]...β (3142)...β (*Pub. L. O.* II)...Hough (3234)...HΣ ( )...]

β 641. Lalande 33897

R.A. 18h 16m 42s
Decl. + 21° 27'

1878.68	356.4°	1.07"	8.2... 9.0	1n	Δ
1880.12	349.2	1.00	7.1... 9.0	5n	β
1884.22	347.4	1.01	...	3n	HΣ
1886.29	345.0	1.10	7.3... 9.1	8n	En
1890.45	345.9	1.01	7.3... 9.0	3n	β
1890.71	357.1	1.02	...	2n	Maw
1891.01	351.6	0.87	...	4n	Sp
1891.79	355.9	0.94	...	1n	Maw
1892.81	357.5	0.62	7.5... 9.0	1n	Highton
1894.77	355.0	...	...	1n	Highton
1894.77	358.4	...	...	1n	Seabroke
1896.61	336.5	1.31	...	1n	Dyson
1896.62	346.5	0.92	...	4n	Lew
1897.53	349.5	1.04	...	2n	Lew
1897.70	342.3	0.97	...	3n	A

Discovered with the 18½-inch. Apparently there is change in angle.

[β (x)...β^{2}...β^{3}...β (3048)...β (*Pub. L. O.* II)...Δ (1)... Engelmann (2786)...Sp (III)...Seabroke and Highton (*Mem. R. A. S.* LI)...Maw (*Mem. R. A. S.* L)...Aitken (*A. J.* 429)...Lewis and Dyson (*Mon. Not.* LIX, 400)... IIΣ ( )...]

β 49. O. Arg. S. 18155

R.A. 18h 17m 3s
Decl. — 19° 38′

1875.19	49°.1	7″.82	8.0...11.3	3*n*	Δ
1877.66	47.2	7.86	8.0...11.0	1*n*	Cin
1880.52	44.8	...	...	1*n*	Cin
1892.55	46.0	8.39	8.3...10.7	3*n*	Lv
1897.70	45.5	8.31	7.5...11.8	2*n*	See
1898.47	46.5	8.10	8.0...10.0	3*n*	A
1898.50	44.6	8.08	8.4... 9.8	3*n*	D

Discovered with the 6-inch. AITKEN measures from A two more distant stars:

301°.3	21″.73	...12 5	1898.47
148.3	24.20	...12.0	

[β (1)...β (*Mon. Not.* XXXIII, 351)...Δ (1)...Cin^{4}...Cin^{6}... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsv.* 1892)...See (3496)...Doolittle (*Pub. Flower Obsv.* 1)...Aitken (3585)...]

β 1203. *Serpentis* 191

R.A. 18h 19m 57s
Decl. + 0° 43′

1890.67	67°.8	0″.30	7.5... 7.7	3*n*	β
1892.40	66.8	0.32	7.0... 7.2	1*n*	β
1893.77	48.0	0.25 ±	...	1*n*	Sp
1896.74	72.6	0.43	...	1*n*	Lew
1899.46	72.0	0.31	7.0... 7.3	3*n*	A

Discovered with the 36-inch. Lalande 34015.

[β (XVII)...β (3047,31421...β (*Pub. L. O.* II)...Sp (III)... Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...]

β 965. S.D. (17°) 5196

R.A. 18h 20m 2s
Decl. — 17° 15′

1880.60	105°.6	1″.57	8.1...11.8	3*n*	β
1898.60	105.3	1.60	8.1...12.5	3*n*	A
1898.63	106.4	1.44	8.3...11.8	3*n*	D

Discovered with the 18½-inch. Relatively fixed.

[β (XIII)...β^{3}...Aitken (3585)...Doolittle (*Pub. Flower Obsv.* 1)...]

β 133. B.A.C. 6261

R.A. 18h 20m 15s
Decl. — 26° 42′

1875.66	265°.3	1″.80	7.5... 7.5	4*n*	Sp
1876.54	85.5	1.77	7.0... 7.5	1*n*	Cin
1877.53	261.9	1.96	7.0... 7.0	1*n*	Cin
1878.97	263.0	1.72	6.7... 6.7	3*n*	Cin
1888.52	264.7	1.80	5.8... 6.2	2*n*	Lv
1890.49	267.5	2.07	7.0... 7.1	2*n*	Gl
1892.64	264.4	1.79	7.5... 7.5	2*n*	T
1893.65	260.5	1.37	7.0... 7.0	2*n*	Sel
1895.46	260.5	2.10	...	2*n*	Bar
1897.50	259.3	1.75	7½... 7½	3*n*	Sc
1897.68	258.7	1.74	7.5... 8.0	2*n*	See

Discovered with the 6-inch. Very little, if any, change. The β star of a small equilateral triangle of 7 m stars, about 1° 20′ *s* of λ *Sagittarii*. GOULD gives this 6.8 m.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Sp (II)...Sp (2133)... Cin^{1}...Cin^{4}...Cin^{5}...Lv^{1}...Glasenapp (1)...Tarrant (3186)...Sellors (3240)...Barnard (*A. J.* 447)...See (3496)...Scott (*Mon. Not.* LIX, 427)...]

β 264. D.M. (27°) 3023

R.A. 18h 21m 43s
Decl. + 27° 16′

1874.72	360°±	8″±	8.5...12	1*n*	β

This was noted with the above description with the 9.4-inch of the Dartmouth College Observatory. I could not see this with the 12-inch in 1891, nor recently with the 40-inch. There is no doubt of the identity of the star. It is described in the original catalogue as 1m 29s *f* Σ 2315. It was noted as "excessively faint" with the 9.4-inch, and it is possible that the companion has no real existence.

[β (V)...β (*Mon. Not.* XXXV, 31)...]

β 464. W. XVIII. 476

R.A. 18h 21m 45s
Decl. + 6° 29′

1877.17	111°.3	1″.20	8.5... 9.5	2*n*	Δ
1891.61	108.2	1.03	8.6... 9.7	3*n*	β
1898.53	108.4	1.12	8.9... 9.8	3*n*	D

Discovered with the 6-inch. There is a third star 11 m, 90° : 25″. In a low-power field with OΣ 350.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β (3114)...β (*Pub. L. O.* II)...J (1)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 134. O. Arg. N. 18233

R.A. 18h 21m 59s
Decl. + 46° 49′

1861.32	138°.9	1″.24	7.2... 9.2	2*n*	OΣ
1875.18	133.7	1.07	7.9... 9.8	4*n*	J
1879.47	136.1	0.95	8.0...10.0	1*n*	β
1896.52	137.3	1.15	7.7... 9.7	3*n*	Lv
1896.74	127.4	1.08	...	1*n*	Lew
1898.62	135.3	1.04	...	2*n*	Bow
1898.64	138.4	1.13	...	2*n*	Bry

Discovered with the 6-inch, but it had been seen before at Poulkowa, and is OΣ 543, one of the subsequently published additions to the Poulkowa Catalogue (*Poulkowa Observations*, Vol. IX). There is no change in the components.

[β (III)...β (*Mon. Not.* XXXIV, 50)...β[1]...OΣ (*Poulkowa Obsns.* IX)...J (1)...Lv (*A. J.* 407)...Lewis, Bowyer and Bryant (*Mon. Not.* LIX, 418)...]

β 1128. B.A.C. 6285

R.A. 18h 23m 12s
Decl. — 33° 4′

1877.53	204°.8	2″.41	6.0...12.0	1*n*	Cin
1889.42	198.6	3.17	6.1...11.5	3*n*	β
1892.56	201.0	...	6.0...11.0	1*n*	Lv

When this pair was found with the 12-inch, its identity with one of HOWE's, discovered in 1877 at Cincinnati, was overlooked. The *Cape Catalogue* gives the principal star a proper motion of 0″.07 in the direction of 180°. If this is correct, and the small star is fixed in space, its distance from the primary should decrease annually by nearly this amount.

[Cin[4]...β (XVI)...β (2956)...β (*Pub. L. O.* II)...Howe (Cin[4])...Lv (*Proc. Haverford Coll. Obsy.* 1892)...]

β 966. B.A.C. 6301

R.A. 18h 25m 25s
Decl. — 19° 3′

B and C

1880.61	120°.2	0″.62	9.0... 9.5	3*n*	β
1898.68	120.6	0.70	8.0... 9.5	1*n*	A
1898.75	120.5	0.72	9.8...10.2	4*n*	Cg

A and BC

1880.58	252°.8	66″.34	6.7...	3*n*	β
1898.68	252.9	66.82	6.5...	1*n*	A
1898.75	252.7	66.62	7.0...	3*n*	Cg

Discovered with the 18½-inch. This is the principal star in the cluster, MESSIER 25. In HEIS 6–7 m; GOULD, 7¼; B.A.C. 7. There is a wide pair of small stars in the field *sp* measured in Cin[5]; 173°.0 : 10″.96 : 8.0...8.5 (1879.39) 1*n*. GLASENAPP measures a very distant 7.4 m star from A, 254°.2 : 430″.66 (1893.66) 2*n*.

[β (XIII)...β[7] (pp. 196, 299)...Aitken (3585)...Cogshall ( )...]

β 247. Lalande 34253

R.A. 18h 25m 36s
Decl. — 9° 27′

1875.43	167°.4	7″.62	7.8...11.2	3*n*	J
1878.54	166.9	7.70	8.0...11.5	1*n*	Cin
1880.59	169.0	7.42	7.0...10.0	1*n*	Cin
1888.56	167.9	7.99	6.5...10.8	2*n*	Lv
1891.66	166.8	7.69	...	2*n*	Col

Discovered with the 6-inch. Without change.

[β (V)...β (*Mon. Not.* XXXV, 31)...J (1)...Cin[5]...Cin[6]...Lv[2]...Collins (*Proc. Haverford Coll. Obsy.* 1891)...]

β 419. Lalande 34259

R.A. 18h 25m 42s
Decl. — 7° 55′

1877.03	57°.6	1″.22	8.5... 9.2	3*n*	J
1888.52	56.6	1.32	8.0...10.0	2*n*	Lv
1898.51	46.9	1.54	7.6... 8.9	3*n*	D

Discovered with the 6-inch. Change?

[β (VII)...β (2103)...J (1) ..Lv[1]...Doolittle (*Pub. Flower Obsy.* 1)...]

β 420. W° XVIII. 722

R.A. 18h 25m 53s
Decl. + 37° 5'

A and B

1873.13	277°.0	1".45	9.7...11.0	4*n*	J
1880.44	277.4	1.64	8.5...10.2	2*n*	β
1893.44	276.6	1.80	8.8...10.5	3*n*	W

A and C

1880.42	198°.1	21".58	...11.0	1*n*	β
1893.41	200.5	21.42	...11.5	3*n*	W

Discovered with the 6-inch.

[β (VII)...β (2103)...β^3...J (1)...Wilson ( )...]

β 642. S.D. (10°) 4718

R.A. 18h 26m 45s
Decl. − 10° 32'

1878.50	91°.5	4".11	9.0...11.0	1*n*	β
1891.62	91.4	4.14	8.9...10.9	3*n*	β

Discovered with the 18½-inch. One of the principal stars in the cluster, DREYER 6649.

[β (X)...β^3...β (3114)...β (*Pub. L. O.* II)...]

β 1253. *Lyrae* 28

R.A. 18h 28m 15s
Decl. + 30° 28'

1891.38	156°.3	7".44	6.2...13.5	3*n*	β
1898.75	157.1	7.31	6.0...13.2	3*n*	A

Discovered with the 36-inch. This is the naked-eye star in *Lyra*; HEIS 6.5m; Harvard 5.7. Lalande 34418. KUSTNER gives this star a proper motion of 0".015 in the direction of 350°.2.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 643. Lalande 34138

R.A. 18h 29m 41s
Decl. + 4° 50'

A and B

1878.23	338°.2	8".86	...12.5	3*n*	β
1891.67	336.3	9.27	...12.7	3*n*	β
1898.49	334.5	9.39	...12.5	1*n*	D
1898.53	335.8	9.59	...12.5	3*n*	A

A and C (= Σ 2342)

1830.71	11°.9	26".91	5.7... 8.5	4*n*	Σ
1865.58	9.3	28.07	6.5... 8.9	5*n*	J
1877.63	9.2	28.88	...	7*n*	Jed
1891.67	7.3	29.12	... 8.7	3*n*	β
1898.49	7.1	29.35	6.5... 8.0	1*n*	D
1898.53	7.0	29.28	6.0... 8.2	3*n*	A

The nearest companion was detected with the 18½-inch. The change in STRUVE'S star is evidently due to the proper motion of A. The measures of AC in 1830 and 1898 give this as 0".05 in the direction of 144°, and this movement accounts for the change in AB. There was a time when these two stars were separated by a distance of about 2".

[β (X)...β^1...β^3...β (3114)...β (*Pub. L. O.* II)...β (*Ast. & A.-P.* XIII, 16)...Doolittle (*Pub. Flower Obsy.* I)...Aitken (3585)...]

There are many measures of the wide pair, of which enough are given to show the character and extent of the relative motion. All the measures will be found in the following:

(Madler (*Fixstern-Systeme* I) (*Dorpat Obsns.* XI, XIII, XV)...Herschel (*Mem. R. A. S.* VI, XXXVIII)...J (1573)...J (II)...Jedrzejewicz (2369)...Gledhill, Wilson and Seabroke (*Mem. R. A. S.* XLII, XLVIII)...Glasenapp (III)...]

β 135. Lalande 34476

R.A. 18h 31m 16s
Decl. − 14° 6'

1875.08	184°.0	2".45	6.7...11.5	4*n*	J
1878.49	186.6	...	6.7...11.5	1*n*	Cin
1879.59	183.9	2.27	7.0...12.0	1*n*	β
1882.47	187.3	2.49	7.0...11.0	1*n*	W
1886.44	185.8	...	7.5...12.5	1*n*	LM
1892.52	187.1	...	8.0...12.0	1*n*	Lv
1893.54	187.6	2.24	7.0...12.5	2*n*	Lv
1893.67	188.8	2.26	7.0...12.0	2*n*	W

Discovered with the 6-inch. Very difficult with that aperture. Probably without material change. The distance in my single measure in 1879 is erroneously reduced in β^3. It should be as given above.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β^3...J (1)...Cin^5...Wilson (Cin^{62})...LM...Lv (*A. J.* 278, 382) (*Proc. Haverford Coll. Obsy.* 1892)...Wilson ( )...]

β 967. S.D. (14°) 5152

R.A. 18h 34m 5s
Decl. — 14° 36′

1880.54	195°.8	2″.44	8.0...11.1	4*n*	β
1888.45	196.9	...	8.0...11.2	1*n*	Lv
1893.54	191.1	2.33	7.8...11.8	3*n*	Lv
1893.60	200.2	2.25	8.5...11.0	1*n*	W
1898.50	194.4	2.21	7.9...10.5	3*n*	D
1898.73	198.3	2.43	8.2.. 12.5	3*n*	Bd

Discovered with the 18½ inch. Probably unchanged. The magnitude in S.D. is 8.3.

[β (XIII)...β¹...Lv¹...Lv (*A. J.* 382)...Wilson ( )... Doolittle (*Pub. Flower Obsy.* I)...Boothroyd ( )...]

β 50. D.M. (39°) 3475

R.A. 18h 34m 9s
Decl. + 39° 29′

A and B

1892.38	6°.9	21″.96	8.5...13.0	1*n*	β
1899.42	8.7	21.36	9.5...12.5	1*n*	β

A and C

1892.38	330°.0	73″.06	...	1*n*	β
1899.42	329.9	73.52	...	1*n*	β

C and D

1892.38	167°.2	5″.85	9.5...11.0	1*n*	β
1899.42	168.0	6.44	10 ...11	1*n*	β

Distant double companion noted with the 6-inch. Of no special interest as a double star.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3142)...β (*Pub. L. O.* II)...]

β 136. W¹ XVIII. 893

R.A. 18h 37m 0s
Decl. + 5° 37′

1874.84	8°.0	4″.39	9.2... 9.7	3*n*	Δ
1892.54	7.7	4.68	9.0... 9.2	2*n*	Lv
1899.44	6.8	4.60	8.7... 9.0	1*n*	β

Faint pair noted with the 6-inch. In D.M. 8.6 m. It is 49° *p* and 6′ *s* of OΣ 361.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Δ (1)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 645. *Herculis* 475

R.A. 18h 38h 1m
Decl. + 19° 21′

1877.52	304°.0	9″.9	7.0...12.0	1*n*	β
1877.74	307.3	9.03	7.0...12.0	1*n*	Δ
1883.57	305.0	9.22	...	2*n*	HΣ
1896.58	303.6	9.53	7.3...11.8	3*n*	Lv
1898.69	304.9	9.92	7.7...11.7	3*n*	D

Discovered with the 18½-inch. In my single measure the distance was noted as uncertain, and Δ found it very difficult. On the whole there is no evidence of change. Lalande 34772.

[β (X)...β¹...Δ (1)...Lv (*A. J.* 407)...Doolittle (*Pub. Flower Obsy.* I)...HΣ ( )...]

β 1254. W¹ XVIII. 935

R.A. 18h 38m 52s
Decl. — 13° 48′

1875	80°±	2″.5±	8.0...12.0	2*n*	β
1889.67	74.5	2.43	8.0...12.0	2*n*	Ho
1891.50	78.2	2.67	8.2...11.0	6*n*	β
1897.58	73.7	2.35	8.0...11.0	3*n*	A

Discovered with the 18½-inch in 1875, but inadvertently omitted from the catalogues of new pairs of that time. It was found independently and subsequently published by Hough (= Ho 438).

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Hough (3234) ...Aitken (3466)...]

β 968. ζ *Lyrae*

R.A. 18h 40m 38s
Decl. + 37° 29′

A and B

1889.43	48°.7	26″.93	...15.7	2*n*	β
1898.63	50.7	27.04	...14.7	3*n*	A

A and C

1880.50	275°.4	43″.37	...13.2	2*n*	β
1898.63	273.1	45.55	...14.0	3*n*	A

A and D (= Σ 38 App. 1)

1835.23	149°.7	43".71	4.2...	5.5	5*n*	Σ
1840.71	150.0	43.79	...		3*n*	OΣ
1868.20	149.6	43.69	4.1...	5.8	6*n*	J
1878.23	149.6	44.11	...		10*n*	Jed
1880.49	149.6	43.48	...		2*n*	β
1889.43	149.3	43.73	...		2*n*	β

A and E

1880.49	304°.1	61".66		...11.4	1*n*	β
1898.63	302.8	61.79		...13.0	3*n*	A

The small stars, C and E, were discovered with the 18½-inch, and subsequently a still fainter and nearer companion was detected with the 36-inch.

There is no suggestion of motion in the old companion (= H I V. 2 = Sh 279 = Σ38 App 1 = OΣ (App) 173) since the measures of STRUVE in 1835. AUWERS gives the proper motions of these stars:

A = 0".027 in 37°.1
D = 0.029 in 23.8

The measures indicate a common proper motion. It will have to be determined hereafter whether or not the faint stars share in this movement.

[β (XIII)...β^3...β (2957)...β (*Pub. L. O.* II)...β (*Observatory* IV, 18)...Aitken (3585)...]

A few only of the measures of AD are given. All will be found in the following references:

[OΣ (*Poulkowa Obsns.* X)...J (II)...Dawes (*Mem. R. A. S.* XXXV)...Herschel (*Mem. R. A. S.* V)...Plummer (*Oxford Obsns.* No. 1)...*Radcliffe Obsns.* XXI, XXV, XXVII, XXXV, XXXVIII...Ball (*Dunsink Obsns.*, Part V)...Hall (*Wash. Obsns.* 1886) (II)...Hunt (*Observatory* III, 605)...Jedrzejewicz (2340)...Tarrant (2866)...Franz (3080)...Maiebekto (*Double Star Measures* 1892)...Glasenapp (II, III, IV)...]

β 465. D.M. (56°) 2130

R.A. 18h 41m 39s
Decl. + 56° 45'

1877.29	292°.8	3".15	9.0...	11.0	2*n*	J
1891.59	295.4	3.12	8.4...	10.5	3*n*	β
1895.64	292.8	3.13	8.1...	10.4	3*n*	A

Discovered with the 6 inch. Fixed.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β (3114)...β (*Pub. L. O.* II)...Aitken (*Ast. Soc. Pac.* VII, 305)...]

β 51. D.M. (39°) 3523

R.A. 18h 41m 42s
Decl. + 39° 34'

B and C

1898.56	297°.5	6".13	10.2...	11.2	3*n*	D

A and B

1898.56	185°.2	74".65	9.0...		3*n*	D

Unimportant triple a short distance *f* ε *Lyrae;* noted with the 6-inch.

[β (I)...β (*Mon. Not.* XXXIII, 351)...Doolittle (*Pub. Flower Obsy.* I)...]

β 969. S.D. (8°) 4726

R.A. 18h 43m 49s
Decl. — 8° 3'

1880.51	236°.6	14".33	7.0...	11.9	4*n*	β
1892.38	238.0	14.11	7.0...	11.8	1*n*	β
1892.56	238.3	14.79	7.5...	11.6	2*n*	Lv
1898.70	237.6	14.26	7.2...	11.5	3*n*	Cg

Discovered with the 18½-inch. Probably fixed. The principal star is No. 219 of *Schjellerup's Catalogue of Red Stars.*

[β (XIII)...β^3...β (3142)...β (*Pub. L. O.* II)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1802)...Cogshall ( )...]

β 970. S.D. (8°) 4729

R.A. 18h 44m 15s
Decl. — 8° 8'

1880.58	107°.3	1".43	8.3...	11.2	4*n*	β
1892.38	107.9	1.54	8.3...	10.7	1*n*	β
1898.72	106.8	1.44	8.5...	11.7	3*n*	Cg

Discovered with the 18½-inch. In S.D. 8.8 m. It is closely *f* the last pair.

[β (XIII)...β^3...β (3142)...β (*Pub. L. O.* II)...Cogshall ( )...]

β 971. *Draconis* 205

R.A. $18^h\ 44^m\ 24^s$
Decl. $+49^\circ\ 18'$

1879.39	350.1	...	8.0...	8.0	1*n*	Cin
1879.88	354.7	0.54	6.5...	8.5	2*n*	β
1891.48	364.5	0.36	6.8...	9.2	3*n*	β
1893.54	107.0	0.25±	...		2*n*	Lv
1894.61		Single, 36 inch			2*n*	Bar
1897.43	11.6	0.30	...		1*n*	Lew
1898.70	5.2	0.36	6.5...	9.0	1*n*	A

Discovered with the 18½-inch. It is certainly a binary, and in rapid motion. In 1891 it had become a difficult pair with the 36-inch, and appeared to be rapidly closing. Three years later BARNARD found it single with the same instrument. Under fair conditions 1898.56 I could not see any certain elongation with the 40-inch. The single observation of AITKEN is noted as "very difficult and uncertain." The difference in magnitude of the components makes it a much more difficult pair than it would at first seem to be. The measures indicate that the plane of the orbit is nearly in the line of sight. This is B.A.C. 6421 = Lalande 35119.

[β (XIII)...β^{20}...β (3114)...β (*Pub. L. O.* II)...Cin^3... Lv (*A. J.* 382)...Barnard (*A. J.* 447)...Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...]

β 265. Lalande 35060

R.A. $18^h\ 44^m\ 38^s$
Decl. $+11^\circ\ 23'$

1875.29	235.9	1.46	7.1...	9.1	4*n*	J
1877.28	228.4	1.04	9 ...10		3*n*	Hl
1879.55	235.1	1.36	7.0...	9.2	2*n*	OΣ
1881.60	232.4	1.34	7.7...	9.3	3*n*	β
1884.61	227.8	1.40	...		2*n*	HΣ
1885.55	229.1	1.31	...		3*n*	Hl
1888.58	233.2	1.33	7.5...	9.8	2*n*	Lv
1889.38	234.2	1.46	...		3*n*	Maw
1898.65	233.3	1.38	...		2*n*	Hu
1898.72	235.0	1.25	7.8...	9.8	3*n*	Bd

Discovered with the 9.4-inch at the Dartmouth College Observatory. The measures show no motion.

[β (V)...β (*Mon. Not.* XXXV, 31)...β^6...J (I)...Hall (I, II) ...HΣ ( )...OΣ (*Poulkowa Obsns.* X)...Lv^1...Maw (*Mem. R. A. S.* L, 75)...Hussey ( )...Boothroyd ( )...]

293. β *Lyrae*

R.A. $18^h\ 45^m\ 39^s$
Decl. $+33^\circ\ 13'$

A and C

1878.36	248.0	46.30	...13	2*n*	β
1898.65	247.6	47.13	...13.2	3*n*	A

A and B (= Σ 39 App. I)

1835.23	149.8	45.77	3.0...	6.7	5*n*	Σ
1877.64	149.1	45.85	...		12*n*	Hl
1895.08	149.0	45.70	...7.1		4*n*	Gl

A and D

1898.65	68.3	64.26	...14.3	3*n*	A

A and E

1879.33	317.7	66.25	...	9.2	3*n*	β
1898.65	317.8	67.22	...	9.7	3*n*	A

A and F

1879.33	18.8	85.78	...	9.0	3*n*	β
1898.66	19.0	86.28	...	9.0	2*n*	A

The faint star, C, was noted with the Washington 26-inch; and the still fainter companion, D, was added by AITKEN with the 36-inch. AUWERS gives the proper motion of *β Lyrae*, 0".009 in the direction of 303°.6. Between 1835 and 1877 this would increase the distance of the HERSCHEL star about 0".6. As the line of motion is nearly identical with the direction of B, the position-angle would remain unchanged. The measures of these stars do not appear to show any trace of relative motion, and it is therefore probable that they have the same proper motion.

[β (V)...β (*Mon. Not.* XXXV, 31)...β^1...β^3...Aitken (3585)...]

The measures of AB (= H^1 V. 3 = Sh 281 = Σ 39, App I = OΣ (App) 275) will be found in the following:

[Herschel (*Mem. R. A. S.* IV)...Dawes (*Mem. R. A. S.* XXXV)...*Radcliffe Obsns.* XXII, XXVI, XXVIII...J (II)...Ball (*Dunsink Obsns.* Part V)...Hall (I, p. 20)...Hunt (*Observatory* III, 605)...Engelmann (2662)...Tarrant (2866)... Jedrzejewicz (2340)...Franz (3080)...Glasenapp (I, II, III, IV)...]

β 1033. ν¹ *Sagittarii*

R.A. 18h 46m 56s
Decl. −22° 53′

A and B

1888.68	104.0	1.86	5.5...11.0	1n	β
1897.62	97.0	2.36	5 ...13.9	2n	See
1898.48	96.0	2.54	...10.9	4n	A
1898.54	106.4	2.32	...12	1n	β

A and C (= H 5072)

1837.5	60.3	...	...		H
1877.66	59.5	...	...	1n	Cin
1878.52	57.8	29.00	4.5...10.5	1n	Cin
1897.65	59.2	28.22	...12.8	1n	See
1898.58	59.6	28.22	...10.5	3n	β

The close star was discovered with the 36-inch. The distance in the first measure by an error in reducing was printed in β (XIV) 1″.37. It should have been as given above. The proper motion of the principal star is 0″.043 in the direction of 243°.8 (AUWERS). This in the interval covered by the measures would diminish the angle of B 7° and increase the distance 0″.3 if that star was fixed in space.

The foregoing are all the measures of the Herschel companion. The angle appears to have remained constant, but this would not be affected by the proper motion of A. The distance of C, if fixed in space, should be 2″.6 more than at the time of HERSCHEL'S observation.

[β (XIV)...β (2875)...β (*Pub. L. O.* II)...See (3496)... Aitken (3585)...Cin⁴ ..Cin⁵...]

β 421. W^a XVIII. 1152

R.A. 18h 48m 3s
Decl. +43° 15′

A and B

1877.16	289.9	1.00	9.1... 9.3	4n	J
1893.43	292.4	1.09	9.0... 9.4	2n	W
1893.49	288.5	0.90	9.0... 9.2	2n	Lv
1898.48	290.8	1.02	9.2... 9.6	3n	D

AB and C

1893.43	230.8	39.05	... 9.2	2n	W
1898.48	229.9	39.04	... 9.1	3n	D

Discovered with the 6-inch. So far without change.

[β (VII)...β (2103)...J (1)...Wilson ( )...Lv (*A. J.* 382) ...Doolittle (*Pub. Flower Obsy.* 1)...]

β 646. 113 *Herculis*

R.A. 18h 49m 41s
Decl. +22° 30′

B and C

1877.53	159.2	7.0	12.5...12.5	1n	β
1892.71	332.4	6.48	12.0...12.1	2n	Ho
1898.69	150.8	...	13.0...13.5	1n	D

A and B

1878.68	34.2	35.48	6 ...	1n	β
1892.70	31.9	35.29	6 ...	1n	Ho
1898.69	33.1	35.63	...	1n	D

A and C

1878.68	24.9	40.68	...	1n	β

Discovered with the 18½-inch. This star has a proper motion of 0″.024 in the direction of 305°.8 (AUWERS).

[β (X). :β'...Hough (3234)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 137. W^a XVIII. 1503

R.A. 18h 49m 48s
Decl. +37° 14′

A and B

1875.33	123.8	1.15	8.2... 8.7	4n	J
1875.68	123.9	1.15	8.2... 8.7	4n	Sp
1880.47	126.9	1.10	8.3... 8.5	1n	β
1883.57	130.2	1.45	8.0... 8.4	6n	En
1888.77	127.8	1.17	8.0... 8.5	6n	T
1891.49	130.0	1.14	8.3... 8.5	3n	β
1896.60	132.3	1.34	...	3n	Lew
1896.77	136.7	1.47	...	1n	Bow
1897.44	128.2	1.47	...	1n	Bow
1897.46	130.6	1.24	...	2n	Lew
1898.47	127.9	1.29	...	1n	Lew
1898.59	131.9	1.13	8.8... 9.4	3n	D
1898.62	127.3	1.29	...	1n	Bow

A and C

1880.47	142.0	17.92	...11.5	1*n*	*β*
1884.64	141.9	17.68	...11.5	1*n*	En
1896.46	141.0	18.20	...	1*n*	Lew
1897.47	140.6	19.15	...	1*n*	Lew
1898.59	141.6	18.68	...11.5	3*n*	D

Discovered with the 6-inch. There is no change in AB unless it is a slight advance in the angle.

[*β* (III)...*β* (*Mon. Not.* XXXIV, 59)...β^1...*β* (3114)...*β* (*Pub. L. O.* II)...*J* (1)...Sp (2133)...Sp (11)...Engelmann (2678)...Tarrant (2991)...Doolittle (*Pub. Flower Obsy.* 1)...Lewis and Bowyer (*Mon. Not.* LIX, 420)...]

β 972. Schj. 7042

R.A. $18^h\ 49^m\ 59^s$
Decl. $-\ 0°\ 43'$

A and B

1880.42	4.7	1.09	8.9... 9.6	5*n*	*β*
1892.70	5.3	...	8.5... 9.0	1*n*	Ho
1893.49	5.4	0 94	8.6... 9.4	2*n*	Lv
1893.65	3.0	1.20	9.0...10.0	2*n*	W

A and C

1880.42	14.4	73.58	... 9.1	4*n*	*β*
1893.49	14.2	73.48	.. 9.0	2*n*	Lv
1893.65	14.2	73.48	... 9.5	2*n*	W

Discovered with the 18½-inch.

[*β* (XIII).. β^1...Hough (3234)...Lv (*A. J.* 382)...Wilson ( )...]

β 647. D.M. (13°) 3816

R.A. $18^h\ 50^m\ 29^s$
Decl. $+13°\ 27'$

A and B

1877.52	14.1	1.±	9.0... 9.0	1*n*	*β*
1877.72	11.5	1.01	9.0... 9.2	2*n*	*J*
1892.58	8.0	0.81	9.0... 9.0	1*n*	Ho
1898.57	10.3	1.16	9.0... 9.5	4*n*	A

AB and C

1877.72	215.8	19.56	... 9.2	2*n*	*J*
1885.56	217.2	19.30	...	3*n*	deB
1892.58	216.5	19.25	... 9.0	1*n*	Ho
1898.57	217.7	19.09	... 9.0	3*n*	A

Discovered with the 18½-inch. Change in distance of C?

[*β* (X).. β^2...*J* (1)...Hough (3234)...de Ball (27531... Aitken (3585)...]

β 1255. B.A.C. 6476

R.A. $18^h\ 51^m\ 37^s$
Decl. $+48°\ 43'$

1891.58	88.0	1.56	5.8...12.5	3*n*	*β*
1898.56	88.8	1.56	6.0...13.0	1*n*	*β*
1898.64	89.3	1.78	6.0...12.5	3*n*	A

Discovered with the 36-inch. A naked-eye star in *Draco*. HEIS 6m; Harvard 5.9. The measures of LEWIS (*Mon. Not.* LIX. 420) evidently belong to some other pair.

[*β* (XVIII)...*β* (3113)...*β* (*Pub. L. O.* II)...Aitken (3585)...]

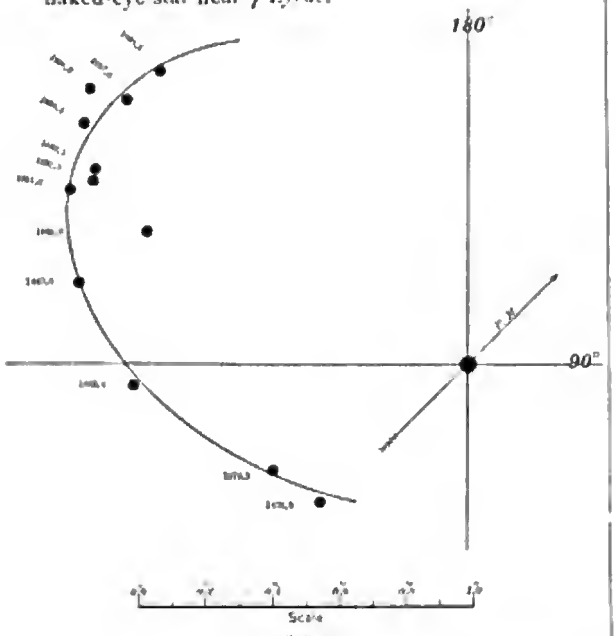
β 648. B.A.C. 6480

R.A. $18^h\ 52^m\ 30^s$
Decl. $+32°\ 45'$

1878.47	312.5	0.60	6.0... 9.5	2*n*	*β*
1879.47	298.3	0.66	6.5... 9.0	1*n*	*β*
1883.64	273.4	1.00	...	2*n*	HΣ
1885.61	258.0	1.19	...	1*n*	HΣ
1889.87	247.4	1.04	...	1*n*	Sp
1891.33	247.7	1.26	6.0...10.3	3*n*	*β*
1891.63	249.6	1.10	6.0... 9.5	3*n*	T
1891.84	241.4	1.37	...	1*n*	HΣ
1892.38	245.6	1.29	6.0... 9.2	5*n*	*β*
1892.70	242.5	1.21	...	4*n*	Sp
1893.43	246.1	1.26	6.0... 8.8	2*n*	W
1893.49	240.2	1.40	6.0... 8.8	2*n*	Lv
1893.77	240.8	1.12	...	1*n*	Sp
1894.78	237.9	1.22	...	4*n*	Sp
1895.90	237.9	1.49	6.0... 9.8	3*n*	Lew
1896.45	238.7	1.62	...	1*n*	*β*
1896.47	225.1	1.33	...	1*n*	Dy
1896.49	231.5	1.34	...	3*n*	A
1896.57	233.4	1.45	6.0... 8.8	3*n*	Lv
1896.62	233.2	1.27	...	4*n*	Lew
1896.77	232.6	1.30	...	3*n*	Sp
1897.44	229.1	1.36	...	1*n*	Bow
1897.54	231.2	1.14	...	4*n*	Lew
1897.70	229.8	1.33	...	3*n*	A
1897.74	235.5	1.40	...	2*n*	Br

1898.40	227.7	1.33	6.2 . . . 9.2	3*n*	A
1898.54	230.2	1.50	. . .	1*n*	Lew
1898.67	228.3	1.24	. . .	2*n*	Bry
1898.92	228.2	1.21	. . . 9.5	2*n*	β
1899.34	223.3	1.26	6.0 . . . 9.0	3*n*	A

Discovered with the 18½-inch. At that time it was a very difficult object, but in recent years the distance has considerably increased, and it has been measurable with moderate apertures. It was certain at the beginning that this was a binary system, since the two stars must have the same proper motion, as otherwise it would have been recorded as a double star long before. The principal star has an annual proper motion of 0".231 in the direction of 134°.8 (PORTER). The maximum distance of the companion appears to have been reached, and the change in angle is now slow. It will be impossible to form any idea of the apparent orbit for some time to come, but there can be no doubt that this will be a most interesting physical system for investigation in the future. This is a naked-eye star near γ *Lyrae*.



β 648

[β (x) . . . β' . . . β (3114,3142) . . . β (*Pub. L. O.* II) . . . β (*Observatory*, Dec. 1891) . . . Sp (III) . . . Tarrant (3186) . . . Wilson ( ) . . . Gaudibert (*L'Astronomie*, Sept 1892) . . . Lv (*A. J.* 382, 407) . . . Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsns.* 1895) . . . Aitken (3396,3585) (*A. J.* 420) . . . Lewis, Bowyer and Dyson (*Mon. Not.* LIX, 400) . . . Aitken ( ) . . . ΠΣ ( ) . . . Brown ( ) . . .]

β 649. D.M. (32°) 3285

R.A. 18h 54m 24s
Decl. + 32° 18'

1878.46	12.8	1.57	8.5 . . . 11.7	2*n*	β
1891.37	7.3	1.59	8.2 . . . 10.6	3*n*	β
1897.75	7.9	1.44	. . .	2*n*	Lew
1898.70	2.8	1.76	. . .	1*n*	Bry

Discovered with the 18½-inch. This pair is 13' *s* of γ *Lyrae*.

[β (x) . . . β' . . . β (3114) . . . β (*Pub. L. O.* II) . . . Lewis and Bryant (*Mon. Not.* LIX, 400) . . .]

β 973. D.M. (8°) 3945

R.A. 18h 55m 58s
Decl. + 8° 35'

A and B

1880.13	350.7	1.43	9.1 . . . 12.0	5*n*	β
1890.61	350.0	1.60	9.0 . . . 11.6	3*n*	β
1898.73	350.1	1.72	8.3 . . . 12.5	3*n*	Bd

C and D (= Howe)

1879.31	249.3	. . .	11.0 . . . 12.0	1*n*	Cin
1880.13	262.7	2.90	11.4 . . . 12.0	5*n*	β
1890.61	260.1	3.24	11.0 . . . 11.2	3*n*	β
1898.73	261.2	3.77	11.8 . . . 12.1	3*n*	Bd

A and C

1880.58	20.7	10.73	. . .	3*n*	β
1890.61	19.8	11.06	. . .	3*n*	β
1898.73	20.7	11.10	. . .	3*n*	Bd

A and D (= Σ 2435)

1827.67	12.3	10.25	8.5 . . . 11.5	2*n*	Σ
1847.66	12.3	. . .	. . .	1*n*	Ma
1876.58	8.8	10.38	. . .	1*n*	OΣ
1879.31	12.6	9.23	. . .	1*n*	Cin
1880.16	5.9	9.84	. . .	3*n*	β
1890.60	12.2	10.10	. . .	2*n*	β
1898.73	4.2	10.07	. . .	3*n*	Bd

The smaller component of Σ 2435 was discovered to be double by HOWE at Cincinnati. In measuring this with the 18½-inch I found that the principal star was also double. There are but few measures of the STRUVE pair. In 1864 DEMBOWSKI was unable to see the companion. In 1873

I examined it with the 6-inch, and saw it without difficulty, and noted it as "certainly much brighter than 11.5m." It was called "extremely difficult" by OΣ in 1876.

So far there is no evidence of relative motion in either of the new pairs. All the measures of AD are given above.

[β (XIII)...β^5...β (3048)...β (*Pub. L. O.* II)...β (*Ast. Reg.* XIX. 120)...Cin^5...Boothroyd ( )...Madler (*Fixstern-Systeme* II)...Herschel (*Mem. R. A. S.* XXXVIII)...J (1730)...OΣ (*Poulkowa Obsns.* X)...]

β 974. Schj. 7133

R.A. 18h 58m 53s
Decl. — 6° 21′

1880.60	87°.8	0″.72	9.4... 9.8	3*n*	β
1891.40	84.4	0.96	9.0... 9.2	2*n*	β
1898.69	87.5	0.91	8.2... 9.8	3*n*	Bd

Discovered with the 18½-inch. There is a 12m star about 25″ distant in 100°.

[β (XIII)...β^5...β (3114)...β (*Pub. L. O.* II)...Boothroyd ( )...]

β 52. W° XVIII. 1804

R.A. 18h 58m 54s
Decl. + 25° 51′

B and C

1896.61	171°.0	8″.65	9.6...11.5	3*n*	Lv
1898.73	171.5	8.90	10.3...11.2	5*n*	D

A and B

1896.61	299°.8	51″.91	8.2...	3*n*	Lv
1898.73	299.8	51.66	8.6...	5*n*	D

Discovered with the 6-inch. The distances are too great to make it an object of any interest. In the field with Σ 2444.

[β (I)... β (*Mon. Not.* XXXIII, 351)...Lv (*A. J.* 407)...Doolittle (*Pub. Flower Obsy.* I)...]

β 1285. Lalande 35740

R.A. 18h 59m 31s
Decl. + 33° 58′

A and B

1899.31	295°.1	11″.10	7.1...13.3	3*n*	β

A and C

1899.44	208°.4	39″.84	...10.5	1*n*	β

In my Mt. Hamilton observing book of May 27, 1892, I find this star noted with the 36-inch, "possibly a close pair. There is a faint star 10″ or 12″ *p*." I have looked at this a number of times with the 40-inch, and measured the distant companions as given above, but cannot say whether or not the large star is a close pair. Further observations with a large aperture are necessary to settle this point. AITKEN found the principal star single 1899.44 with the 36-inch on a good night with power of 1000.

β 466. W° XVIII. 1503

R.A. 18h 59m 34s
Decl. + 10° 39′

1877.73	165°.1	1″.71	9.2...10.0	2*n*	J
1891.77	165.9	1.84	8.5... 9.0	2*n*	β

Discovered with the 6-inch.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β (3114)...β (*Pub. L. O.* II)...J (I)...]

β 287. ζ *Aquilae*

R.A. 18h 59m 54s
Decl. + 13° 41′

1874.60	58°.9	5″.53	3 ...12	1*n*	New
1878.54	59.6	4.92	...12	3*n*	β
1878.90	59.7	5.95	3.2...12	3*n*	OΣ
1879.08	61.1	5.55	3 ...15	3*n*	Hl
1879.53	60.1	4.74	...13	4*n*	β
1885.68	62.4	5.64	...	2*n*	Hl
1886.89	59.5	5.75	...	8*n*	HΣ
1889.43	57.3	5.63	...13	3*n*	β
1894.38	57.0	6.18	...	1*n*	Bar
1896.64	56.8	5.87	...	4*n*	Lew
1898.61	59.0	5.98	...13.2	3*n*	D

Discovered with the 26 inch at the Naval Observatory. AUWERS gives the proper motion of ζ *Aquilae*, 0″.0967 in the direction of 203°.1. If the small star was stationary, in twenty years its position-angle would diminish 10°, and the distance increase 1″.7 by virtue of the proper motion of A.

It is obvious from the measures that the two are moving together, as there has been no sensible relative change.

[β (v)...β (*Mon. Not.* xxxv, 31)...β'...β'...β (2957)...β (*Pub. L. O.* II)...Newcombe (*Wash. Obsns.* 1874)...OΣ (*Poulkova Obsns.* x)...*Hall* (I, II)...HΣ ( ). Barnard (*A. J.* 447)...Doolittle (*Pub. Flower Obsy.* I)... Lewis (*Mon. Not.* LIX, 400)...]

β 359. W^a XVIII, 1849

R.A. 19^h 0^m 7^s
Decl. + 23° 15'

1876.97	82°.6	4".29	8.8...10.0	6*n*	J
1891.77	86.4	3.84	8.4... 9.3	2*n*	β
1898.73	81.7	4.20	8.9... 9.7	4*n*	D

Discovered with the 6-inch.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...J (I)...Doolittle (*Pub. Flower Obsy.* I)...]

β 1204. *Aquilae* 56

R.A. 19^h 6^m 1^s
Decl. + 2° 25'

A and B

1890.56	3°.8	-0".44	7.7... 8.5	3*n*	β
1893.24	5.7	0.3±	...	2*n*	Sp
1898.74	8.6	0.38	7.5... 8.0	2*n*	A

A and C

1890.57	195°.0	12".89	...14.0	4*n*	β
1898.76	197.1	13.03	...14.2	3*n*	A

A and D

1890.61	159°.9	21".23	...14.8	3*n*	β
1898.76	160.6	21.24	...14.8	2*n*	A

A and E

1890.57	317°.4	26".30	...14.2	2*n*	β
1898.76	315.6	26.65	...14.5	2*n*	A

A and F

1890.57	202°.5	27".77	...14.0	3*n*	β
1898.76	201.1	27.82	...14.0	2*n*	A

A and G (= Σ 2476)

1828.65	209°.3	26".47	6.7...11	1*n*	H^a
1830.61	214.7	31.41	6.2...11.0	2*n*	Σ
1843.70	214.3	32.38	...	1*n*	Ma
1866.70	214.1	31.88	6.2...11.2	3*n*	J
1879.58	213.2	31.42	7.0...10.7	2*n*	Cin
1890.55	213.8	31.36	7.1...10.2	2*n*	β
1898.76	214.0	31.52	...10.2	3*n*	A

The principal star of Σ 2476 was found to be a close pair with the 36-inch. That instrument shows four other stars nearer the STRUVE companion. There is no change in this star since the first measures by STRUVE. All the measures are given above. The principal star is Lalande 36008.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken (3585)... Sp(III)...Herschel (*Mem. R. A. S.* V)...Madler (*Fixstern-Systeme* I) (*Dorpat Obsns.* XI)...J (II)...Cin^5...]

β 138. Lalande 36013

R.A. 19^h 6^m 37^s
Decl. — 14° 39'

1875.07	278°.3	1".54	7.5...10.9	4*n*	J
1877.57	280.2	1.26	7.5...10.0	1*n*	Cin
1880.59	281.7	1.09	8.0...10.0	1*n*	Cin
1892.58	280.5	0.79	8.0...10.0	1*n*	Ho
1893.75	289.8	1.14	8.0...10.0	3*n*	W
1898.57	288.6	1.27	7.2...10.2	3*n*	A
1898.71	277.2	1.05	7.1...10.8	2*n*	D

Discovered with the 6 inch. The measures are not very accordant, and further observations are needed to show whether or not there is any motion.

[β (III)..β (*Mem. Not.* XXXIV, 59)...J (I)...Cin^4...Cin^5... Hough (3234)...Wilson ( )...Aitken (3585)...Doolittle (*Pub. Flower Obsy.* I)...]

β 139. *Aquilae* 59

R.A. 19^h 7^m 12^s
Decl. + 16° 39'

A and B

1874.70	140°.7	0".79	...	2*n*	New
1875.58	137.4	0.59	6.7... 8.0	5*n*	Sp
1875.88	139.5	0.72	6.7... 8.0	6*n*	J
1883.66	140.9	0.56	8.0... 8.2	2*n*	Ho
1887.63	140.2	0.53	...	4*n*	Sp
1888.73	140.5	0.61	...	3*n*	Sp
1888.76	140.0	0.58	7.0... 8.0	4*n*	T
1898.57	140.9	0.84	7.2... 8.1	4*n*	A
1898.85	140.2	0.61	...	1*n*	Maw

AB and C (= OΣ (App.) 177)

1874.96	288°.3	120".76	...	7.5	3*n*	J
1891.08	287.1	118.07	6.7...	7.7	4*n*	Fr
1898.56	286.5	116.54	...	7.0	2*n*	A

The principal star of this very wide pair of bright stars was found to be a close double with the 6-inch. The measures, so far, show no change. There are several other faint stars nearer than C; one a 13m star from AB, 103°.6 : 27".75 (1899.44). The change in C is due to proper motion. All the measures are given. AUWERS gives the proper motions of the two bright stars:

AB 0".030 in 270°.0 = Lalande 36081
C 0.223 in 148.5 = Lalande 36074

[β (III)...β (*Mon. Not.* XXXIV, 59)...Newcomb (*Wash. Obsns* 1874)...Sp (II, app)...Sp (2133)...J (I)...J (2086)... Hough (2978)...Sp (III)...Tarrant (2091)...Franz. (3464)...Rechenberg (3482)...Maw (*Mem. R. A. S.* LIII) ...Aitken (3585)...]

β 422. O. Arg. S. 19281

R.A. 19h 7m 43s
Decl. — 18° 16'

1879.54	44°.1	"....	8.0...12.0		1*n*	Cin
1891.57	44.6	12.40	8.2...11.8		3*n*	β
1898.54	42.0	12.61	7.6... 9.9		3*n*	D

Discovered with the 6-inch.

[β (VII)...β (2103,3114)...β (*Pub. L. O.* II)...Cin5...Doolittle (*Pub. Flower Obsy.* I)...]

β 975. Lalande 36263

R.A. 19h 10m 4s
Decl. + 31° 21'

B and C

1880.59	221°.8	0".77	...	9.4	3*n*	β
1881.63	220.3	0.82	10.0...10.2		3*n*	Ho
1890.63	222.3	0.83	9.3...10.2		3*n*	β

A and BC (= OΣ 367 *rej.*)

1843.66	229°.5	33".73	...		1*n*	Ma
1866.86	228.1	33.57	6.8...	9.3	3*n*	J
1880.59	228.0	33.42	7.4...	8.9	2*n*	β
1881.62	226.6	33.54	8 ...10		1*n*	Ho
1890.63	227.3	33.34	7.5...		1*n*	β

The close pair was discovered with the 18½-inch. There seems to be no material change in this or in OΣ 367 *rej.* This was excluded from the last edition of the *Poulkowa Catalogue* by reason of the distance between the components. All the measures of these stars are given above. HOUGH measures a 12m star from A, 68°.4 : 22".95 (1881.26) 1*n*.

[β (XIII)...β?...β (2341,3048)...β (*Pub. L. O.* II)...Hough (2978)...Madler (*Dorpat Obsns.* XI)...J (I)...]

β 140. Lalande 36185

R.A. 19h 10m 12s
Decl. — 11° 11'

B and C

1879.54	206°.9	"....	...11.0		1*n*	Cin
1891.56	209.3	7.18	11.0...11.2		2*n*	β
1896.66	208.6	7.66	10.9...11.6		3*n*	Lv
1898.59	209.6	7.13	...		2*n*	β
1898.66	209.8	7.35	10.7...11.2		3*n*	D

A and B

1879.54	317°.9	33".98	8.0...12.0		1*n*	Cin
1891.55	326.9	36.87	7.6...		3*n*	β
1896.66	324.9	37.30	...		3*n*	Lv
1898.59	325.5	37.26	...		2*n*	β
1898.66	325.9	37.46	7.2...		3*n*	D

Discovered with the 6-inch. There appears to be no change in either companion. There is evidently an error in the first distance of AB. With a correction of one revolution in reading the micrometer, the distance would become 37".34.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (3114)...β (*Pub. L. O.* II)...Cin5...Lv (*A. J.* 407)...Doolittle (*Pub. Flower Obsy.* I)...

β 1256. W1 XIX, 265

R.A. 19h 12m 36s
Decl. + 6° 7'

1891.56	37°.1	0".64	8.3...	8.3	3*n*	β
1893.77	38.2	0.5±	...		1*n*	Sp
1898.59	36.8	0.71	8.4...	8.9	3*n*	A
1898.74	36.1	0.60	...		1*n*	Bry

Discovered with the 36-inch. The planetary nebula, Dreyer 6781, is 12" *n*.

[β (XVIII)...β 13113...Sp (III)...Aitken (3585)...Bryant (*Mon. Not.* LIX, 400)...]

β 248. 2 *Vulpeculae*

R.A. 19h 12m 39s
Decl. + 22° 49′

1876.11	125.0	1.86	5.7... 9.5	6*n*	Δ
1879.43	127.8	1.89	6.0... 9.5	1*n*	β
1879.58	124.2	1.79	5.8... 9.3	4*n*	OΣ
1881.64	124.7	1.78	6 ...10	2*n*	Ho
1883.82	120.0	1.8	...	1*n*	Perry
1884.11	130.5	2.08	6.1... 9.2	6*n*	En
1885.26	128.1	1.94	...	5*n*	HΣ
1887.76	134.2	2.12	5.7... 9.3	6*n*	T
1888.68	125.1	1.69	...	2*n*	Maw
1888.72	128.2	2.00	5.5... 9.5	5*n*	T
1889.51	125.9	1.70	...	6*n*	Sp
1890.63	125.4	1.86	...	3*n*	β
1891.71	126.8	1.92	...	2*n*	Col
1896.85	129.6	1.84	...	2*n*	Maw
1898.73	127.7	1.97	...	3*n*	D

Discovered with the 6-inch. A fine pair with a moderate aperture, but so far the measures do not show any relative change. The authorities assign no proper motion to the principal star.

[β (v)...β (*Mon. Not.* xxxv, 31)...β...β (3048)...β (*Pub. L. O.* II)...Δ (1)...Δ (2086)...OΣ (*Pub. Poulkowa Obsy.* x)...Hough (29781...Perry (*Eng. Mech.* xxxvi, 65; xxxix, 11)...HΣ ( )...Engelmann (2678)...Tarrant (2899,2901)...Maw (*Mem. R. A. S.* L)...Sp (III)...Collins (*Proc. Haverford Coll. Obsy.* 1891)...Doolittle (*Pub. Flower Obsy.* I)...Maw (*Mem. R. A. S.* LIII)...]

β 360. Rümker 7334

R.A. 19h 14m 19s
Decl. + 35° 0′

A and B

1876.61	72.2	6.27	8.4...10.0	4*n*	Δ
1891.77	71.8	6.48	8.4... 9.7	2*n*	β
1899.44	70.7	6.58	8.5... 8.8	1*n*	β

A and C

1876.61	343.4	36.57	...10.6	4*n*	Δ
1891.77	342.1	36.45	...11.5	2*n*	β
1899.44	343.1	36.94	... 8.9	1*n*	β

Discovered with the 6-inch. Unchanged. The principal star is D.M. (34°) 3494; magnitude 8.2.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...Δ (1)...]

β 141. Lalande 36553

R.A. 19h 16m 50s
Decl. + 22° 17′

A and B

1875.71	81.4	0.70	7.5... 9.0	4*n*	Sp
1875.97	80.6	0.71	7.5... 9.1	6*n*	Δ
1876 56	76.7	0.77	7.5... 8.5	1*n*	OΣ
1885.71	85.6	0.84	...	6*n*	HΣ
1887.71	82.5	0.69	...	2*n*	Sp
1888.72	78.5	0.64	...	3*n*	Sp
1890.64	79.2	0.80	7.5... 8.5	3*n*	β
1897.57	81.6	0.84	...	1*n*	Lew
1897.95	78.9	0.86	...	1*n*	Bry
1898.59	80.0	0.86	7.2... 8.5	3*n*	A

C and D

1897.57	183.0	5.75	10.2...10.5	1*n*	Lew
1897.95	181.7	5.39	...	1*n*	Bry
1898.59	177.2	4.90	12.0...12.7	3*n*	A

AB and C (= H 2867)

1830	329.5	20±	9 ...15	1*n*	H
1875.27	335.2	26.53	...11.5	1*n*	J
1898.59	333.8	28.75	...	2*n*	A

AB and E

1877.78	90.5	50.75	...11.0	1*n*	J
1898.59	90.5	50.28	... 9.7	3*n*	A

AB and F

1898.64	214.4	50.22	...12.5	1*n*	A

The principal star of H 2867 was found to be a close pair with the 6-inch; and the 36-inch shows a faint attendant to the other star.

[β (III)...β (*Mon. Not.* xxxiv, 59)...β (3048)...β (*Pub. L. O.* II)...Δ (1)...Sp (II app; III)...OΣ (*Poulkowa Obsns.* x)...Aitken (3585)...Lewis and Bryant (*Mon. Not.* LIX, 400)...]

β 1129. Groombridge 2829

R.A. 19h 18m 51s
Decl. + 52° 9′

1889.48	344.3	0.34	6.3... 6.3	3*n*	β
1898.62	340.0	0.44	6.5... 6.5	3*n*	A

Discovered with the 36-inch. The *Ast. Gess. Catalogue* gives the proper motion of this star

0".054 in the direction of 36°.2. If that is substantially correct, this is a physical system. If either component was fixed, this movement of the other star would change the position-angle in the above interval not less than 80°. The magnitude in D.M. is 7.1.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 423. O. Arg. S. 19560

R.A. 19h 20m 18s
Decl. — 29° 44'

1878.63	122°.3	1".25	7.5... 8.5	2n	Cin
1886.78	124.3	1.27	...	1n	I.M
1893.68	125.4	1.09	9 ...10	2n	Sel
1897.70	124.9	1.31	7.1... 8.6	1n	See
1898.63	126.5	1.26	8.7... 9.2	3n	D

Discovered with the 6-inch. Apparently without material change.

[β (VII)...β (2103)...Cin⁴...Cin⁶...I.M...Sellors (3240)... See (3496)...Doolittle (*Pub. Flower Obsy.* I)...]

β 142. (=Schj. 28). *Aquilae* 106

R.A. 19h 21m 30s
Decl. — 12° 23'

1874.08	317°.7	1".37	7.9... 8.2	5n	J
1878.89	319.6	1.37	7.8... 8.0	3n	Cin
1879.16	319.5	1.58	8.0... 8.2	4n	Sp
1882.54	324.3	1.68	7.7... 8.0	4n	W
1883.62	325.8	1.10	7.0... 7.2	3n	Ho
1886.54	327.6	1.68	8.0... 8.2	1n	I.M
1888.54	328.3	1.60	7.8... 7.9	3n	I.v
1888.70	326.3	1.47	7.7... 8.0	3n	T
1893.49	330.8	1.53	7.4... 7.9	3n	I.v
1896.50	333.8	1.56	7.7... 8.0	2n	I.v
1896.51	331.4	1.62	7.5... 7.6	2n	Soulé
1897.69	332.7	1.53	...	4n	Scott
1898.65	333.5	1.55	...	2n	Scott

Found with the 6-inch, and given in β (III) before I was aware of the fact that it had been discovered and published long before by SCHJELLERUP. It is given here in order to say that hereafter it should be referred to as Schj. 28, which is the number in his list of new pairs in A.N. 1485. There has been some confusion in regard to his numbers from the fact of two lists having been printed which are not identical. The other list is unnumbered, and is found in the introduction to his *Catalogue of 10,000 Stars*. Each list contains some stars not found in the other, but all the doubles of any consequence are given in A.N., and as those stars have a current number, that list was probably intended by the author to be used for future reference. Two of the pairs given in the catalogue and repeated in the A.N. list are identical with double stars in HERSCHEL and STRUVE, and it was doubtless the purpose to exclude all previously known pairs, but that has not been entirely done. No. 1 is H 658; No. 5 is Σ 1077; and Nos. 15 to 18 inclusive are respectively Σ 3090, Σ 3094, Σ 3096, and Σ 3101.

The measures of the pair given above show slow, direct angular movement. This star is Lalande 36712.

[β (III)...β (*Mon. Not.* XXXIV, 59)...J (I)...Cin⁵...Sp (II)...Wilson (Cin¹⁰)...Hough (2978)...I.M...Lv⁸...Lv (*Sid. Mess.* VIII, 77) (*A. J.* 382,407)...Tarrant (2991)... Soulé (*A. J.* 410)...Scott (*Mon. Not.* LIX, 427)...]

β 1286. W³ XIX. 629

R.A. 19h 21m 39s
Decl. + 35° 41'

B and C

1899.48	67°.4	1".59	9.3...12.5	3n	β

A and B

1899.48	118°.5	5".90	8.6...	3n	β

Discovered with the 40-inch in looking for the next pair (β 424), which is closely *nf*. This star is noted "duplex 10"" in WEISSE. As the distance is now less than 6", there may be some change from proper motion or otherwise.

β 424. W³ XIX. 676

R.A. 19h 23m 5s
Decl. + 35° 49'

1877.14	38°.0	2".76	8.7...10.1	4n	J
1891.77	40.1	2.60	8.7... 9.3	2n	β
1899.44	39.5	2.62	8.6... 9.1	2n	β

Discovered with the 6-inch. Without change.

[β (VII)...β (2103,3114)...β (*Pub. L. O.* II)...J (I)...]

β 651. D.M. (27°) 3409

R.A. 19h 25m 44s
Decl. + 28° 2′

1878.47	291°.5	6″.36	8.5 . . . 12.5	1*n*	β
1892.38	288.6	6.44	8.4 . . . 11.4	2*n*	β

Discovered with the 18½-inch. This is 19′.5 *n* of *β Cygni*.

[β (x) . . . β⁵ . . . β (3142) . . . β (*Pub. L. O.* II) . . .]

β 650. Lalande 36958

R.A. 19h 26m 20s
Decl. + 6° 15′

A and B

1877.52	142°.0	7″.4 ±	8.5 . . . 11.8	1*n*	β
1891.49	143.7	6.61	8.1 . . . 11.6	2*n*	β
1898.52	145.4	6.43	8.7 . . . 11.2	3*n*	D

A and C

1877.52	332°.6	10″ ±	. . .	1*n*	β
1891.49	332.3	11.61	. . . 13	2*n*	β
1898.52	331.8	11.59	. . . 12.3	3*n*	D

A and D

1877.52	252°.8	25″ ±	. . .	1*n*	β
1891.49	254.5	26.63	. . . 10	2*n*	β
1898.52	253.3	26.67	. . . 10.1	3*n*	D

Discovered with the 18½-inch. In the first instance the principal star was erroneously identified with Lalande 36918. The correct place is given above.

[β (x) . . . β⁵ . . . β (3114) . . . β (*Pub. L. O.* II) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 976. *Aquilae* 122

R.A. 19h 26m 27s
Decl. + 9° 5′

1880.59	105°.0	2″.01	7.0 . . . 10.8	4*n*	β
1889.87	106.0	2.18	. . .	1*n*	Sp
1891.42	104.3	2.16	7.2 . . . 10.7	3*n*	β

Discovered with the 18½-inch. Lalande 36963.

[β (XIII) . . . β⁵ . . . β (3114) . . . β (*Pub. L. O.* II) . . . Sp (III) . . .]

β 143. Lalande 37049

R.A. 19h 26m 30s
Decl. + 49° 15′

1875.61	192°.7	2″.20	8.0 . . . 9.1	4*n*	J
1893.51	192.9	2.15	7.8 . . . 8.7	3*n*	Lv
1898.45	193.2	2.21	9.0 . . . 9.6	3*n*	D

Discovered with the 6-inch. Probably fixed.

β (III) . . . β (*Mem. Not.* XXXIV, 59) . . . J (I) . . . Lv (*A. J.* 382) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 438. D.M. (36°) 3588

R.A. 19h 27m 3s
Decl. + 36° 27′

A and B

1879.46	40°.9	4″.37	. . . 13	1*n*	β
1891.53	40.5	4.05	7.9 . . . 12.7	2*n*	β

A and C

1878.47	238°.5	21″.09	. . . 13	1*n*	β
1891.52	236.7	21.52	. . . 12.8	2*n*	β

A and D (= Σ 2538)

1830.85	245°.2	53″.04	8.2 . . . 8.3	2*n*	Σ
1866.35	247.4	52.86	8.1 . . . 8.4	3*n*	J
1886.57	246.1	52.91	7.9 . . . 8.3	3*n*	Per
1891.53	246.0	53.04	. . .	2*n*	β

D and E

1830.87	52°.5	6″.08	. . . 8.7	3*n*	Σ
1866.35	53.3	6.08	. . . 8.6	3*n*	J
1886.57	51.3	6.05	. . . 8.5	3*n*	Per
1891.51	53.8	6.06	. . . 8.0	2*n*	β

A and E

1862.64	247°.4	46″.81	. . .	1*n*	J
1883.70	246.8	47.13	. . .	1*n*	En
1891.51	247.9	46.91	. . .	2*n*	β

The faint attendant to the principal star of the triple, Σ 2538 (= S 719), and the little star between the two pairs were discovered with the 18½-inch. There is no change in the relation of the original components. A few only of the measures are given to show their relative fixity.

[β (VIII) . . . β (*Am. Jour. Sci.* July 1877) . . . β⁵ . . . β¹ . . . β (3114) . . . β (*Pub. L. O.* II) . . .]

The following include all the observations of the old stars:

[Herschel (*Mem. R. A. S.* IV, V)...Madler (*Dorpat Obsvt.* XI) (*Fixstern-Systeme* I)...OΣ (*Poulkowa Obsvs.* IX; X, pp. 42, 183)...Gledhill, Wilson and Seabroke (*Mem. R. A. S.* XLII, XLIII, XLVIII)...Secchi (*Cat. 1321 Stars*)...Perrotin (*Annals Nice Obsy.* II)...J (II)...Engelmann (2677)...Glasenapp (III)...]

β 652. Piazzi XIX. 169

R.A. $19^h\ 27^m\ 16^s$
Decl. $+28°\ 1'$

A and B

1878.97	328°.6	4".33	...13.0	2*n*	β
1884.24	325.3	5.29	...	3*n*	HΣ
1892.38	325.3	5.17	...13.3	3*n*	β

A and C (= Σ 2539)

1830.69	5°.2	5".36	7.9... 9.7	4*n*	Σ
1867.03	2.4	5.38	7.5... 9.3	3*n*	J
1878.73	3.8	5.60	8.0... 9.0	4*n*	β
1887.78	2.8	5.34	7.5... 9.3	4*n*	T
1892.38	3.5	5.40	8.0... 8.7	3*n*	β

The faint companion to the principal star of Σ 2539 (= H I. 99 = S 718) was discovered with the 18½-inch. There is no change in AC since the first measures of STRUVE.

[β (X)...β^{II}...β^{I}...β (*A. J.* 268)...β (3142)...β (*Pub. L. O.* II)...HΣ ( )...]

A few of the measures of Σ 2539 are given above. All will be found in the original double-star catalogue referred to, and in the following:

[Madler (*Fixstern Systeme* II) (*Dorpat Obsvt.* XI, XIII)... Secchi (*Catalogo di 1321 Stelle Doppie*)...Gledhill, Wilson and Seabroke (*Mem. R. A. S.* XLII, XLIII)...J (II)...Tarrant (2898)...Lewis, etc. (*Mon. Not.* LIX, 421)...]

β 653. μ *Aquilae*

R.A. $19^h\ 28^m\ 14^s$
Decl. $+7°\ 8'$

A and B

1878.07	274°.9	21".42	4.5...13	1*n*	β
1891.43	276.6	24.98	...	2*n*	β
1896.49	278.2	26.56	4.5...13	2*n*	Lv
1898.57	278.3	27.29	5 ...	3*n*	A

A and C

1878.62	285°.7	21".18	...13	2*n*	β
1891.43	288.4	25.12	...	2*n*	β
1896.49	289.0	26.58	...13	2*n*	Lv
1898.57	288.9	27.13	...	3*n*	A

B and C

1877.51	194°.4	5".2±	...	1*n*	β
1891.43	195.7	5.06	12.2...12.3	2*n*	β
1898.57	196.4	5.22	11.3...11.8	3*n*	A

These faint companions were discovered with the 18½-inch. The change in the distance from the primary is the result of the proper motion of A, which is given, 0".233 in the direction of 124°.7 (AUWERS). There seems to be no relative change in BC. ENGELHARDT (*Obsns. Astron.* II, III) has measured two distant stars:

1887.65	349°.7	59".60	...12.5	1*n*	Eng
1899.55	347.5	60.94	...	1*n*	β
1887.65	71°.9	183".06	... 9.6	2*n*	Eng
1894.71	71.3	182.15	...	2*n*	Eng
1899.55	70.9	180.78	...	1*n*	β

[β (X)...β^{I}...β (3114)...β (*Pub. L. O.* II)...Lv (*A. J.* 407)...Aitken (3585)...]

β 1130. 9 *Vulpeculae*

R.A. $19^h\ 29^m\ 19^s$
Decl. $+19°\ 31'$

1889.43	31°.3	9".53	5.5...14.0	3*n*	β
1898.57	31.7	9.19	...13.3	3*n*	β
1898.77	33.0	9.30	5 ...14.2	3*n*	A

The faint companion was discovered with the 36-inch. AUWERS gives the proper motion of A, 0".027 in the direction of 313°.8. The interval between the measures is too short to say whether or not the companion is moving with it.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 654. 52 *Sagittarii*

R.A. $19^h\ 29^m\ 24^s$
Decl. $-25°\ 0'$

1878.57	160°.8	2".93	5.0...10.8	3*n*	β
1878.72	163.2	2.64	4.2... 9.7	2*n*	Cin
1889.42	159.1	3.00	5.1...11.5	4*n*	β

1897.69	164°.3	2".89	4.8...11.8	3*n*	See
1898.73	163.0	3.02	...10.1	4*n*	D

Discovered with the 18½-inch. The large star has a proper motion of 0".024 in the direction of 114°.3 (AUWERS). Further measures are necessary to show whether this belongs to both components.

[β (x)...β^1...β (2957)...β (*Pub. L. O.* II)...Cin^5...See (3490)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 53. D.M. (11°) 3902

R.A. 19^h 29^m 48^s
Decl. + 11° 11'

1875.07	246°.8	1".40	9.5...10.2	4*n*	Δ
1891.72	249.6	1.43	8.8... 9.7	3*n*	β

Discovered with the 6-inch.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...Δ (1)...]

β 655. D.M. (63°) 1533

R.A. 19^h 29^m 55^s
Decl. + 63° 3'

C and D

1878.48	152°.6	1".93	...12.5	1*n*	β

A and B (= Σ 2549)

1832.24	291°.3	21".12	7.7... 8.9	4*n*	Σ
1847.39	291.8	21.90	...	1*n*	Ma
1864.61	289.6	22.32	7.1... 8.8	4*n*	Δ
1878.48	289.4	22.86	...	1*n*	β
1884.65	288.6	22.75	6.7... 7.9	4*n*	Fr
1895.64	288.3	23.58	7.7... 8.9	2*n*	Gl
1896.57	288.6	23.75	8.0... 8.9	2*n*	Lv
1898.59	288.2	24.00	... 8.2	2*n*	A
1898.60	288.6	24.02	...	1*n*	β

A and C (= Σ 2549)

1832.24	278°.8	47".48	... 7.7	4*n*	Σ
1864.61	277.2	48.98	7.1... 7.3	4*n*	Δ
1878.48	276.7	49.79	...	1*n*	β
1884.65	276.1	49.71	6.8... 6.6	5*n*	Fr
1895.64	275.4	50.36	7.7... 7.3	2*n*	Gl
1896.57	275.2	50.62	... 8.2	2*n*	Lv
1898.59	275.2	50.61	7 ... 7	2*n*	A
1898.60	275.6	50.22	...	1*n*	β

C and B

1832.24	89°.0	26".88	...	4*n*	Σ
1864.61	87.1	27.45	...	4*n*	Δ
1878.48	85.9	27.63	...	1*n*	β
1895.64	84.0	27.93	...	2*n*	Gl
1898.59	84.9	27.86	...	2*n*	A

The preceding star of the wide triple was found to be double with the 18½-inch. There has been some change in the components of Σ 2549, probably from proper motion. At least two of the three principal stars have some movement, as the distance of CB is evidently increasing. A, B, and C are respectively Nos. 10572, 10571, and 10570 of *Krueger's A. G. Catalogue.*

[β (x)...β^1...]

The complete measures of the wide stars are given. The observations will be found as follows:

[Madler (*Fixstern-Systeme* II)...Δ (1474)...Δ (II)... Franz (2649)...Lv (*A. J.* 407)...Glasenapp (IV)...Nobile (*Rend. Accad. Sci.* Napoli, Jan. 1875)...Aitken ( )...]

β 1257. Lalande 37156

R.A. 19^h 30^m 27^s
Decl. + 10° 50'

1891.72	175°.5	3".72	6.8...13.2	3*n*	β
1898.74	178.6	4.08	7.0...13.2	2*n*	A

Discovered with the 36-inch. In D.M. 6.8 m.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 761. Lacaille 8174

R.A. 19^h 31^m 45^s
Decl. — 39° 42'

1879.68	197°.4	2".±	8.0...10.5	3*n*	β
1886.71	198.7	2.55	7 ...11	1*n*	Pol
1889.42	198.2	2.45	7.7...10.2	3*n*	β
1896.63	196.0	2.33	...	3*n*	See

Discovered with the 6-inch on Mt. Hamilton in 1879. The measures show no motion.

[β (XI)...β^2...β (2057)...β (*Pub. L. O.* I, II)...Pollock (*Pub. Sydney Obsy.* 1891) (*Mon. Not.* XLVII, 473) (*Mem. R. A. S.* L)...See (3466)...]

β 249. Lalande 37227

R.A. 19h 32m 13s
Decl. + 0° 4′

1875.56	141°.7	1″.29	7.2 . . . 9.3	5*n*	♃
1876.61	149.1	1.55	7.5 . . . 10.0	1*n*	OΣ
1879.17	141.5	1.20	7.2 . . . 9.2	1*n*	Sp
1884.25	137.8	1.76	. . .	3*n*	HΣ
1891.72	137.4	1.23	7.4 . . . 9.3	3*n*	β

Discovered with the 6-inch. Little or no change A distant companion in 45°.

[β (v). . . β (*Mon. Not.* xxxv, 31). . . β (3114). . . β (*Pub. L. O.* II). . . ♃ (1). . . OΣ (*Poulkowa Obsrv.* x). . . Sp (III). . . HΣ ( ). . .]

β 144. D.M. (30°) 3664

R.A. 19h 33m 3s
Decl. + 30° 5′

1875.37	351°.0	6″.34	8.9 . . . 8.9	4*n*	♃
1880.43	352.1	6.24	8.7 . . . 8.8	1*n*	β
1883.76	350.9	6.48	9.1 . . . 9.1	6*n*	En
1888.77	351.0	6.57	. . .	2*n*	Maw

Discovered with the 6-inch. Fixed.

[β (III). . . β (*Mon. Not.* xxxiv, 59). . . β^1. . . ♃ (1). . . Engelmann (2078). . . Maw (*Mem. R. A. S.* L, 75). . .]

β 1131. θ *Cygni*

R.A. 19h 33m 13s
Decl. + 49° 56′

A and B

1889.37	43°.9	3″.62	5 . . . 14.3	3*n*	β
1892.38	47.0	3.79	. . . 14.5	1*n*	β
1898.46	49.2	3.37	. . .	1*n*	β
1898.63	46.9	3.71	5 . . . 14.5	3*n*	A

A and C

1852.69	186°.1	29″.90	. . . 11.0	1*n*	OΣ
1882.62	183.8	37.27	. . .	1*n*	OΣ
1898.45	182.8	42.16	. . . 10.3	3*n*	β
1899.55	183.0	42.30	. . .	1*n*	β

The close star was discovered with the 36-inch. It is a difficult object and beyond the reach of all but large refractors. Auwers gives the proper motion of *θ Cygni*, 0″.244 in the direction of 351°.8. It is evident from the measures that the faint companion is moving with it, and we certainly have a most interesting physical system. So far the relative change is small. The change in C is accounted for by the proper motion of A, which is nearly in the opposite direction, and therefore principally affects the distance.

[β (XVI). . . β (2912,2936,3142). . . β (*Pub. L. O.* II). . . Aitken (3585). . . OΣ (*Poulkowa Obsrv.* X, 105). . .]

β 1287

R.A. 19h 34m 5s
Decl. — 16° 36′

1899.44	144°.0	1″.07	10 . . . 10	1*n*	β

A close pair of small stars found with the 40-inch. This star is not given in S.D. It is 245″.5 from 54 *Sagittarii* in the direction of 111°.7 (1899.44).

β 977. Lalande 37329

R.A. 19h 34m 19s
Decl. + 4° 4′

1880.70	58°.9	3″.78	8.3 . . . 12.3	3*n*	β
1891.63	56.7	4.14	8.1 . . . 11.7	2*n*	β
1898.62	52.0	3.76	8.2 . . . 13.5	1*n*	D

Discovered with the 18½-inch.

β (XIII). . . β^2. . . β (3114). . . β (*Pub. L. O.* II). . . Doolittle (*Pub. Flower Obsy.* I). . .]

β 54. W° XIX. 1088

R.A. 19h 34m 49s
Decl. + 29° 28′

A and C

1876.61	303°.5	21″.86	. . . 11.5	1*n*	OΣ
1878.47	303.4	20.95	. . . 11.0	1*n*	β
1880.43	301.5	21.12	. . . 10.5	1*n*	β

A and B (= Σ 2557)

1831.78	104°.7	11″.42	7.3 . . . 9.8	3*n*	Σ
1843.77	105.7	11.17	. . .	2*n*	Ma
1868.32	104.4	11.16	7.2 . . . 10.0	3*n*	♃
1876.61	104.2	11.22	. . .	1*n*	OΣ
1879.45	103.6	10.94	. . .	2*n*	β

The more distant star, C, was added with the 6-inch. Neither of the companions is likely to be of much interest. The above are all the measures of AB. The measures of Δ (1573) belong to H 2888, another double of the same RA, and exactly 10^{v} *s*.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β^{5}...β^{3}...Mædler (*Fixstern Systeme* 1) (*Dorpat Obsns.* XI)...Δ (11)...Δ (1573, 1736)...OΣ (*Poulkowa Obsns.* X)...]

β 1288. 55 *Sagittarii*

R.A. $19^{h}\ 35^{m}\ 39^{s}$
Decl. $-16^{\circ}\ 24'$

In looking over my Mt. Hamilton observing books I find that on June 7, 1889, I examined this star with the 12-inch, and recorded it as a close equal pair, with magnitudes 5½ and 5½, and "distance less than 0".2." The angle was measured with the highest power of that instrument, giving 340°.7. This observation was overlooked by me, and the star not subsequently examined either with the 12 or 36-inch. As I have no reason to doubt the substantial correctness of the original observation, I give this star a place here, with the confident expectation that it will be hereafter verified. Professor Aitken has examined it with the 36-inch several times this year (1899) at my request. At one time there was a slight suspicion of possible elongation, but if double it was too close for even that instrument.

β 656. Lalande 37475

R.A. $19^{h}\ 35^{m}\ 45^{s}$
Decl. $+51^{\circ}\ 33'$

1878.17	257°.6	0".50	8.0...	9.2	3*n*	β
1878.33	259.1	0.51	8.3...	9.0	3*n*	Δ
1884.57	256.3	0.73	...		2*n*	HΣ
1890.47	257.9	0.69	...		5*n*	Sp
1898.48	256.0	0.78	8.4...	9.1	5*n*	D

Discovered with the 18½-inch. Rogers (*A. G. Catalogue*) gives the star a proper motion of 0".046 in the direction of 90°.0. The measures show no relative motion.

[β (x)...β^{5}...Δ (1)...Sp (III)...Doolittle (*Pub. Flower Obsy.* 1)...HΣ ( )...]

β 145. Lalande 37464

R.A. $19^{h}\ 36^{m}\ 31^{s}$
Decl. $+30^{\circ}\ 26'$

A and B

1875.13	268°.2	0".87	6.8... 9.5	4*n*	Δ
1878.63	258.1	0.93	7.2... 9.7	2*n*	OΣ
1885.53	264.9	1.05	...	1*n*	HΣ
1888.78	266.4	0.73	...	4*n*	Sp
1893.50	266.1	0.87	7.2... 9.7	3*n*	W

AB and C

1878.43	32°.6	8".51	7.5...13.0	1*n*	β
1879.66	24.5	9.62	...11.8	2*n*	OΣ
1885.53	28.5	9.08	...	1*n*	HΣ
1893.50	28.7	9.30	...12.8	2*n*	W

AB and D

1876.70	155°.9	27".39	...10.5	1*n*	OΣ
1878.43	157.3	26.67	...10.8	1*n*	β
1885.53	156.9	26.80	...	1*n*	HΣ
1893.50	157.6	26.76	...11.0	2*n*	W

Discovered with the 6-inch.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β^{3}...Δ (1)...OΣ (*Poulkowa Obsns.* X)...Wilson ( )...]

β 827. Lalande 37470

R.A. $19^{h}\ 38^{m}\ 7^{s}$
Decl. $-11^{\circ}\ 29'$

1881.62	268°.0	0".87	8.3...	9.1	3*n*	β
1888.05	269.9	0.98	8.5...	9.5	3*n*	Com
1893.76	264.5	1.02	8.5...	9.7	3*n*	W

Discovered with the 15½-inch at the Washburn Observatory. The measures credited to this star by Collins (*Proc. Haverford Coll. Obsy.* 1891) belong to a new pair 15".*n* of β 827. It is somewhat similar to this in angle and magnitudes. Collins gives 251°.8 : 1".34 : 8.5...9.5 (1891.72) 2*n*.

[β (XII)...β^{5}...Comstock (*Pub. Washburn Obsy.* VI)...Wilson ( )...]

β 1132. W° XIX, 1204

R.A. $19^{h}\ 38^{m}\ 11^{s}$
Decl. $+26^{\circ}\ 39'$

1889.56	227°.3	0".49	8.3...	8.7	3*n*	β
1897.68	227.1	0.47	...		2*n*	Lew
1898.82	225.2	0.42	8.3...	9.0	2*n*	A

Discovered with the 36-inch.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...Aitken (3585)...]

β 657. W° XIX. 1209

R.A. 19h 38m 40s
Decl. + 22° 21′

1877.74	140.1°	0.93″	9.2...10.0	2*n*	J
1878.78	144.4	0.90	9.2...10.7	1*n*	β
1892.71	328.2	0.80	9.0...10.0	2*n*	Ho
1898.65	147.7	0.84	9.0...10.0	3*n*	A

Discovered with the 18½-inch. The change, if any, is slow.

[β (IX)...β′...Δ (I)...Hough (3234)...Aitken (3585)...]

β 658. B.A.C. 6762

R.A. 19h 39m 1s
Decl. + 26° 51′

1878.53	295.2°	0.57″	6.5...10.0	1*n*	β
1882.62	295.9	0.63	7.0...10.0	1*n*	OΣ
1882.68	286.5	0.51	6.5...10.0	1*n*	Perry
1889.16	290.8	0.56	...	9*n*	HΣ
1889.56	299.9	0.50	6.7... 9.7	3*n*	β
1889.86	297.4	0.45±	...	3*n*	Sp
1897.63	291.1	0.50	...	3*n*	Lew
1898.72	310.9	0.59±	6.0...10.5	2*n*	D

Discovered with the 18½-inch. Relative change is not very certain, but the components evidently have the same movement in space. The proper motion of the principal star is 0″.062 in the direction of 195°.0 (AUWERS), and this is therefore a physical system.

[β (X)...β′...β (2957)...β (*Pub. L. O.* II)...OΣ (*Poulkowa Obsns.* X)...Perry (*Eng. Mech.* XXXVI, 65)...Sp (III)...Doolittle (*Pub. Flower Obsy.* I)...Lewis (*Mon. Not.* LIX, 400)...HΣ ( )...]

β 467. O. Arg. S. 19936

R.A. 19h 39m 24s
Decl. — 21° 49′

1879.61	135.0°	2.61″	7.7...10.0	2*n*	Cin
1886.72	131.2	3.04	7.8...10.7	3*n*	I.M
1892.52	134.2	3.13	8.0...11.0	1*n*	I.v
1897.75	136.7	3.27	7.5...10.8	1*n*	See
1898.62	133.4	3.07	7.5...10.7	3*n*	D

Discovered with the 6-inch. Probably without change.

[β (IX)...β (*Mon. Not.* XXXVII, 78)...Cin5...I.M...I.v (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892I...See (3496)...Doolittle (*Pub. Flower Obsy.* I)...]

β 468. Lalande 37571

R.A. 19h 39m 58s
Decl. + 3° 57′

1876.97	182.4°	9.55″	7.0...11.3	3*n*	J
1878.58	181.1	9.77	7.0...10.5	1*n*	OΣ
1884.60	182.2	9.72	...	2*n*	HΣ
1891.63	183.0	9.81	6.6...11.0	2*n*	β
1899.42	183.0	9.58	6.7...11.5	2*n*	β

Discovered with the 6-inch.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β (3111)...β (*Pub. L. O.* II)...Δ (I)...OΣ (*Poulkowa Obsns.* X)...]

β 146. Lalande 37541

R.A. 19h 40m 6s
Decl. — 20° 10′

1873.50	290.1°	1.1″	9.0...10.5		β
1879.57	301.8	0.91	8.3... 9.0	1*n*	β
1879.64	295.7	1.00	8.0...10.0	1*n*	Cin
1891.73	308.4	0.91	8.1... 9.2	3*n*	β
1893.70	315.1	1.07	8.0... 9.3	3*n*	W
1897.74	305.8	1.09	8.1... 9.2	3*n*	A

Discovered with the 6-inch. In a low-power field with 56 *Sagittarii*, 43° *f* and 7′.4 *s* of that star.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β′...β (3114)...β (*Pub. L. O.* II)...Wilson ( )...Aitken (*A. J.* 429)...]

β 55.

R.A. 19h 40m 30s
Decl. + 10° 16′

A and B

1891.73	28.3°	3.69″	9.6... 9.7	2*n*	β
1898.57	30.2	3.67	...	1*n*	β

A and C

1898.57	260.6°	33.26″	... 9.6	1*n*	β

A pair of small stars about 3′ *s* of γ *Aquilæ*. Not in the D.M.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...]

β 828. D.M. (5°) 4290

R.A. 19h 41m 3s
Decl. + 5° 52′

1881.64	10.1	2.87	8.3...10.2	3n	β
1887.92	5.6	3.02	8.0...10.0	4n	Com
1891.73	9.0	2.74	8.3...10.2	3n	β
1899.42	9.4	2.57	8.3...10.5	2n	β

Discovered with 15½-inch at the Washburn Observatory. Without change.

[β (XII)...β²...β (3114)...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* VI)...]

β 147. D.M. (31°) 3770

R.A. 19h 42m 16s
Decl. + 31° 48′

1875.37	298.8	8.66	8.7...10.6	4n	J
1877.67	300.4	8.55	8.5...10.0	2n	Sp
1893.54	297.6	8.86	8.3... 9.3	3n	Lv
1898.60	297.4	8.70	8.2... 9.5	3n	D

Discovered with the 6-inch. No motion.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Δ (I)...Sp (II, p. 137)...Lv (*A. J.* 382)...Doolittle (*Pub. Flower Obsy.* I)...]

β 829. D.M. (5°) 4299

R.A. 19h 43m 2s
Decl. + 5° 27′

1881.65	312.0	0.72	8.4... 8.8	3n	β
1887.71	314.2	0.93	8.5...10.0	3n	Com
1892.52	319.0	0.80	8.0... 8.6	2n	Lv
1892.70	306.6	0.60	8.5... 8.7	1n	Ho
1896.54	308.6	0.72	8.0... 8.7	4n	Lv
1898.64	308.9	0.83	8.2... 8.6	3n	A

Discovered with the 15½-inch at the Washburn Observatory. The measures are not consistent in angle, but there is probably no material change.

[β (XII)...β²...Comstock (*Pub. Washburn Obsy.* VI)...Lv (*A. J.* 278,407) (*Proc. Haverford Coll. Obsy.* 1892)...Hough (3234)...Aitken (3585)...]

β 361. W³ XIX. 1429

R.A. 19h 45m 7s
Decl. + 22° 22′

1875.89	350.0	3.49	9.2... 9.9	4n	J
1892.52	350.0	3.96	9.0... 9.1	2n	Lv

Discovered with the 6-inch. In a low-power field with 12 *Vulpeculae*.

[β (VI)...β (2062)...Δ (I)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

β 148. Lalande 37779

R.A. 19h 45m 27s
Decl. − 10° 30′

A and B

1875.26	333.2	0.91	7.9... 8.3	4n	J
1879.25	331.2	0.87	7.8... 8.4	1n	Cin
1888.51	325.9	0.79	8.0... 8.5	1n	Lv
1891.63	323.3	0.78	7.4... 7.7	2n	β
1893.66	322.5	0.78	7.8... 8.5	4n	W
1898.75	321.4	0.95	7.9... 8.4	3n	D

A and C

1891.63	64.7	26.32	...13.5	2n	β
1893.62	63.3	26.51	...12.0	1n	W
1898.75	64.0	27.13	...12.6	3n	D

Discovered with the 6-inch. There seems to be slow retrograde motion in the angle of the close pair.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (3114)...β (*Pub. L. O.* II)...Δ (I)...Cin⁵...Lv⁴...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 978. W³ XIX. 1470

R.A. 19h 46m 22s
Decl. + 23° 13′

1880.48	234.2	0.94	8.3... 8.4	3n	β
1889.84	235.6	0.99	...	4n	Sp
1898.64	233.8	1.05	8.5... 8.5	3n	A

Discovered with the 18½-inch.

[β (XIII)...β²...Sp (III)...Aitken (3585)...]

β 979. W³ XIX. 1496

R.A. 19h 46m 57s
Decl. + 22° 58′

1880.49	338.7	2.24	8.3...11.1	3n	β
1893.53	335.9	2.25	8.1...11.5	4n	Lv

Discovered with the 18½-inch.

[β (XIII)...β²...Lv (*A. J.* 382)...]

β 659. Rümker 7844

R.A. $19^h\ 48^m\ 48^s$
Decl. $+\ 6°\ 50'$

1878.62	316°.0	12".32	6.5...12.5	1*n*	β
1884.58	314.2	12.13	...	2*n*	HΣ
1891.50	315.6	12.39	6.6...12.5	5*n*	β
1898.68	314.5	12.47	6.7...12.3	3*n*	D

Discovered with the 18½-inch. The change, if any, is small. This is D.M. (6°) 4351, 7.0 m.

[β (x)...β^1...β (3114)...β (*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...HΣ ( )...]

β 830. Lalande 37916

R.A. $19^h\ 49^m\ 0^s$
Decl. $-\ 1°\ 9'$

1881.74	106°.4	2".72	8.0...11.2	2*n*	β
1886.80	106.3	2.69	7.7...12.0	2*n*	Ho
1886.87	105.6	2.90	...	2*n*	UL
1887.81	106.0	2.81	8.2...11.8	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory. Without change.

[β (XII)...β^2...Hough (2978)...Updegraff and Lamb (*Pub. Washburn Obsy.* V)...Comstock (*Pub. Washburn Obsy.* VI)...]

β 980. η *Cygni*

R.A. $19^h\ 51^m\ 48^s$
Decl. $+\ 34°\ 46'$

A and B

1879.89	209°.6	7".07	5 ...13	5*n*	β
1887.27	207.3	7.44	...	5*n*	HΣ
1889.51	210.4	7.21	4 ...13	4*n*	β
1898.56	208.2	7.23	...13	2*n*	β
1898.91	209.0	7.70	4 ...14.2	2*n*	A

A and C (= H 1455)

1828	332°.0	30"±	...18	1*n*	H
1879.47	325.3	46.17	...11.5	1*n*	β
1889.51	326.2	46.08	...11.0	2*n*	β
1898.56	326.2	46.00	...12.5	2*n*	β

A and D (= H 1455)

1828	170°±	20"±	...18	1*n*	H
1879.47	170.0	49.52	...11.5	1*n*	β
1889.51	169.1	49.82	...10.7	2*n*	β
1898.56	168.0	49.65	...12.5	2*n*	β

A and E

1898.56	247°.3	61".72	...12.5	1*n*	β

The faint companion was detected with the 18½-inch. AUWERS gives the proper motion of *η Cygni* as 0".046 in the direction of 231°.0. This movement would increase the distance of B, if fixed, about 0".4 in the time covered by the measures. The object is not an easy one to measure, and it is impossible at this time to say whether these stars have the same proper motion. The probabilities are that they form a system. The relation will be apparent from the measures of the next few years.

The distant stars, C and D, noted by HERSCHEL (*Fourth Catalogue*), can only be optical companions. All the measures of these stars are given.

[β (XIII)...β^1...β (2957)...β (*Pub. L. O.* II)...HΣ ( )...Aitken (3585)...]

β 831. D.M. (47°) 2955

R.A. $19^h\ 51^m\ 59^s$
Decl. $+\ 47°\ 4'$

1881.46	128°.0	0".94	8.6... 9.0	3*n*	β
1888.20	128.3	0.92	8.9... 9.6	4*n*	Com
1898.59	128.4	1.08	8.6... 9.3	4*n*	D

Discovered with the 15½-inch at the Washburn Observatory. Without change.

[β (XII)...β^2...Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* I)...]

β 266. W^s XIX. 1282

R.A. $19^h\ 52^m\ 15^s$
Decl. $+\ 11°\ 5'$

1875.31	167°.3	15".65	7.2...11.3	3*n*	J
1892.57	167.0	15.94	8.0...11.0	1*n*	Lv
1898.55	166.4	15.55	7.5... 9.5	3*n*	D

Discovered with the 6-inch.

[β (V)...β (*Mon. Not.* XXXV, 31)...J (I)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* I)...]

β 425. Lalande 38087

R.A. 19h 52m 15s
Decl. + 19° 58′

A and B

1876.29	241°.3	1″.26	8.8...	9.0	3*n*	J
1879.55	241.2	1.41	83....	8.4	3*n*	β
1883.46	63.7	1.70	8.4...	8.6	6*n*	En
1891.50	242.1	1.30	8.4...	8.5	3*n*	β
1896.61	242.1	1.28	...		1*n*	Lew
1898.58	241.5	1.32	...		5*n*	Bow
1898.66	240.9	1.39	8.5...	8.5	4*n*	D
1899.60	237.4	1.25	...		1*n*	Bar

A and C

1879.55	40°.4	19″.81	...12.0	3*n*	β
1898.66	39.5	19.85	...10.9	4*n*	D

Discovered with the 6-inch. Fixed.

[β (VII)...β (2103,3114)...β[c]...β[3]...β (*Pub. L. O.* II)...J (I)...Engelmann (2678)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...Doolittle (*Pub. Flower Obsy.* I)...Barnard ( )...]

β 981. W[c] XIX. 1687

R.A. 19h 52m 40s
Decl. + 20° 13′

A and B

1880.31	111°.4	3″.07	8.0...11.4		4*n*	β
1891.51	109.7	3.32	8.2...10.0		2*n*	β
1898.55	109.1	2.86	8.7...11.9		3*n*	D

A and C

1880.48	58°.8	32″.10	...	1*n*	β
1898.55	58.5	32.61	...10.7	3*n*	D

Discovered with the 18½-inch.

[β (XIII)...β[1]...β (3114)...β (*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

β 149. Lalande 38105

R.A. 19h 52m 47s
Decl. + 16° 10′

B and C

1893.54	199°.8	8″.32	9.9...12.5		4*n*	Lv
1898.64	199.5	8.38	8.5...11.5		3*n*	A

A and B

1893.54	278°.6	126″.57	6.5...		3*n*	Lv
1898.64	278.6	127.75	7.0...		3*n*	A

Distant double companion noted with the 6-inch. Probably unimportant. The principal star has a very small proper motion of 0″.005 in the direction of 324°.2 (*Berlin A. G. Catalogue*).

[β (III)...β (*Mon. Not.* XXXIV, 59)...Lv (*A. J.* 382)...Aitken (3585)...]

β 469. W[c] XIX. 1757

R.A. 19h 54m 28s
Decl. + 24° 24′

1877.01	175°.4	14″.43	8.3...10.7		3*n*	J
1891.50	177.3	14.34	8.1...10.8		3*n*	β

Discovered with the 6 inch. Too wide to be of any interest as a double star.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β (3114)...β (*Pub. L. O.* II)...J (I)...]

β 1133. Lalande 38224

R.A. 19h 54m 56s
Decl. + 31° 30′

1889.56	338°.6	0″.87	6.8...	9.5	3*n*	β
1897.67	335.4	0.68	...		2*n*	L
1897.79	335.3	0.93	...		3*n*	A
1898.73	337.4	0.73	...		1*n*	Bow

Discovered with the 36-inch.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...]

β 1258. D.M. (29°) 3838

R.A. 19h 55m 26s
Decl. + 29° 35′

1878.41	159°.9	1″.52	8.0...12.0		1*n*	β
1891.49	157.4	1.45	8.0...10.8		3*n*	β
1897.78	153.2	1.23	...		1*n*	L
1897.79	153.9	1.56	8.0...10.8		3*n*	A
1898.73	156.3	1.35	...		1*n*	Bow

In attempting to remeasure β 439 in 1878, the first observation given above was made. It was

evidently a case of unusual motion in a pair of this kind, or of mistaken identity. The matter was investigated with the 36-inch, and it was found that the measure of 1878 belonged to a new pair 30ˢ *p* *β* 439. There is no obvious change in the components.

[*β* (XVIII)...*β* (3113)...*β*¹...*β* (*Pub. L. O.* II)...Aitken (*A. J.* 429)...Lewis and Bowyer (*Mon. Not.* LIX, 400)...]

β 439. D.M. (29°) 3845

R.A. 19ʰ 55ᵐ 57ˢ
Decl. + 29° 30′

1876.80	249°.7	2″.70	8 ...	1*n*	*β*
1891.50	248.2	3.05	7.9...12.7	3*n*	*β*
1897.75	241.8	3.28	...	1*n*	L

Discovered with the 18½-inch. The measure in *β*¹, credited to this pair, really belongs to a new pair in the field *np*. (See *β* 1258.)

[*β* (VIII)...*β* (*Am. Jour. Sci.* July 1877)...*β* (3114)...*β* (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...]

β 1289. W° XIX. 1835

R.A. 19ʰ 56ᵐ 38ˢ
Decl. + 37° 23′

A and B

1899.32	57°.7	0″.84	8.3... 9.2	3*n*	*β*

A and C

1899.32	90°.0	21″.51	... 9.0	3*n*	*β*

The close pair was discovered with the 18¾-inch July 13, 1880, but forgotten at the time, and only found upon a recent examination of the old observing records of twenty years ago. The measures given above were made with the 40-inch. C is W° XIX. 1838. The distance from the meridian positions of 1825 is 22′.41.

β 56. Lalande 38313

R.A. 19ʰ 58ᵐ 47ˢ
Decl. — 4° 30′

1875.43	162°.2	1″.61	8.2... 9.2	4*n*	J
1879.26	164.3	1.57	7.7... 9.0	3*n*	Cin
1886.73	165.0	1.65	7.9... 8.9	3*n*	LM
1888.57	165.6	1.70	7.7... 9.0	1*n*	Lv
1892.70	168.2	2.43	7.5... 9.1	1*n*	Gl
1896.52	165.7	1.55	8.0... 8.9	3*n*	Lv
1898.62	167.4	1.71	...	1*n*	Cg
1898.63	166.1	1.55	8.2... 9.5	3*n*	Bd

Discovered with the 6-inch. Probably fixed.

[*β* (1)...*β* (*Mon. Not.* XXXIII, 351)...J (1)...Cin³...LM...Lv²...Lv (*A. J.* 407)...Glasenapp (III)...Boothroyd and Cogshall ( )...]

β 426 and β 427. O. Arg. N. 19938

R.A. 19ʰ 59ᵐ 13ˢ
Decl. + 54° 18′

A and B (= *β* 426)

1877.05	310°.0	5″.75	8.2...10.2	6*n*	J
1884.49	311.5	6.02	8.3...10.1	6*n*	En
1893.49	310.1	5.71	8.1...10.7	3*n*	Lv
1898.48	308.8	5.78	8.6... 9.1	3*n*	D

C and D (= *β* 427)

1877.05	336°.5	3″.01	8.1...10.0	6*n*	J
1884.49	337.3	3.18	8.3...10.0	6*n*	En
1893.49	335.7	2.93	8.3...10.5	3*n*	Lv
1898.48	333.8	2.90	8.5... 9.5	3*n*	D

A and C

1877.18	53°.3	166″.17	...	4*n*	J
1884.78	53.4	165.99	...	2*n*	En
1898.48	53.2	164.64	...	3*n*	D

The two pairs, forming a wide quadruple group, were discovered with the 6-inch. All are probably relatively fixed. C is O. Arg. N. 19952.

[*β* (VII)...*β* (2103)...J (1)...Engelmann (2742)...Lv (*A. J.* 382)...Doolittle (*Pub. Flower Obsy.* I)...]

β 57. Lalande 38415

R.A. 19ʰ 59ᵐ 55ˢ
Decl. + 15° 9′

1875.10	118°.9	2″.33	6.2...10.6	4*n*	J
1876.60	120.7	2.09	6.5...10.0	1*n*	OΣ
1877.70	123.4	2.50	...	1*n*	*β*
1884.31	121.8	2.53	...	3*n*	HΣ
1891.50	118.3	2.60	6.7...11.3	3*n*	*β*

Discovered with the 6-inch. Without change. The magnitude in D.M. is 6.0; Harvard, 6.5.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β^1...β (3114)...β (*Pub. L. O.* II)...Δ (1)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...]

β 832. S.D. (11°) 5230

R.A. 20h 0m 5s
Decl. − 10° 59′

1881.65	101°.8	1".34	8.6... 8.9	3*n*	β
1886.74	101.1	...	9 ... 9	1*n*	LM
1886.87	104.0	1.36	...	2*n*	UL
1887.79	103.3	1.49	8.6... 9.5	3*n*	Com
1888.51	100.2	1.34	8.7... 9.2	1*n*	Lv
1898.68	104.2	1.80	8.7... 9.7	3*n*	Cg

Discovered with the 15½-inch at the Washburn Observatory. The measures show no change.

[β (XII)...β^a...LM...Updegraff and Lamb (*Pub. Washburn Obsy.* V)...Lv^1...Comstock (*Pub. Washburn Obsy.* VI)... Cogshall ( )...]

β 428. D.M. (12°) 4226

R.A. 20h 1m 5s
Decl. + 12° 36′

1876.49	343°.7	0".56	7.2... 8.5	3*n*	Δ
1878.58	353.2	1.04	7.5... 9.5	1*n*	OΣ
1885.52	355.5	0.60	...	2*n*	HΣ
1892.57	351.4	0.61	7.5... 8.8	1*n*	Lv
1893.72	350.2	0.68	7.8... 9.2	3*n*	W
1897.73	351.6	0.73	...	3*n*	Dob

Discovered with the 6-inch. Probably unchanged.

[β (VII)...β (2103)...Δ (1)...OΣ (*Poulkowa Obsns.* X)...HΣ ( )...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ...Wilson ( )...Doberck (3466)...]

β 429 and β 440. Lalande 38520

R.A. 20h 1m 27s
Decl. + 35° 27′

A and B (= β 440)

1876.80	61°.3	6".47	7.0...12.0	1*n*	β
1878.53	61.1	6.63	7.0...12.5	1*n*	β
1892.80	60.6	6.93	7.0...12.0	1*n*	Ho

A and C (= β 429)

1876.73	25°.8	7".75	7.0...11.0	2*n*	Δ
1878.53	25.1	8.39	...12.0	1*n*	β
1892.80	26.3	8.12	...10.0	1*n*	Ho

A and E (= β 429)

1876.73	106°.8	28".15	...11.5	2*n*	Δ
1892.80	106.3	27.84	...11.0	1*n*	Ho

A and D (= H^1 III. 113 = Sh 314)

1783.75	296°.0	11".27	...	1*n*	H^1
1823.58	301.0	10.79	...12	1*n*	Sh
1876.73	300.7	11.11	... 9.5	2*n*	Δ
1892.80	300.3	11.34	...10.0	1*n*	Ho

A and F

1783.75	32°.8	29".45	...	1*n*	H^1
1823.58	28.2	36.52	...	2*n*	Sh
1876.73	28.2	35.98	... 7.7	2*n*	Δ
1892.80	28.4	35.97	... 8.0	1*n*	Ho

F and G

1876.80	113°.0	10".12	...12	1*n*	β
1892.80	104.5	10.25	...12	1*n*	Ho

The near faint companions were discovered with the 18½-inch. A, D, and F make the wide triple, H^1 III, 113 (= Sh 314 = Σ 2630 *ref*). These stars are probably unchanged. All the measures are given above.

[β (VII, VIII)...β (2103) (*Am. Jour. Sci.* July 1877)...β^1...Δ (1)...Hough (3234)...]

β 470. O. Arg. N. 20079

R.A. 20h 3m 41s
Decl. + 63° 25′

1877.69	214°.8	2".40	9.5...11.0	2*n*	Δ
1892.63	215.7	2.48	8.3...10.5	3*n*	W

Discovered with the 6-inch. In the field 16^p β and 4′ *n* of Σ 2642.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...Δ (1)...Wilson ( )...]

β 833. Lalande 38625

R.A. 20h 5m 11s
Decl. — 6° 30′

B and C

1881.74	63°.7	2″.30	8.8...11.7	2*n*	β
1884.82	58.4	2.10	8.5...11.5	1*n*	Ho
1886.86	76.0	2.52	...	1*n*	UL
1888.08	59.2	2.45	8.5...12.1	3*n*	Com
1898.53	59.9	2.18	8.9...12.5	3*n*	D
1898.62	57.7	2.41	8.3...11.6	3*n*	A
1898.73	61.1	2.13	...12.6	4*n*	Bd

A and B

1881.74	63°.5	118″.58	8.4...	2*n*	β
1886.86	63.0	119.65	...	3*n*	UL
1898.60	63.1	119.74	8.0... 8.3	3*n*	A
1898.72	63.1	120.66	8.0... 8.5	3*n*	Bd

Discovered with the 15½-inch at the Washburn Observatory Probably no change. BOOTHROYD measures a 12 m star from A, 357°.2 : 43″.63 (1898.72) 3*n*.

[β (XII)...β^1...Hough (2978)...Updegraff and Lamb (*Pub. Washburn Obsy.* V)...Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* I)...Aitken (3585)...Boothroyd ( )...]

β 1205. Lalande 38649

R.A. 20h 5m 47s
Decl. — 8° 27′

1890.65	50°.0	0″.56	8.1... 9.4	3*n*	β
1897.71	46.6	0.70	...	3*n*	A
1897.79	48.2	0.59	...	1*n*	Br

Discovered with the 12-inch. In S.D. 7.0 m.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429)...Brown ( )...]

β 150. W^3 XX. 176

R.A. 20h 5m 36s
Decl. + 33° 17′

B and C

1840.82	191°.6	1″.55	8.0... 9.5	1*n*	OΣ
1875.45	187.1	1.66	8.1...10.0	4*n*	J
1893.51	187.7	1.85	8.0... 9.8	3*n*	Lv
1898.75	187.2	1.78	... 9.6	4*n*	D

A and B (= S 738)

1824.69	112°.3	41″.86	8 ... 9	1*n*	S
1840.82	111.7	41.24	7.5...	1*n*	OΣ
1875.76	110.3	41.15	7.0...	3*n*	J
1885.91	110.3	41.40	...	5*n*	Eng
1898.74	109.2	41.26	7.1... 7.7	2*n*	D

The duplicity of the smaller member of the wide pair, S 738, was discovered with the 6 inch. It had been previously seen, however, and was given as OΣ 541 in the *Poulkowa Observations*, IX, published after β (III). All the measures of these stars are given above. There is no evidence of change.

[β (III)...β (*Mon. Not.* XXXIV, 59)...J (1)...OΣ (*Poulkowa Observations* IX, X, p. 45)...Lv (*A. J.* 382)...Engelhardt (2785) (*Astron. Obsns.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

β 430. D.M. (35°) 4008

R.A. 20h 6m 48s
Decl. + 35° 28′

A and B

1877.30	18°.7	1″.10	9.3...10.2	3*n*	J
1893.51	21.1	0.98	8.9...10.0	3*n*	Lv
1898.76	23.8	0.97	8.7... 9.7	4*n*	D

AB and C (= H 1489)

1828	236°.3	13″.±	9-10...10	1*n*	H
1877.61	51.3	17.09	9.3... 9.2	2*n*	J
1893.55	52.5	17.15	... 9.3	1*n*	Lv
1898.76	51.6	16.87	... 9.8	4*n*	D

The close pair was discovered with the 6-inch. It is probable there is an error of 180° in the angle of the wide pair by H, as the *p* star is obviously the brightest, and so in D.M., where the respective magnitudes are 9.3 and 9.5.

[β (VII)...β (2103)...J (1)...Lv (*A. J.* 382)...Doolittle (*Pub. Flower Obsy.* I)...]

β 982. D.M. (25°) 4146

R.A. 20h 6m 51s
Decl. + 26° 1′

1880.47	51°.0	0″.87	8.8...10.0	2*n*	β
1893.51	50.1	0.81	9.1...10.3	3*n*	Lv

Discovered with the 18½-inch. It is the *sf* star of a wide pair. There is a 6.2 m star 6′.5 *n*.

[β (XIII)...β^2...Lv (*A. J.* 382)...]

β 762. Lacaille 8392

R.A. 20h 9m 19s
Decl. − 32° 59′

1877.65	303°.3	2″.49	7.7 ... 8.0	2n		Cin
1887.72	303.8	2.78	8 ... 8	4n		Pol
1891.13	303.3	2.36	8.1 ... 8.3	3n	β	
1891.74	301.6	2.21	7 ... 8	1n		Sel
1893.68	303.1	2.25	7½ ... 7½	1n		Sel
1896.69	301.7	2.33	7.8 ... 8.2	5n		See
1897.62	303.8	2.49	7 ... 8	2n		Sc

Discovered with the 6-inch. Without change.

[β (XI)...β″...β (3114)...β (*Pub. L. O.* II)...Cln[4]...Pollock (*Pub. Sydney Obsy.* 1891) (*Mem. R. A. S.* L)...Sellors (3158,3240)...See (3496)...Scott (*Mem. Not.* LIX, 427)...]

β 660. B.A.C. 6963

R.A. 20h 9m 40s
Decl. + 43° 1′

1878.65	318°.1	9″.44	7.0 ... 13.5	1n	β
1884.55	320.5	9.72	...	2n	HΣ
1898.57	320.2	9.60	6.5 ... 13.0	3n	A

Discovered with the 18½-inch. In HEIS 6.7 m.

[β (8)...β″...Aitken (3585)...HΣ ( )...]

β 294. 3 *Capricorni*

R.A. 20h 9m 44s
Decl. − 12° 42′

B and C

1891.64	177°.9	8″.17	13.0 ... 13.5	2n	β
1898.56	180.4	7.49	13.5 ... 14.5	2n	A

A and B

1891.64	36°.2	27″.14	5.7 ...	2n	β
1898.56	36.0	26.54	6.5 ...	2n	A

These faint companions were noted with the 26-inch of the Naval Observatory. The large star has a proper motion of 0″.020 in the direction of 275°.6 (AUWERS).

[β (V)...β (*Mon. Not.* XXXV, 31)...β (3114)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 983. B.A.C. 6966

R.A. 20h 10m 11s
Decl. + 25° 14′

1879.86	154°.9	0″.86	6.1 ... 10.2	3n	β
1888.84	155.6	0.81	...	5n	Sp
1899.51	152.6	1.04	5.8 ... 10.3	3n	A

Discovered with the 18½ inch. In HEIS and ARGELANDER this star is 5 m (*Vulpecula*); Harvard photometry 4.8.

[β (XIII)...β′...Sp (III)...Aitken ( )...]

β 59. W[3] XX. 213

R.A. 20h 10m 36s
Decl. + 4° 45′

1875.66	118°.8	8″.79	9.1 ... 11.0	4n	J
1892.65	116.5	8.72	8.8 ... 11.0	3n	W
1898.46	116.0	8.59	9.0 ... 9.7	3n	D

Discovered with the 6-inch.

[β (1)...β (*Mon. Not.* XXXIII, 351)...J (1)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 295. α[1] *Capricorni*

R.A. 20h 11m 0s
Decl. − 12° 53′

A and B

1875.75	181°.8	40″±	4	...16	1n	Hn
1891.83	181.9	43.46		...13.5	2n	β
1899.43	181.5	43.46		...13.0	2n	β

A and C (= H 607)

1830.56	220°.1	44″.14	4	... 9.10	1n	Dawes
1879.49	221.1	44.32		... 9.0	3n	β
1881.85	221.2	44.65		...	1n	Big
1890.52	220.8	44.37		... 8.0	2n	Gl
1891.83	221.5	44.65		... 8.9	2n	β
1899.43	221.1	44.84		... 9.5	2n	β

The faint star was added with the Washington 26-inch. All the measures of AC are given. AUWERS gives the proper motion of the large star, 0″.028 in the direction of 335°.8.

[β (V)...β (*Mon. Not.* XXXV, 31)...β (3114)...β (*Pub. L. O.* II)...Holden (*Wash. Obsns.* 1875)...Dawes (*Mem. R. A. S.* XIX)...Bigourdan (*Paris Obsns.* 1883)...Glasenapp (1)...]

β 442. W^s XX. 417

R.A. 20^h 12^m 4^s
Decl. + 37° 13′

A and B

1876.77	104°.1	18″.47	8.0... 8.5	1*n*	β
1879.43	103.7	19.02	8.0... 9.5	1*n*	Cin
1898.60	102.2	18.83	...	1*n*	β

B and C

1876.77	48°.6	17″.69	... 8.5	1*n*	β
1879.47	48.5	17.41	7.0... 8.5	2*n*	Cin
1898.76	50.6	16.82	...	1*n*	β

A and *a*

1876.77	157°.5	4″.40	...	1*n*	β
1879.47	155.3	4.01	8.7... 10.2	2*n*	Cin
1898.60	156.9	3.88	...	1*n*	β

A and *b*

1876.77	157°±	7″±	...	1*n*	β
1888.60	156.7	9.01	...	1*n*	β

A and *c*

1876.77	332°.5	19″.55	...	1*n*	β
1879.43	331.2	18.88	...10.5	1*n*	Cin
1898.60	333.2	19.01	...	1*n*	β

B and *d*

1898.76	128°.1	3″.68	...14	1*n*	β

B and *e*

1876.77	164°.3	8″.12	...	1*n*	β
1879.43	165.3	5″±	...13	1*n*	Cin
1898.60	163.7	6.77	...	1*n*	β

C and *f*

1879.43	109°.4	11″.26	...11.0	1*n*	Cin
1898.60	110.3	12.65	...	1*n*	β

C and *g*

1879.43	116°.1	20″.52	...11.0	1*n*	Cin
1898.60	116.2	20.83	...	1*n*	β

C and *h*

1879.43	305°.6	15″±	...13.0	1*n*	Cin
1898.60	306.1	15.57	...	1*n*	β

A multiple star or group, discovered with the 18½-inch, except the extremely faint star *d*, which was detected with the 40-inch in measuring the other stars. This is probably only a perspective group.

[β (VIII)...β (*Am. Jour. Sci.* July 1877)...Cin^s...]

β 984. D.M. (25°) 4184

R.A. 20^h 12^m 31^s
Decl. + 26° 0′

1880.47	204°.1	0″.86	7.9... 8.2	2*n*	β
1883.70	199.8	0.63	8.0... 8.0	3*n*	Ho
1888.49	203.1	...	...	1*n*	Lv
1890.85	207.5	0.73	...	7*n*	Sp

Discovered with the 18½-inch.

[β (XIII)...β^1...Hough (2978)...Lv^4...Sp (III)...]

β 441. Lalande 39013

R.A. 20^h 12^m 37^s
Decl. + 28° 46′

1876.80	65°.4	5″.87	7.0...	1*n*	β
1877.68	67.6	5.74	6.7...11.5	2*n*	J
1878.58	67.5	6.07	7.0...10.0	1*n*	OΣ
1880.47	65.7	5.67	6.5...11.5	1*n*	β
1883.62	65.5	6.10	...	2*n*	HΣ
1893.51	65.6	5.93	6.3...11.5	3*n*	Lv
1896.80	66.3	5.70	...	3*n*	Morgan

Discovered with the 18½-inch. Without change.

[β (VIII)...β (*Am. Jour. Sci.* July 1877)...β^3...J (1)...HΣ ( )...OΣ (*Poulkowa Obsrv.* X)...Lv (*A. J.* 382)... Morgan (*A. J.* 439)...]

β 661. *Cygni* 166

R.A. 20^h 12^m 39^s
Decl. + 40° 0′

1878.52	67°.0	12″.60	6.2...12.5	2*n*	β
1884.56	66.5	12.81	...	2*n*	HΣ
1891.50	65.1	12.99	5.8...12.2	3*n*	β

Discovered with the 18½-inch. The Harvard photometric magnitude is 5.5. B.A.C. 6986.

[β (X)...β^3...β (3114)...β (*Pub. L. O.* II)...HΣ ( )...]

β 985. W* XX. 448

R.A. 20h 13m 12s
Decl. + 25° 16′

A and B

1880.66	148°.7	5″.03	7.5...13.5	3*n*	β
1898.83	146.8	4.72	6.8...13.5	2*n*	A

C and D

1893.59	61°.8	8″.89	...12.7	3*n*	W
1898.83	63.7	9.83	...13.0	2*n*	A

A and C (= H 1499)

1828	358°.4	15″±	8 ...13	1*n*	H²
1880.66	356.0	21.39	...10.3	3*n*	β
1893.58	356.4	21.54	7.5...10.2	3*n*	W
1898.83	355.8	21.62	...10.0	2*n*	A

Discovered with the 18½-inch. All the measures of H 1499 are given here.

[β (XIII)...β²...Wilson ( )...Aitken (3585)...]

β 662. S.D. (20°) 5904

R.A. 20h 14m 0s
Decl. — 19° 59′

1878.52	300°±	1″.7±	9 ...10		β
1898.74	300.6	1.61	9 ...11.7	3*n*	Cg

Discovered with the 18½-inch. This is the most northern of two small stars 2′.7 apart. A 7½ m star 28° *p* and 2′.6 *s*.

[β (X)...β²...Cogshall ( )...]

β 986. W* XX. 491

R.A. 20h 14m 10s
Decl. + 34° 44′

1880.51	242°.1	4″.41	8.1...11.4	5*n*	β
1892.72	240.6	4.20	8.5...11.8	3*n*	W

Discovered with the 18½-inch.

[β (XIII)...β²...Wilson ( )...]

β 1206. Lalande 39115

R.A. 20h 14m 36s
Decl. + 36° 23′

1890.52	363°.0	1″.90	7.8...10.8	3*n*	β
1897.74	359.7	1.80	...	1*n*	L
1897.83	355.6	2.25	...	1*n*	A
1897.99	365.6	2.14	...	1*n*	Br

Discovered with the 36-inch

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429) ...Lewis (*Mon. Not.* LIX, 400)...Brown ( )...]

β 431. W* XX. 530

R.A. 20h 15m 25s
Decl. + 35° 53′

1877.33	220°.8	0″.56	8.5... 8.8	6*n*	Δ
1884.25	42.4	0.72	...	3*n*	HΣ
1884.84	53.1	0.42	8.0... 8.5	7*n*	En
1889.53	38.2	0.66	8.6... 8.6	4*n*	β
1898.60	38.0	0.75	8.4... 8.5	4*n*	A

Discovered with the 6-inch. Change uncertain.

β (VII)...β (2103,2057)...β (*Pub. L. O.* III)...Δ (I)...Engelmann (2742)...HΣ ( )...Aitken (3585)...]

β 763. κ² *Sagittari*

R.A. 20h 15m 43s
Decl. — 42° 48′

1887.38	213°.3	0″.93	7 ... 8	1*n*	Pol
1889.47	211.2	1.33	6.0... 8.9	4*n*	β
1891.04	216.0	0.88	6 ... 9	1*n*	Sel
1894.71	213.4	0.73	6 ... 8	2*n*	Sel
1897.78	195.1	1.40	7.0... 8.9	1*n*	See
1898.58	212.9	1.00	6.0... 8.8	3*n*	A

Discovered with the 6-inch at Mt. Hamilton in 1879. The Córdoba magnitude is 5.6. Probably unchanged. See measures a 14 m star 209°.3 : 29′.31 (1897.78) 1*n*.

[β (XI)...β²...β (2957)...β (*Pub. L. O.* II)...Pollock (*Pub. Sydney Obsy.* 1891) (*Mon. Not.* XLVII, 473) (*Mem R. A. S.* L)...Sellors (3154,3303)...Aitken (3585)...]

β 1207. Lalande 39198

R.A. 20h 16m 25s
Decl. + 43° 28′

1890.58	217°.8	5″.76	7.7...13.5	3*n*	β
1898.66	215.7	5.83	7.3...13.5	3*n*	A

Discovered with the 36 inch. One of the Wolf-Rayet stars in *Cygnus*.

[β XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 1259. W° XX. 563

R.A. 20h 16m 27s
Decl. + 30° 13′

1891.65	171°.9	0″.47	8.3... 8.7	3*n*	β
1895.01	172.9	0.37	...	5*n*	Sp
1898.60	167.5	0.63	8.6... 8.7	3*n*	A

Discovered with the 36-inch. It is 11ᵐ *p* a 7 m star.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Sp (III)...Aitken (3585)...]

β 1260. D.M. (55°) 2368

R.A. 20h 16m 33s
Decl. + 55° 19′

1891.57	169°.4	0″.47	8.2...10.8	3*n*	β

Discovered with the 36-inch. This is 18′ *n* of of Σ 2761.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...]

β 663. Lalande 39260

R.A. 20h 17m 19s
Decl. + 53° 13′

A and B

1891.54	313°.6	6″.58	6.3...15.2	2*n*	β
1898.67	311.4	7.80	6.0...15.5	1*n*	A

A and C

1877.57	79°.4	8″.3±	...12.5	1*n*	β
1885.52	77.5	7.80	...	2*n*	HΣ
1891.53	75.2	7.67	...12.5	3*n*	β
1898.67	76.7	7.60	...13.0	1*n*	A

The faint star, C, was discovered with the 18½-inch, and in measuring that with the 36-inch a still nearer companion was detected. This is a difficult object with a large aperture. ROGERS (*A. G. C.*) gives the proper motion, 0″.092 in the direction of 270°.

[β (x)...β′...β (3114)...β (*Pub. L. O.* II)...Aitken (3585)...HΣ ( )...]

β 665. γ *Cygni*

R.A. 20h 17m 55s
Decl. + 39° 52′

B and C

1878.52	305°.1	1″.41	10.0...11.0	2*n*	β
1891.53	302.0	1.78	10.4...10.4	3*n*	β
1898.55	300.2	1.86	10.0...10.0	3*n*	A

A and BC

1878.19	196°.5	140″.44	2.3...	3*n*	β
1891.53	196.3	141.13	...	3*n*	β
1898.54	196.2	141.32	...	1*n*	A

The distant double companion was discovered with the 18½-inch. There are several small stars nearer A than this. AUWERS gives the proper motion of γ *Cygni* 0″.019 in the direction of 176°.5.

MITCHELL at Cincinnati has a companion which is ascribed to γ *Cygni* (Cin°) 233°.3 : 33″.80 (1847.54). He gave the colors, A *red*, B *greenish*. There is no doubt that the observation really belongs to β *Cygni*, there being an error of 180° in the position angle. With this correction the measure and description apply perfectly.

[β (x)...β′...β (3114)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 664. *Aquilae* 264

R.A. 20h 18m 36s
Decl. + 5° 7′

1878.62	285°.1	9″.66	7.0...12.5	1*n*	β
1885.13	289.0	8.78	...	4*n*	HΣ
1893.66	290.0	8.90	7.2...13.0	3*n*	W
1896.71	287.0	8.76	7.5...12.2	1*n*	Lv
1898.68	288.2	8.90	7.0...12.2	3*n*	A

Discovered with the 18½-inch. Probably without change. Lalande 39236.

[β (x)...β′...Lv (*A. J.* 307)...Wilson ( )...Aitken (3585)...HΣ ( )...]

β 666. D.M. (53°) 2392

R.A. 20h 19m 9s
Decl. + 53° 15′

1877.58	121°.4	1″.7±	8.5...11.0	1*n*	β
1877.86	124.7	2.00	9.0...12.0	1*n*	J
1892.82	121.6	1.58	9.0...10.5	1*n*	Ho

Discovered with the 18½-inch.

[β (x)...β′...J (1)...Hough (3234)...]

β 443. Lalande 39293

R.A. 20h 19m 12s
Decl. + 28° 37'

A and B

1878.47	134°.3	12".98	7.5...11.5	1*n*	β
1878.58	132.9	13.30	...	1*n*	OΣ
1892.81	133.2	13.16	7.5...12.0	2*n*	W
1898.51	136.2	13.64	7.5...11.5	2*n*	β

A and C

1878.47	87°.4	35".22	...12.0	1*n*	β
1892.81	88.8	35.18	...10.5	2*n*	W
1898.51	89.2	35.38	...	2*n*	β

Discovered with the 18½ inch. The 40-inch shows a faint star in the direction of B, which is nearer than C.

[β (VIII)...β (*Am. Jour. Sci.* July 1877)...OΣ (*Poulkowa Obsns.* X)...Wilson ( )...]

β 1134. D.M. (63°) 1618

R.A. 20h 19m 29s
Decl. + 63° 36'

1889.48	80°.8	4".32	5.8...12.7	3*n*	β

Discovered with the 36-inch. A naked-eye star in *Cepheus*, but not given as such by Heis and Argelander. The Harvard photometric magnitude is 5.8.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...]

β 432. W° XX. 698

R.A. 20h 20m 13s
Decl. + 35° 22'

1877.23	195°.2	1".24	8.6... 9.9	5*n*	Δ
1878.65	199.6	1.34	8.5... 9.5	1*n*	OΣ
1892.72	197.8	1.44	8.3... 9.7	3*n*	W
1897.79	192.7	1.35	...	1*n*	Br
1898.60	196.1	1.44	8.4... 9.5	4*n*	A

Discovered with the 6-inch. Without relative change.

[β (VII)...β (2103)...Δ (1)...Wilson ( )...OΣ (*Poulkowa Obsns.* X)...Wilson ( )...Aitken (3585)...Brown ( )...]

β 60. π *Capricorni*

R.A. 20h 20m 27s
Decl. — 18° 36'

A and B

1846.70	145°.1	2".85	...	5*n*	Mh
1871.80	144.9	3.15	6.0...10.3	3*n*	Kn
1874.96	145.2	3.27	5.1... 8.7	4*n*	Δ
1876.64	146.2	3.47	5.0... 9.7	3*n*	Cin
1877.64	144.2	3.16	4.7... 8.7	2*n*	Cin
1880.72	145.4	3.31	...	2*n*	Pt
1887.79	145.0	3.34	5.0... 9.0	2*n*	T
1888.60	146.2	3.49	5.0... 8.2	6*n*	Lv
1888.71	146.9	3.53	5.0... 8.5	2*n*	T
1889.69	145.1	3.43	5 ... 9	2*n*	Hl
1897.74	146.5	3.45	4.9... 7.8	2*n*	See
1898.51	144.2	3.15	... 7.8	3*n*	D
1898.56	144.2	3.40	5.0... 9.3	2*n*	A

A and C (= β 296)

1874	45°±	30"±	...13.5		β
1898.56	43.5	38.12	...14.0	2*n*	A

The close pair was discovered with the 6-inch in 1871, but it had been seen long prior by Mitchell at Cincinnati, although not published until 1876. The principal star has a proper motion of 0".017 in the direction of 313°.2 (Auwers). If the smaller star was fixed, the distance should increase about 0".8 in the time covered by the measures. The measures appear to indicate some change in this respect. The distant star was added with the Washington 26-inch.

[β (I, V)...β (*Mon. Not.* XXXIII, 351; XXXV, 31)...Mitchell (Cin²)...Δ (1)...Δ (2081)...Knott (*Mem.R. A. S.* XLIII)...Cin³...Cin⁴...Pritchett (*Pub. Morrison Obsy.* I)...Tarrant (2899,2991)...Lv¹...Hall (II)...See 13496]...Doolittle (*Pub. Flower Obsy.* I)...Aitken (3585)...]

β 61. ρ *Capricorni*

R.A. 20h 22m 1s
Decl. — 18° 13'

A and C

1891.49	151°.4	55".21	...13.2	3*n*	β
1898.63	151.3	55.10	...12.3	3*n*	D
1899.44	151.1	55.32	...13.0	1*n*	β

A and B (= H⁵ II. 51 = Sh 323)

1823.78	177°.3	4″.02	5 ...10	2*n*	Sh
1869.01	174.1	2.83	5.0... 7.1	4*n*	J
1872.28	172.4	2.92	...	2*n*	Sp
1898.63	172.2	2.58	... 7.5	3*n*	D

A and D (= H⁵ VI. 29 = Sh 322)

1823.78	150°.7	238″.02	5 ... 7	2*n*	Sh
1899.44	150.1	246.96	... 7	1*n*	β

The faint star, C, was noted with the 6-inch. There are many measures of AB, which, taken together, do not show any sensible change. The principal star has a proper motion of 0″.040 in the direction of 260°.0 (AUWERS). It would appear from the measures that A and B are moving together. The very distant star, D, is Lalande 39364. The Cordoba meridian observations give for AD, 149°.9 : 245″.8.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II) Doolittle (*Pub. Flower Obsy.* 1)...Herschel (*Cape Obsns.*)...Mitchell (Cin⁵)...Jacob (*Mem. R. A. S.* XVII, XVIII)...Secchi (*Catalogo di 1321 Stelle Doppie*) (*Mem. Coll. Romano*, 1855)...Secchi (1017)...Knott (*Mem. R. A. S.* XLIII)...J (1)...Sp (11)...Pritchett (*Pub. Morrison Obsy.* 1)...Cin⁵...Cin⁶...Tarrant (2899)...L.v⁴...L.M ...Scott (*Brit. Ast. Asso.* V, 75; VI, 250)...]

β 62. Lalande 39445

R.A. 20ʰ 23ᵐ 6ˢ
Decl. + 29° 44′

1875.52	135°.5	1″.20	8.5... 9.4	4*n*	J
1892.59	137.6	1.21	8.2... 9.8	2*n*	W
1898.54	136.2	1.16	8.1... 9.2	3*n*	D

Discovered with the 6-inch

[β (1)...β (*Mon. Not.* XXXIII, 351)...J (1)...Wilson ( )... Doolittle (*Pub. Flower Obsy.* 1)...]

β 433. D.M. (55°) 2399

R.A. 20ʰ 23ᵐ 36ˢ
Decl. + 55° 55′

A and B

1892.74	208°.6	7″.38	9.0...11.2	2*n*	W
1898.47	206.0	7.81	8.8... 9.9	3*n*	D

A and C

1892.74	244°.8	27″.09	...10.0	2*n*	W
1898.47	244.0	27.57	... 9.2	3*n*	D

Discovered with the 6-inch.

[β (VII)...β (2103)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 363. *Vulpeculae* 93

R.A. 20ʰ 24ᵐ 28ˢ
Decl. + 20° 12′

1878.71	62°.8	21″.77	7.0.. 11.0	1*n*	β
1879.54	61.8	20.±	7.0...12.0	1*n*	Cin
1892.68	65.4	19.72	7.2...12.2	2*n*	W

Discovered with the 6-inch. WILSON measures a third star, 197°.5 : 44″.14 (1892.68) 2*n*. The principal star is W⁸ XX, 807.

[β (VI)...β (2062)...β⁵...Cin⁵...Wilson ( )...]

β 63. 1 *Delphini*

R.A. 20ʰ 24ᵐ 33ˢ
Decl. + 10° 30′

A and B

1874.70	350°.0	0″.64	...	1*n*	N
1874.92	343.3	0.84	6.0... 8.0	4*n*	J
1878.46	345.0	...	6.0... 8.0	1*n*	β
1878.60	338.9	0.85	6.5... 8.5	1*n*	OΣ
1879.70	344.9	0.67	...	1*n*	β
1880.19	345.4	0.88	6.4... 7.9	3*n*	β
1884.97	346.6	0.91	...	3*n*	HΣ
1887.60	344.8	0.89	6.0... 8.0	3*n*	T
1887.84	347.4	0.79	6 ...10	2*n*	HI
1888.59	347.0	0.89	5.9... 8.0	3*n*	L.v
1888.62	347.9	0.67	...	8*n*	Sp
1888.69	346.4	0.88	6.0... 8.0	2*n*	T
1891.69	353.0	1.06	...	2*n*	Maw
1897.82	346.5	1.11	...	2*n*	Br
1898.48	343.6	0.93	7.3... 8.3	2*n*	D
1898.64	346.7	0.88	6.1... 8.5	2*n*	β
1898.70	344.0	1.14	6.0... 8.9	4*n*	A
1898.85	353.9	0.93	...	1*n*	Maw

A and C (= β 207)

1874	360°±	15″±	...13.5		β
1885.60	349.0	16.71	...	1*n*	HΣ
1898.48	352.7	15.81	...13.5	2*n*	D
1898.55	346.6	16.79	...14.2	2*n*	β
1898.79	346.6	17.77	...13.5	3*n*	A

The close pair was discovered with the 6-inch, and the distant star added with the Washington 26-inch. So far there appears to be no sensible change in AB. The proper motion of the principal star is very small—0″.0114 in the direction of 345°.0. If this is substantially correct as to amount, the components are moving together, as otherwise the distance would be increased nearly 0″.3 in the time covered by the measures.

[β (1)...β (*Mon. Not.* XXXIII)...β^2...β^1...Newcomb (*Wash. Obsns.* 1874)...Δ (1)...Δ (2081)...OΣ (*Poulkowa Obsns.* X)...Tarrant (2899,2991)...Lx^{6}...Hall (II)...Sp (III)...Maw (*Mem. R. A. S.* L, LIII)...Doolittle (*Pub. Flower Obsy.* I)...Aitken (3585)...Brown ( )...]

β 987. Lalande 39506

R.A. 20^h 24^m 50^s
Decl. + 19° 1′

A and B

1880.15	127°.7	2″.32	7.2...11.5	5*n*	β
1893.59	130.7	2.40	7.5...11.7	3*n*	W

A and C (= S 752)

1824.98	288°.6	105″.38	7 ... 7¼	3*n*	S
1879.99	288.5	106.17	... 7.2	2*n*	β

The close companion to A was discovered with the 18½-inch. The foregoing are all the measures of AC. The *Berlin A. G. Catalogue* gives the proper motion of the principal star 0″.041 in the direction of 290°.1.

[β (XIII)...β^1...Wilson ( )...]

β 1135. Lalande 39561

R.A. 20^h 25^m 10^s
Decl. + 45° 20′

1889.53	338°.3	1″.53	8.3...10.7	4*n*	β
1895.78	336.8	1.40	8.1...11.4	3*n*	A
1897.78	340.4	1.56	...	1*n*	A

Discovered with the 12-inch.

β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429) (*Ast. Soc. Pac.* VII, 305)...]

β 668. B.A.C. 7080

R.A. 20^h 25^m 49^s
Decl. — 10° 16′

1878.63	29°.0	4″.64	6.2...11.7	3*n*	β
1881.67	26.1	4.99	6.5...12.4	4*n*	β
1890.57	25.0	4.80	6.8...11.2	3*n*	β
1891.49	27.8	4.64	6.0...11.5	3*n*	β
1898.56	27.3	4.75	6.5...12.0	2*n*	β
1898.57	25.6	4.96	6.9...12.2	3*n*	A
1898.70	26.3	4.66	6.7...11.3	4*n*	D

Discovered with the 18½-inch. A very interesting physical system from the considerable proper motion of the components. This motion of the principal star is given:

Bonn	0″.309 in 67°.7
Auwers	0.309 in 72.1
Porter	0.305 in 66.2

There has been very little, if any, change in the position of the small star in twenty years. This is a naked-eye star in *Capricornus*. The Harvard photometric magnitude is 5.6.

[β (X)...β^1...β^4...β (3048,3114)...β (*Pub. L. O.* II)...Aitken (3585)...Doolittle (*Pub. Flower Obsy.* I)...]

β 669. ω^2 *Cygni*

R.A. 20^h 26^m 20^s
Decl. + 48° 33′

A and B

1878.65	342°.5	17″.26	5.5...13.5	1*n*	β
1898.51	342.2	18.11	...	3*n*	β

A and C

1878.65	86°.3	56″.28	...10.0	1*n*	β
1893.65	86.6	55.86	...10.9	4*n*	W
1898.49	86.5	56.02	... 8.7	2*n*	D
1898.51	86.3	56.39	...	3*n*	β

These distant companions were noted with the 18½-inch. AUWERS gives the proper motion 0″.042 in the direction of 160°.8. This would increase the distance of B in twenty years about 0″.8, and this change is shown by the measures.

[β (X)...β^2...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 670. D.M. (13°) 4435

R.A. 20h 27m 17s
Decl. + 13° 32′

1877.75	58°.3	0″.76	8.5	8.8	2*n*	β
1877.83	53.5	0.63	8.5	9.0	1*n*	J
1889.87	50.7	0.6±	...		5*n*	Sp
1893.51	47.3	0.53	8.5	8.9	3*n*	Lv
1896.12	44.8	0.62	8.2	9.2	2*n*	W
1897.84	48.4	0.45	...		2*n*	Br
1898.75	47.1	0.57	8.7	9.2	3*n*	A

Discovered with the 18½-inch. The measures suggest angular motion. The southern star of a wide pair.

[β (x)...β^3...J (1)...Sp (III)...Lv (*A. J.* 382)...Aitken (3585)...Wilson ( )...Brown ( )...]

β 434. W° XX. 941

R.A. 20h 28m 5s
Decl. + 41° 28′

1877.29	101°.1	1″.37	9.1	9.9	3*n*	J
1892.70	100.8	1.56	9.0	9.8	2*n*	W

Discovered with the 6-inch.

[β (VII)...β (2103)...J (1)...Wilson ( )...]

β 1136. Lalande 39698

R.A. 20h 28m 6s
Decl. + 49° 8′

1889.54	206°.6	0″.35	8.1	9.7	3*n*	β

Discovered with the 12-inch. Recent measures are wanting.

[β (XVI)...β (2056)...β (*Pub. L. O.* II)...]

β 1208. Lalande 39656

R.A. 20h 28m 38s
Decl. + 6° 28′

1890.55	335°.5	2″.04	7.4	12.2	3*n*	β
1897.80	333.0	3.12	...		1*n*	Br
1899.45	330.8	3.02	7.2	13.0	2*n*	A

Discovered with the 36-inch.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Brown ( )... Aitken ( )...]

β 671. O. Arg. N. 20741

R.A. 20h 29m 33s
Decl. + 62° 3′

1877.57	334°.8	0″.5±	8.0	10.0	1*n*	β
1877.78	335.9	0.47	8.0	8.5	1*n*	J
1879.49	333.9	0.42	7.5	9.0	1*n*	β
1881.57	333.2	0.49	8.0	11.5	1*n*	β
1885.53	337.9	0.6±	...		1*n*	HΣ
1898.65	336.0	0.49	7.9	8.7	2*n*	D

Discovered with the 18½-inch. No certain change.

[β (x)...β^1...β^2...β^3...J (1)...Doolittle (*Pub. Flower Obsy.* I). HΣ ( )...]

β 151. β *Delphini*

R.A. 20h 31m 55s
Decl. + 14° 11′

A and B

1873.60	355°±	0″.7±	...			β
1874.66	15.5	0.65	4.1	5.4	5*n*	J
.70	13.6	0.49	...		3*n*	New
.73	8.0	0.69	3.5	4.5	1*n*	OΣ
1875.61	14.7	0.42	4.0	6.0	4*n*	Sp
.65	20.1	0.54	4.3	6.7	4*n*	J
1876.65	25.8	0.48	4.1	6.3	4*n*	J
.85	54.4	obl.	...		1*n*	OΣ
1877.27	17.7	0.35	...		2*n*	Sp
.71	29.7	0.51	4.6	5.0	5*n*	J
.79	40.8	0.32	...		2*n*	β
1878.65	53.7	0.24	...		4*n*	β
.75	59.2	...	...		1*n*	J
1880.68	133.6	0.26	...		3*n*	β
.75	214.5	0.2±	...		2*n*	Hl
1881.54	149.2	0.26	...		5*n*	β
.88	154.7	...	...		1*n*	Big
1882.60	167.5	0.26	...		3*n*	β
1883.25	183.9	0.19	..		7*n*	En
.55	182.5	0.23	...		3*n*	β
1884.69	195.9	0.32	...		3*n*	Hl
.71	197.7	0.32	..		4*n*	En
.77	199.2	0.29	...		5*n*	β
1885.61	222.9	0.4±	...		1*n*	HΣ
.75		Single	...		2*n*	Hl
.91	216.6	0.38	...		8*n*	En
1886.77	257.8	...	...		1*n*	HΣ
.88	238.1	0.25±	...		7*n*	Sp

	°	″				
1886.91	219.5	0.39	...		4*n*	En
1887.45	287.3	0.2±	...		9*n*	Sp
.55	278.5	0.36	...		5*n*	T
.66	272.0	0.41	...		5*n*	HΣ
.75	308.1	0.3±	...		1*n*	Ho
.85	287.8	0.2±	...		8*n*	Sp
1888.65	310.1	0.29	...		7*n*	β
.81	300.9	0.35	...		3*n*	HΣ
.83	311.5	0.25±	...		17*n*	Sp
1889.50	314.2	0.31	...		5*n*	β
.78	318.5	0.43	...		6*n*	HΣ
.86	319.2	0.37±	...		11*n*	Sp
1890.49	324.2	0.45	..		4*n*	β
.89	326.5	0.43	...		12*n*	Sp
1891.45	331.6	0.38	...		4*n*	β
.52	338.4	0.79	...		1*n*	See
.64	330.1	0.39	...		3*n*	Hl
.76	334.0	0.47	...		5*n*	HΣ
.84	338.2	....	...		1*n*	Big
.88	333.5	0.46	...		9*n*	Sp
1892.39	338.7	0.50	...		4*n*	β
.87	337.6	0.49	...		2*n*	Bar
.92	340.7	0.54	...		5*n*	Sp
1893.52	339.2	0.58	4.0...	7.0	2*n*	Lv
.53	338.8	0.73	5.5...	8.0	2*n*	W
.63	335.3	0.57	...		3*n*	Ho
.70	342.2	0.56	..		5*n*	Bar
.79	346.8	0.51	..		3*n*	Com
.87	344.3	0.51	...		13*n*	Sp
.95	345.8	....	..		1*n*	Big
1894.51	346.3	0.56	...		8*n*	Bar
.72	345.9	0.6±	...		1*n*	HΣ
.83	347.2	0.50	...		13*n*	Sp
1895.31	351.8	0.49	..		1*n*	See
.48	349.7	0.68	...		6*n*	Bar
.61	348.1	0.54	..		1*n*	Ho
.66	350.8	0.58	..		3*n*	Com
.69	350.3	0.66	4.5...	6.0	2*n*	Dy
.77	351.9	0.67	...		3*n*	Sp
.81	351.9	0.65	...		1*n*	Lew
1896.63	361.8	0.45	..		1*n*	Pt
.66	354.0	0.59	...		3*n*	Com
.69	356.6	0.51	...		3*n*	Morgan
.76	357.0	0.67	.		3*n*	See
.84	352.6	0.49	..		3*n*	A
.86	355.1	0.60	...		3*n*	Hu
.87	355.9	0.65	.		7*n*	Sp
1897.52	357.6	0.84	...		2*n*	Leh-man
.55	356.7	0.55	...		4*n*	Bar
.55	356.3	0.68	...		3*n*	A
1897.61	357.3	0.71	...		4*n*	Hu
.65	362.5	0.55	...		1*n*	Maw
.66	356.1	0.79	...		3*n*	D
.69	357.7	0.62	...		4*n*	Dob
.76	354.0	0.65	...		1*n*	See
.86	356.9	0.62	...		4*n*	Sp
.90	359.5	0.63	...		1*n*	Br
1898.50	361.0	0.64	...		3*n*	A
.58	359.0	0.67	...		4*n*	β
.61	360.3	0.62	...		7*n*	Hu
.70	359.5	0.79	...		4*n*	D
.72	363.0	0.55	...		2*n*	Br
.75	364.7	0.66	...		1*n*	Lew
.90	360.4	0.57	...		5*n*	Sp

AB and C (= Herschel)

	°	″			
1828	107.7	18±	...14	1*n*	H'
1878.05	116.2	27.66	...	3*n*	β
1881.19	115.6	27.57	...12.7	4*n*	β
1883.54	116.2	27.43	...	1*n*	β
1888.82	115.7	26.77	...	2*n*	β
1890.46	117.3	26.89	...	3*n*	β
1895.81	117.8	26.14	...	1*n*	Lew
1898.49	117.6	25.87	...	3*n*	β
1898.59	117.1	25.92	..	2*n*	Bar

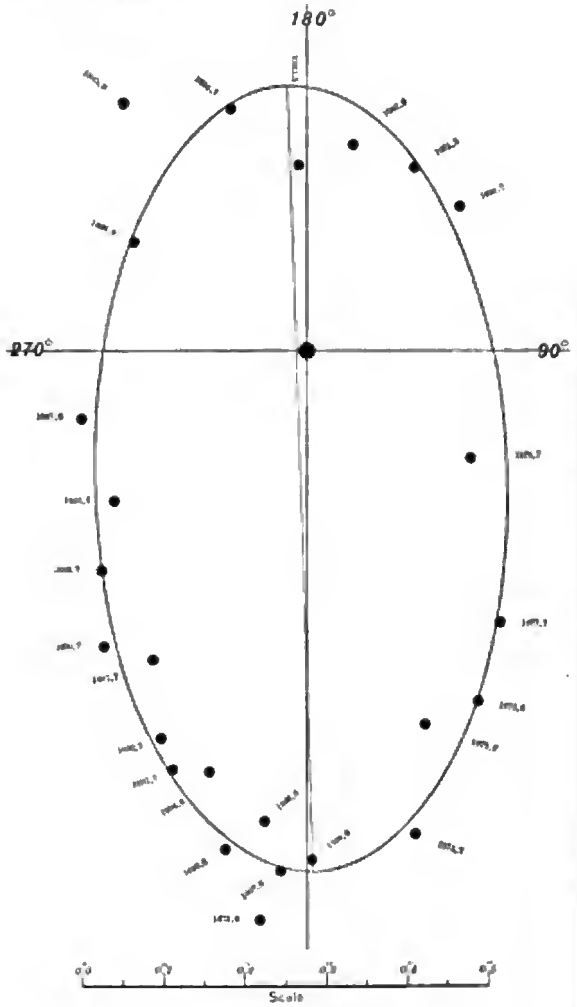
AB and D (= H' IV. 35 = 2704)

	°	″			
1829.40	343.8	32.48	3.0...11.0	3*n*	Σ
1851.84	339.2	33.74	...11.0	2*n*	OΣ
1864.94	336.6	34.64	...10.3	3*n*	J
1888.82	333.2	36.35	...	2*n*	β
1898.49	331.4	37.18	...	3*n*	β
1898.71	332.3	36.98	...	1*n*	Bar

The close pair, AB, was discovered with the 6-inch in August 1873. It was evident at this time that it would prove to be a binary system, as otherwise it could not have escaped detection by prior observers. It has now (1899) completed substantially one revolution since it was discovered. The following orbits have been computed, the first column giving the date of the last measures used :

1883	Doubiago	26.07	years	*A. N.* 2602
1884	Gore	30.91	"	*Proc. R. I. Ac.* IV, No. 5
1887	Celoria	16.95	"	*A. N.* 2824
1890	Burnham	28.5	"	*Sid. Mess.* X, 215
1892	Glasenap	22.97	"	*A. N.* 3177
1895	See	27.66	"	*Evolution Binary Systems*
1899	Burnham	26.70	"	(This volume)

The principal positions down to 1899, and the last orbit given above, are shown on the accompanying diagram.



β Delphini. β 161.

The elements of the several orbits are as follows:

		P	T	e	a	Ω	i	λ
1883	Doolittle	26.07	1882.2	0.36	0.55	163.6	54.9	354.6
1884	Gore	30.91	1882.2	0.34	0.52	2.7	59.3	327.8
1887	Celoria	16.05	1885.8	0.09	0.36	10.9	61.6	220.9
1892	Glasenapp	22.97	1882.4	0.26	0.50	174.2	64.1	343.0
1895	See	27.66	1883.0	0.37	0.67	3.9	61.3	164.9
1899	Burnham	26.70	1883.1	0.33	0.48	1.8	55.9	171.7

The next companion, C, was discovered by HERSCHEL, and is first mentioned in his *Fourth Catalogue* (*Mem. R. A. S.* IV). This is much fainter than the more distant companion discovered by the first HERSCHEL, and observed by STRUVE as Σ 2704, and does not appear to have been noticed by either of these observers. On account of its faintness it has been missed or neglected by all the early observers who measured D. My own measures are the first, and comprise substantially all the observations of this star.

There is no lack of positions of D, as this is readily seen with the smallest apertures. The change is due to the proper motion of the principal star. AUWERS gives this as 0".093 in the direction of 110°.1. As this movement is nearly in the direction of C, it will finally become a difficult object, the minimum distance of 3¼" being reached in about 275 years.

In 1896 SEE measured a faint star from AB 111.2 : 5".66 (1896.75) 5*n*, with the 24-inch of the Lowell Observatory. As this star has not been seen elsewhere with much larger apertures, there is much doubt of its real existence.

[β (111)...β (*Mon. Not.* XXXIV, 59)...β'...β'...β (*Am. Jour. Sci.* Sept. 1873) (*Mon. Not.* XLI, 305) (*Std. Mess.* X, 215) ...β (2875,2957,3048,3114,3142)...β (*A. J.* 246)...d (II, 491)...d (1573,2086,2195)...Newcomb (*Wash. Obsns.* 1874)...OΣ (*Poulkowa Obsns.* IX, 222; X, 47,185)...Sp (II, II App. III)...Sp (2133)...Hall (II) (*A. J.* 247)... Engelmann (2078,2742,2780)...Tarrant (2899)...Bigourdan (*Bul. Ast.* XVIII) (*Paris Obsns.* 1883)...Barnard (*A. J.* 447)...Lv (*A. J.* 3821...Hough (2078,3234)...Wilson ( )...See (3314,3496)...Comstock (*Pub. Washburn Obsy.* X)...Lewis and Dyson (*Mon. Not.* LVI, 359; LIX, 400)...Pritchett (*A. J.* 397)...See (*A. J.* 349,357,378) (*Beob. Sternwarte*, Berlin, 1892, No. 6)...Morgan (*A. J.* 439)...Lehman (*Ast. Soc. Pac.* IX, 141)...Hussey (*A. J.* 397, 427)...Doberck (3466)...Doolittle (*A. J.* 416)... Aitken (3466,3585) (*A. J.* 429)...HΣ ( )...Hough (3558)...Maw (*Mem. R. A. S.* LIII)...Lewis ( ) Hussey ( )...Doolittle (*Pub. Flower Obsy.* I)...Barnard ( ) ...Brown ( )...]

A few only of the measures of D are given. They will all be found in the references cited for AB, and in the following:

[Madler (*Fixstern Systeme* I) (*Dorpat Obsns.* XI, XIII, XV) Lamont (*Annalen Konigsberg Stern.* XVII)...Wilson and Seabroke (*Mem. R. A. S.* XLIII, XLVI)...Herschel (*Mem. R. A. S.* IV)...Gore (*Ast. Reg.* XIX, 1441...Everett (*Mon. Not.* LVI, 464)...Flammarion (*Etoiles Doubles et Multiples*)...*Greenwich Obsns.* 1895...]

β 672. 71 *Aquilae*

R.A. 20h 32m 8s
Decl. — 1° 31′

1878.66	280.8	30.52	6.0...12.5	2n	β
1892.83	280.9	30.68	6.0...12.0	2n	Ho
1898.62	281.1	31.54	6 ...12.0	3n	Cg

Discovered with the 18½-inch. This star has no sensible proper motion.

[β (x)...β¹...Hough (3234)...Cogshall ( )...]

β 435 Lalande 39867

R.A. 20h 33m 14s
Decl. + 14° 35′

1876.68	113.5	2.86	8.1...10.9	4n	J
1876.81	124.0	3.45	8.5...10.5	1n	OΣ
1892.67	116.8	3.08	8.0...10.8	2n	W
1898.55	113.3	3.32	8.2... 9.4	3n	D

Discovered with the 6-inch. Near β *Delphini*.

[β (VII)...β (2103)...OΣ (*Poulkowa Obsns.* X)...J (1)... Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 288. *Delphini* 32

R.A. 20h 33m 31s
Decl. + 15° 25′

1878.54	167.8	7.87	7.0...13.5	1n	β
1891.51	162.0	7.71	6.2...13.2	3n	β
1899.42	161.3	7.24	6.2...13.2	2n	β

Discovered with the Washington 26-inch. This star (B.A.C. 7146) has a small proper motion, 0″.030 in the direction of 289°.1 (A.G.C.). Near α *Delphini*.

[β (V)...β (*Mon. Not.* XXXV, 31)...β¹...β (3114)...β (*Pub. L. O.* II)...]

β 298. α *Delphini*

R.A. 20h 34m 4s
Decl. + 15° 29′

A and B

1891.70	223.8	28.90	4.0...13.5	2n	β
1898.55	223.8	29.51	...14.0	1n	β

A and C (= H 1554)

1828	278.0	35±	...13	1n	H
1878.62	279.8	42.29	...12.0	3n	β
1891.70	280.5	43.81	...11.1	2n	β
1898.55	278.9	43.50	...12.0	1n	β

A and D

1877.82	150.2	47.96	...13.0	1n	β
1891.70	150.8	47.95	...11.5	2n	β
1898.55	150.8	47.62	...12.3	1n	β

A and E

1891.70	308.9	51.65	...12.7	2n	β
1898.55	308.6	50.91	...13.0	1n	β

A and F

1879.34	113.8	80.67	...10.8	2n	β
1891.70	114.6	79.79	...11.0	2n	β

The nearest star and some of the others noted with the Washington 26-inch. The 36-inch shows another and smaller star 14 m, about the same distance as B, in the direction of 335°.

AUWERS gives the proper motion of α *Delphini* 0″.046 in the direction of 90°.0. All the measures of the Herschel star are given above.

[β (V)...β (*Mon. Not.* XXXV, 31)...β¹...β²...β (3114)...β (*Pub. L. O.* II)...]

β 1209. S.D. (17°) 6055

R.A. 20h 34m 9s
Decl. — 17° 48′

1890.66	294.3	0.45	9.0... 9.9	3n	β
1898.73	281.2	0.63	9.0...10.5	2n	Cg
1899.53	290.0	0.44	9.0...10	3n	A

Discovered with the 12-inch. It is 22″.4 *p* and 0″.4 *s* of the 7 m star, B.A.C. 7151.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Cogshall ( )... Aitken ( )...]

β 267. S.D. (4°) 5223

R.A. 20h 35m 22s
Decl. — 4° 49′

1878.68	242.4	2.11	9.0... 9.0	1n	β
1879.29	240.0	2.22	9.0... 9.3	3n	Cin
1879.59	240.5	2.04	10.0...10.0	1n	Cin
1885.70	62.2	....	9.5...10.0	1n	W
1892.69	241.6	2.04	9.8...10.0	2n	T
1898.66	239.9	2.03	9.0... 9.5	3n	Bd

Discovered with the 9.4-inch at the Dartmouth College Observatory. The angle in the measure in β^1 is erroneously printed 151°.9, the correction for parallel not having been applied. It should be as given above. There is no change in the components. This pair and H 921, which is 5′ *s*, form a wide quadruple.

[β (VII)...β (2103)...β^1...Cin^5...Cin^6...Wilson (Cin^{10})... Tarrant (3186)...Boothroyd ( )...]

β 673. D.M. (20°) 4680

R.A. 20^h 36^m 29^s
Decl. + 20° 17′

1878.78	298°.1	4″.10	7.3...11.8	2*n*	β
1884.62	294.3	4.00	...	2*n*	HΣ
1893.66	298.3	3.71	7.2...11.5	3*n*	W
1898.67	295.6	3.89	7.5...11.1	3*n*	D

Discovered with the 18½-inch. The *n* star of a wide pair, the other being D.M. (20°) 4682, 1^m.9 *f* and 1′.7 *s*.

[β (X)...β^1...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I) ...HΣ ( )...]

β 674. Yarnall 9020

R.A. 20^h 37^m 53^s
Decl. − 21° 19′

1877.51	120°±	1″.3±	8.0...10.5	1*n*	β
1879.78	103.4	1.35	8.0...10.8	1*n*	Cin
1892.79	99.9	1.19	8.0...11.0	1*n*	Ho
1897.80	103.1	1.69	7 ... 9.8	1*n*	See
1898.67	100.9	1.46	7.9... 9.5	4*n*	D
1898.67	102.8	1.59	7.2... 9.7	3*n*	Cg

Discovered with the 18½-inch.

[β (X)...β^1...Cin^8...Hough (3234)...See (3496)...Doolittle (*Pub. Flower Obsy.* I)...Cogshall ( )...]

β 675. 51 *Cygni*

R.A. 20^h 38^m 31^s
Decl. + 49° 54′

A and B

1878.24	101°.5	2″.78	6.0...13.0	3*n*	β
1885.54	103.4	3.25	...	2*n*	HΣ
1889.45	101.5	2.99	5.0...13.2	3*n*	β
1898.63	102.3	3.16	6.0...13.2	3*n*	A

A and C

1878.39	182°.4	25″.39	...12.0	1*n*	β
1898.60	182.5	25.94	...12.5	3*n*	A

A and D

1878.39	328°.4	32″.85	...12.0	1*n*	β
1898.60	328.9	33.43	...12.0	3*n*	A

Discovered with the 18½-inch. The large star has a proper motion of 0″.031 in the direction of 93°.7 (AUWERS). As this is nearly in the direction of B, its distance, if fixed, should decrease annually by that amount. This movement of A during the time covered by the measures would be 0″.6. The observations tend to show an increasing distance, and it is probable that the two stars form a physical system.

[β (X)...β^1...β (2957)...β (*Pub. L. O.* II)...HΣ ( )... Aitken (3585)...]

β 64. W^1 XX. 977

R.A. 20^h 39^m 18^s
Decl. + 12° 17′

A and B

1876.20	172°.4	0″.63	8.7... 9.0	6*n*	J
1882.68	193.0	0.50	...	1*n*	Perry
1891.84	180.3	0.65	8.3... 8.4	4*n*	β
1894.16	187.9	0.50	...	3*n*	Sp
1897.57	183.8	0.57	...	1*n*	Bow
1897.82	186.3	0.49	...	1*n*	Dy
1897.83	186.9	0.55	...	1*n*	Bt
1898.71	184.0	0.61	7.5... 7.5	3*n*	A
1898.75	188.6	0.55	...	1*n*	Lew

AB and C (= OΣ (App.) 209)

1874.67	158°.6	96″.46	7.1... 7.3	3*n*	J
1891.84	158.1	96.45	... 8.2	3*n*	β
1898.68	157.8	96.60	7.2... 7.5	2*n*	A

The close pair was discovered with the 9.4-inch of the Dartmouth College Observatory. There appears to be slow direct motion in angle. The measures show no change in the distant star C. All the observations of this are given. There is a small star nearer AB, which has been measured from the close pair as follows:

1874.25	119°.3	....	...10.7	1*n*	J
1891.84	118.9	62.22	...10.5	2*n*	β

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...J (2086)...Sp (III)...J (1)...Perry (*Eng. Mech.* XXXVI, 65)...Lewis, Bowyer and Dyson (*Mon. Not.* LIX, 400)...Aitken (3585)...Brown ( )...]

β 152. *Cephei* 55

R.A. 20h 39m 18s
Decl. + 56° 57′

1876.01	111.0	0.45	7.2... 8.0	5n	J
1878.53	112.3	0.55	7.0... 9.0	1n	β
1885.57	110.1	0.56	...	2n	HΣ
1889.40	107.5	0.60	...	6n	Sp
1897.90	106.8	0.50	...	1n	Br
1898.68	103.6	0.67	7.5... 9.0	3n	A

Discovered with the 6-inch. There may be some change in the angle. This is Radcliffe 4932.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β[c]...J (1)...J (2086)...Sp (III)...Aitken (3585)...HΣ ( )...Brown ( )...]

β 834. D.M. (6°) 4638

R.A. 20h 39m 48s
Decl. + 6° 43′

1881.58	134.0	2.44	8.5...11.0	6n	β
1886.86	131.7	1.97	...	4n	UL
1887.81	133.3	2.14	8.3...11.0	3n	Com
1898.68	130.9	2.41	8.9...10.5	4n	D

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β[c]...Updegraff and Lamb (*Pub. Washburn Obsy.* V)...Comstock (*Pub. Washburn Obsy.* VI)...Doolittle (*Pub. Flower Obsy.* I)...]

β 153. B.A.C. 7187

R.A. 20h 40m 10s
Decl. − 26° 51′

1876.78	282.2	1.61	7.5... 9.0	1n	Cin
1877.70	282.7	1.34	7.0... 9.5	1n	Cin
1882.62	286.0	1.65	7.7... 9.0	2n	W
1892.61	285.5	1.39	7.0...10.0	1n	W
1894.73	280.0	0.89	7 ...10	1n	Sel
1896.83	280.0	1.49	6.5...11.0	2n	See
1897.68	273.0	1.55	7½...10	2n	Sc
1897.74	274.3	1.66	...	1n	See
1898.71	274.1	1.38	7.1... 9.8	4n	D

Discovered with the 6-inch.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Cin[3]...Cin[4]...Wilson (Cin[10])...Sellors (3303)...See (3496)...See ( )...Doolittle (*Pub. Flower Obsy.* I)...Scott (*Mon. Not.* LIX, 427)...]

β 471. D.M. (61°) 2046

R.A. 20h 41m 1s
Decl. + 62° 0′

1876.72	305.9	1.46	10.0...10.0	1n	J
1893.79	308.0	1.97	10.0...10.3	3n	W
1898.45	307.0	1.78	10.3...10.9	3n	D

Discovered with the 6-inch.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...J (1)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 676. ε *Cygni*

R.A. 20h 41m 21s
Decl. + 33° 31′

1852.63	338.8	40.69	2 ...12	1n	OΣ
1861.63	332.6	39.64	2 ...12.5	1n	OΣ
1878.08	320.9	37.72	3 ...12	2n	β
1883.60	316.5	38.66	...	2n	HΣ
1891.52	310.3	38.68	...13	3n	β
1898.31	305.3	39.22	...12.5	2n	β
1898.59	305.2	39.14	...12.0	3n	A
1898.67	304.3	39.64	...12.0	3n	D

Discovered with the 18½-inch. The large star has a considerable proper motion, 0″.481 in the direction of 46°.5 (AUWERS). This corresponds with substantial exactness to the displacement of the companion shown by the measures. The small star had been seen by OΣ as appears by his observations published long after my *Tenth Catalogue*.

[β (X)...β[c]...β (3114)...β (*Pub. L. O.* II)...OΣ (*Poulkowa Obsns.* X)...Aitken (3585)...Doolittle (*Pub. Flower Obsy.* I)...]

β 364. Lalande 40166

R.A. 20h 41m 52s
Decl. + 24° 58′

1876.17	219.3	1.06	8.7... 8.9	4n	J
1892.75	220.5	1.25	8.7... 8.7	2n	Ho
1898.64	223.3	1.31	8.5... 8.7	3n	D

Discovered with the 6-inch. In a low power field with 30 *Vulpeculae*.

[β (VI)...β (2002)...J (1)...Hough (3234)...Doolittle (*Pub. Flower Obsy.* I)...]

β 65. 13 *Delphini*

R.A. $20^h\ 41^m\ 52^s$
Decl. $+\ 5°\ 34'$

1875.44	186°.4	1".61	5.2 ... 8.8	4*n*	J
1876.85	178.6	1.42	6.0 ... 10.0	1*n*	OΣ
1878.47	186.3	1.72	5.2 ... 9.0	3*n*	Sp
1884.62	187.3	1.76	...	2*n*	HΣ
1887.40	188.8	1.59	5.2 ... 9.0	4*n*	T
1888.65	186.8	1.49	5.0 ... 9.2	1*n*	Lv
1888.70	187.1	1.54	...	2*n*	T
1895.62	189.7	1.41	...	3*n*	Col
1897.84	188.4	1.48	..	2*n*	Br
1898.62	189.1	1.42	6.4 ... 7.7	3*n*	D

Discovered with the 6-inch. The measures do not show any material relative change. The proper motion of this star is very small, 0".010 in the direction of 264°.5 (AUWERS).

[β (1)...β (*Mon. Not.* XXXIII, 351)...J (1)...J (2081)...HΣ ( )...OΣ (*Poulkowa Obsns.* X)...Sp (II)...Tarrant (2866)...Lv[4]...Doolittle (*Pub. Flower Obsy.* I)...Brown ( )...Coleman (*Mem. R. A. S.* LIII)...]

β 677. T *Cygni*

R.A. $20^h\ 42^m\ 23^s$
Decl. $+\ 33°\ 56'$

A and B

1878.41	121°.3	9".66	7.0 ... 12.0	1*n*	β
1881.71	119.8	9.65	6.0 ... 11.7	3*n*	Ho
1885.55	117.7	10.15	...	1*n*	HΣ
1890.52	120.9	9.91	5.6 ... 12.2	3*n*	β
1898.31	120.7	9.88	6.0 ... 12.0	2*n*	β

A and C

1890.52	194°.4	12".35	... 13.3	3*n*	β
1898.31	195.9	12.46	... 13.5	2*n*	β

The nearest companion was detected with the 18½-inch; the other with the 36-inch. The variability of this star was discovered by SCHMIDT; period supposed to be about one year, 5½ to 6 m. The Harvard photometric magnitude is 5.2. BALL measured a distant star in his examination for parallax (*Dunsink Obsns.* III).

[β (X)...β[2]...β (3048)...β (*Pub. L. O.* II)... Hough (2978) ...HΣ ( )...]

β 66. D.M. (66°) 3995

R.A. $20^h\ 42^m\ 59^s$
Decl. $+\ 27°\ 1'$

1876.00	158°.9	1".23	8.6 ... 9.1	5*n*	J
1883.16	159.5	1.57	8.2 ... 8.5	5*n*	En
1890.84	161.7	1.57	...	2*n*	Maw
1898.70	159.5	1.16	8.4 ... 8.9	4*n*	D

Discovered with the 6-inch.

[β (1)...β (*Mon. Not.* XXXIII, 351)...J (1)...Engelmann (2678)...Maw (*Mem. R. A. S.* L)...Doolittle (*Pub. Flower Obsy.* I)...]

β 268. Radcliffe 4958

R.A. $20^h\ 43^m\ 11^s$
Decl. $+\ 41°\ 38'$

1875.88	221°.4	0".42	7.4 ... 8.3	2*n*	J
1884.31	216.2	0.53	...	3*n*	HΣ
1888.64	216.4	0.5±	...	7*n*	Sp
1893.62	218.4	0.52	7.8 ... 8.8	3*n*	W

Discovered with the 9.4 inch at the Dartmouth College Observatory. About 21' *n* is OΣ 414.

[β (V)...β (*Mon. Not.* XXXV, 31)...J (1)...J (2086)...HΣ ( )...Sp (III)...Wilson ( )...]

β 365. O. Arg. N. 21118

R.A. $20^h\ 43^m\ 36^s$
Decl. $+\ 51°\ 21'$

1892.77	285°.2	14".80	8.5 ... 11.8	2*n*	W
1898.69	286.1	14.53	8.5 ... 10.8	1*n*	β

Discovered with 6-inch. Σ 2732 is $1^m\ 29^s$ *p* and 6".7 *s*.

[β (VI)...β (2062)...Wilson ( )...]

β 366. O. Arg. N. 21157

R.A. $20^h\ 44^m\ 49^s$
Decl. $+\ 50°\ 3'$

A and B

1876.44	128°.5	1".40	8.2 ... 8.5	5*n*	J
1893.55	127.5	1.24	8.2 ... 8.5	2*n*	Lv
1893.72	129.0	1.47	8.0 ... 8.5	2*n*	W
1896.88	(152.3)	1.86	...	1*n*	Morgan
1898.48	128.6	1.42	8.3 ... 8.4	3*n*	D
1898.69	130.5	1.21	8.5 ... 8.7	1*n*	β

C and D (= J)

1876.44	3.3	1.07	10.7 . . . 11.2	5*n*	J
1893.55	1.2	1.35	10.0 . . . 11.0	1*n*	L.v
1898.48	6.9	1.72	9.4 . . . 9.8	3*n*	D
1898.69	5.0	1.41	10.3 . . . 10.5	1*n*	*β*

AB and CD

1876.30	106.3	50.78	. . .	3*n*	J
1893.72	106.1	50.71	. . .	1*n*	W

A and C

1898.48	105.1	50.64	. . .	3*n*	D
1898.69	107.2	51.54	. . .	1*n*	*β*

The pair AB and the distant companion C were discovered with the 6-inch. The latter was found to be double by J while measuring AB. Both pairs are without change. OΣ 412 is $2^m\ 48^s$ *p* and 11″ *n*.

[*β* (VI) . . . *β* (2062) . . . J (1) . . . L.v (*A. J.* 382) . . . Wilson ( ) . . . Morgan (*A. J.* 439) . . .]

β 67. Lalande 40318

R.A. $20^h\ 45^m\ 37^s$
Decl. + 30° 28′

1875.45	287.1	1.51	6.9 . . . 10.2	4*n*	J
1876.70	289.4	1.84	7.0 . . . 10.0	1*n*	OΣ
1885.38	283.6	1.73	. . .	4*n*	HΣ
1892.67	291.2	1.68	7.0 . . .	1*n*	W
1897.79	288.1	1.62	. . .	1*n*	Br
1898.58	286.9	1.36	7.0 . . . 9.3	3*n*	D

Discovered with the 6-inch. OΣ 415 is 30′ *s*.

[*β* (I) . . . *β* (*Mon. Not.* XXXIII, 351) . . . J (1) . . . OΣ (*Poulkowa Obsns.* X) . . . Wilson ( ) . . . Doolittle (*Pub. Flower Obsy.* I) . . . HΣ ( ) . . . Brown ( ) . . .]

β 250. Lalande 40310

R.A. $20^h\ 45^m\ 51^s$
Decl. + 46° 13′

1875.60	7.6	20.30	7.0 . . . 12.0	1*n*	J
1876.70	5.2	20.04	6.5 . . . 11.5	1*n*	OΣ
1885.55	6.9	19.92	. . .	1*n*	HΣ
1892.86	7.4	19.43	7.2 . . . 12.0	2*n*	W
1898.46	6.6	19.58	7.2 . . . 10.0	3*n*	D

Discovered with the 6-inch.

[*β* (V) . . . *β* (*Mon. Not.* XXXV, 31) . . . J (1) . . . OΣ (*Poulkowa Obsns.* X) . . . Wilson ( ) . . . Doolittle (*Pub. Flower Obsy.* I) . . . HΣ ( ) . . .]

β 154. Lalande 40292

R.A. $20^h\ 46^m\ 6^s$
Decl. − 16° 37′

1875.73	63.0	2.74	8.7 . . . 10.0	4*n*	J
1877.60	61.1	3.03	8.0 . . . 10.0	1*n*	Cin
1879.66	60.1	2.91	8.5 . . . 9.5	1*n*	Cin
1879.69	59.8	2.88	8.0 . . . 9.2	2*n*	Cin
1886.77	60.9	2.87	7.9 . . . 8.6	3*n*	LM
1888.57	64.9	2.73	8.5 . . . 9.5	1*n*	L.v
1890.51	66.3	2.66	8.0 . . . 9.4	1*n*	Gl
1898.62	59.6	2.88	8.3 . . . 9.4	3*n*	D

Discovered with the 6-inch. Evidently fixed.

[*β* (III) . . . *β* (*Mon. Not.* XXXIV, 59) . . . Cin^4 . . . Cin^5 . . . Cin^6 . . . LM . . . L.v^1 . . . Glasenapp (1) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 155. O. Arg. N. 21217

R.A. $20^h\ 47^m\ 24^s$
Decl. + 50° 58′

1876.49	25.2	0.55	6.5 . . . 7.4	6*n*	J
1884.60	23.5	0.70	. . .	2*n*	HΣ
1884.90	24.2	0.39	7.3 . . . 7.7	5*n*	En
1888.93	26.6	0.58	. . .	2*n*	Sp
1897.90	28.3	0.75	. . .	1*n*	Br
1898.46	27.3	0.76	7.3 . . . 7.9	3*n*	D

Discovered with the 6-inch. A fine pair, but no material change. HΣ measures a third star, 25°.5 : 17″.74 (1885.53) 1*n*. This star was observed by Ball for parallax. The comparison star is 198″ distant in the direction of 48°.4 (*Dunsink Obsns.* V). Σ 2732 is $2^m\ 18^s$ *p* and 30′ *n*.

[*β* (III) . . . *β* (*Mon. Not.* XXXIV, 59) . . . J (1) . . . J (2086) . . . Engelmann (2786) . . Sp (III) . . . Doolittle (*Pub. Flower Obsy.* I) . . . HΣ ( ) . . . Brown ( ) . . .]

β 367. Lalande 40478

R.A. $20^h\ 49^m\ 54^s$
Decl. + 27° 38′

A and B

1876.37	115.7	0.55	7.5 . . . 7.9	4*n*	J
1882.68	105.0	0.45	. . .	1*n*	Perry
1883.66	139.7	0.35	7.8 . . . 8.2	6*n*	En
1891.68	129.8	0.44	8.0 . . . 8.6	3*n*	*β*
1897.74	135.6	0.55	. . .	3*n*	Dob
1897.83	137.1	0.42	. . .	1*n*	Br
1899.51	136.1	0.42	8.0 . . . 8.1	3*n*	A

AB and C

1875.60	28°.2	30".88	...12.0	1*n*	J
1891.68	24.0	31.50	...12.0	3*n*	β
1899.50	22.8	31.82	...12.2	2*n*	A

AB and D

1899.50	92°.6	30".94	...14.0	2*n*	A

Discovered with the 6-inch. There seems to be some angular motion in the close pair. In the field with 32 *Vulpeculae*. The proper motion of this star from BOSSERT is 0".160 in the direction of 138°.5. The two measures of C give 0".147 in 131°.3. This star is fixed in space with reference to the binary AB.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...J (I)...Perry (*Eng. Mech.* XXXVI, 65)...Engelmann (2742)...Doberck (3466)...Brown ( )...Aitken ( )...]

β 1034. *7 Aquarii*

R.A. 20h 50m 25s
Decl. — 10° 9'

1888.68	165°.0	2".09	6.0...11.7	5*n*	β
1897.72	163.7	2.05	...	3*n*	A

Discovered with the 36-inch. It is not a difficult pair. The measures of 1888 were made with the 12-inch. The principal star has a proper motion of 0".033 in the direction of 257°.8 (AUWERS). It is very probable that this is a physical system.

[β (XIV)...β (2875)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429)...]

β 764. S.D. (9°) 5631

R.A. 20h 52m 22s
Decl. — 9° 50'

A and B

1880.55	354.4	0".90	9.0... 9.2	1*n*	β
1886.79	173.2	0.64	9.2... 9.3	2*n*	LM
1893.75	353.8	0.79	9.0... 9.3	3*n*	W
1898.75	359.0	0.86	8.7... 8.7	3*n*	Bd

AB and C

1880.55	112°.9	99".62	... 9.0	1*n*	β
1893.71	112.3	99.64	... 9.1	3*n*	W
1898.75	112.0	100.34	... 8.4	3*n*	Bd

AB and D

1880.55	21°.6	137".45	... 9.0	1*n*	β
1893.71	21.5	137.17	... 9.1	3*n*	W
1898.75	21.6	137.80	... 8.2	3*n*	Bd

Discovered with the 6-inch. The close pair is the β star of a small triangle. The other stars of the triangle, C and D, are S.D. (9°) 5632 and 5635. WILSON measures 11.5 m star from AB, 90°.5 : 58".20 (1893.71) 3*n*; BOOTHROYD, 89°.7 : 59".08 (1898.75) 3*n*.

[β (XI)...β²...β³...I.M...Wilson ( )...Boothroyd ( )...]

β 1137. B.A.C. 7278

R.A. 20h 52m 37s
Decl. + 50° 16'

1889.44	344°.3	6".88	6.0...13.7	3*n*	β
1898.31	346.1	6.94	7.0...13.2	2*n*	β
1898.72	343.9	7.20	6.0...14.3	3*n*	A

Discovered with the 36-inch. This is a naked-eye star in *Cygnus*; Harvard photometric magnitude 5.9.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 765. Lacaille 8632

R.A. 20h 53m 9s
Decl. — 35° 45'

1879.74	140°±	2"±	7.0...11.0	1*n*	β
1891.85	139.1	2.06	6.9...12.3	3*n*	β
1891.76	126.4	2±	7 ...12½	1*n*	Sel
1898.68	130.3	1.86	7.0...10.8	3*n*	A
1898.73	140.7	2.32	7 ...12.5	1*n*	Bd

Discovered with the 6-inch at Mt. Hamilton in 1879. In *Cord. G.C.* 7.1 m.

[β (XI)...β²...β (3114)...β (*Pub. L. O.* I, II)...Sellors (3154) ...Aitken (3585)...Boothroyd ( )...]

β 678. Lalande 40636

R.A. 20h 54m 20s
Decl. — 8° 40'

1878.78	185°.9	2".45	8.0...11.5	1*n*	β
1879.64	189.7	2.37	8.0...11.0	2*n*	Cin
1886.80	192.6	....	8.3...12.5	1*n*	LM

1893.77	202.°5	2.″43	8.0 . . . 11.7	3*n*	W
1897.84	201.4	2.49	. . .	1*n*	Br
1898.68	197.8	2.37	8.4 . . . 11.4	4*n*	D
1898.82	200.0	2.55	8.0 . . . 11.0	2*n*	A

Discovered with the 18½-inch.

[*β* (x) . . . *β*′ . . . Cin^{s} . . . I.M. . . . Wilson ( ) . . . Brown ( ) . . . Aitken (3585) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 68. O. Arg. N. 21466

R.A. 20^{h} 55^{m} 36^{s}
Decl. + 49° 45′

1875.21	153.°1	1.″79	8.5 . . . 9.2	4*n*	J
1882.68	151.0	1.82	8.5 . . . 9.0	1*n*	Perry
1892.67	151.6	1.97	8.3 . . . 8.9	3*n*	W

Discovered with the 6-inch. Unchanged. Σ 2741 is 56° *p* and 15.″4 *n*.

[*β* (1) . . . *β* (*Mon. Not.* XXXIII, 351) . . . J (1) . . . Perry (*Eng. Mech.* XXXVI, 65) . . . Wilson ( ) . . .]

β 1210. Piazzi XX. 440

R.A. 20^{h} 56^{m} 6^{s}
Decl. + 48° 13′

A and B

1890.63	119.°9	2.″30	7.6 . . . 12.3	3*n*	*β*
1898.42	117.2	2.35	. . . 12.2	3*n*	*β*
1898.60	120.2	2.54	7.0 . . . 12.2	2*n*	A

C and D (= OΣ 425)

1851.70	135.°0	″	10.5 . . . 11.0	1*n*	OΣ
1890.63	134.2	4.28	10.8 . . . 11.2	3*n*	*β*
1898.46	133.0	4.31	. . .	2*n*	*β*
1898.60	133.4	4.32	. . . 11.5	2*n*	A

A and C (= OΣ 425)

1847.49	27.°6	12.″33	7.0 . . .	3*n*	OΣ
1868.43	29.7	12.81	7.2 . . . 11.0	4*n*	J
1890.63	28.6	13.80	. . .	3*n*	*β*
1898.45	28.0	13.80	. . .	2*n*	*β*
1898.60	28.0	13.98	. . . 11.0	2*n*	A

A and E

1898.46	18.°0	45.″17	. . .	2*n*	*β*

The close companion to the principal star of the triple, OΣ 425, was discovered with the 36-inch. All the measures of the other stars are given above, except a measure of the angle of AD on one night, 46.°0 (1851.70); and from this and the angle of CD he gives 4.″11 for the distance of CD.

[*β* (XVII) . . . *β* (3047) . . . *β* (*Pub. L. O.* II) . . . OΣ (*Poulkowa Obsns.* IX) . . . J (1) . . . Aitken (3585) . . .]

β 1290. D.M. (46°) 3142

R.A. 20^{h} 56^{m} 50^{s}
Decl. + 47° 1′

A and B

1898.44	16.°3	3.″90	9.2 . . . 9.4	3*n*	*β*

A and *a*

1898.44	271.°3	3.″05	. . . 13.1	3*n*	*β*

B and *b*

1898.44	25.°4	2.″42	. . . 13.8	3*n*	*β*

Discovered with the 40-inch. A pair of small stars, each with a faint companion. It is 64^{s} *f* and 2′ *s* of 59 *Cygni* (Σ 2743).

β 472. D.M. (61°) 2078

R.A. 20^{h} 57^{m} 9^{s}
Decl. + 61° 24′

1877.69	5.°8	0.″66	8.2 . . . 8.5	3*n*	J
1893.67	6.0	0.77	8.3 . . . 8.7	3*n*	W
1898.97	4.4	0.87	8.3 . . . 8.7	3*n*	D

Discovered with the 6-inch.

[*β* (IX) . . . *β* (*Mon. Not.* XXXVIII, 78) . . . J (1) . . . Wilson ( ) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 69. W^{s} XX. 1743

R.A. 20^{h} 57^{m} 11^{s}
Decl. + 21° 13′

A and B

1875.42	314.°6	0.″97	8.2 . . . 9.0	3*n*	J
1881.62	313.9	0.88	8.0 . . . 8.5	2*n*	Ho
1882.68	313.5	1.22	8 . . . 9	1*n*	Perry
1884.22	313.7	1.41	8.0 . . . 9.0	6*n*	En
1891.84	316.5	0.95	8.3 . . . 9.1	3*n*	*β*
1896.72	311.7	0.72	. . .	1*n*	Lew
1897.62	315.2	1.02	. . .	2*n*	Bow
1898.72	311.1	0.97	. . .	1*n*	Bow
1898.73	313.9	0.85	. . .	1*n*	Lew

AB and C

1875.81	238°.4	78".44	... 7.0	1*n*	J
1884.78	238.9	78.47	... 8.1	3*n*	En
1891.34	239.0	77.88	... 8.1	3*n*	β
1899.42	239.5	77.86	...	1*n*	β

C and D (= Ho 599)

1891.84	154°.6	19".47	...13	1*n*	β
1895.65	155.0	18.40	...12	2*n*	Ho
1899.42	153.0	18.91	...	2*n*	β

Discovered with the 6-inch. The measures show no change in the close pair. C and D make Ho 599.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β (3114)...β (*Pub. L. O.* II)...J (1). Perry (*Eng. Mech.* XXXVI, 65)...Engelmann (2678)...Lewis and Bowyer (*Mon. Not.* LIX, 400) ...Hough (3558)...]

β 1211. Lalande 40744

R.A. 20h 57m 15s
Decl. − 18° 35′

1890.65	344°.7	0".58	7.5... 8.1	3*n*	β
1897.72	347.6	0.67	...	3*n*	A
1897.75	349.0	0.52	7.8... 9.0	1*n*	See

Discovered with the 12-inch; the *f* star of a small triangle.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429) ...See (3496)...]

β 156. Groombridge 3369

R.A. 20h 57m 39s
Decl. + 46° 6′

1875.41	241°.6	1".05	7.1... 9.4	4*n*	J
1891.62	245.9	0.99	7.5...9.9	3*n*	β
1896.64	247.6	1.11	...	2*n*	Lew
1898.57	242.1	1.14	7.8... 9.5	4*n*	D

Discovered with the 6-inch. It is 29′ *n* of 60 *Cygni* (OΣ 426).

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (3114)...β (*Pub. L. O.* II)...J (1)...Lewis (*Mon. Not.* LIX, 400)...Doolittle (*Pub. Flower Obsy.* I)...]

β 445. *Cygni* 287

R.A. 20h 58m 23s
Decl. + 28° 37′

1877.58	106°.6	4".60	7.5...12.0	1*n*	J
1878.58	114.4	4.96	7.0...10.5	1*n*	OΣ
1881.89	108.9	4.73	7.0...11.4	3*n*	Ho
1884.66	111.1	4.99	...	2*n*	HΣ
1892.68	110.5	4.77	7.5...11.8	2*n*	W

Discovered with the 18½-inch. Lalande 40821.

[β (VIII)...β (*Am. Jour. Sci.* July 1877)...J (1)...HΣ ( ) ...OΣ (*Pulkowa Obsn.* X)...Hough (2978)...Wilson ( )...]

β 1138. Lalande 40856

R.A. 20h 58m 34s
Decl. + 45° 22′

1888.82	185°.8	0".3±	7 ... 7	2*n*	Ho
1889.44	188.7	0.29	7.2... 8.5	3*n*	β
1894.75	187.4	0.25	7 ... 7	1*n*	Ho
1897.92	189.2	0.36	...	1*n*	Lew
1898.72	185.7	0.32	7.1... 8.0	2*n*	A

Discovered with the 36-inch, but it is given in a list of new pairs subsequently published by HOUGH, by whom it was observed in 1888 (= Ho 282). In D.M. 6.7 m; *A. G. C.* 7.2 m.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Hough (2977,3558) ...Lewis (*Mon. Not.* LIX, 400)...Aitken (3585)...]

β 269 = β 835. Lalande 40815

R.A. 20h 58m 39s
Decl. + 7° 17′

1876.18	252°.6	1".08	8.1...10.1	5*n*	J
1879.64	247.3	...	8.5...11.0	1*n*	Cin
1881.66	255.7	0.84	8.0...11.0	3*n*	β
1885.58	251.4	1.15	...	3*n*	HΣ
1887.74	253.2	1.02	8.2...10.2	3*n*	Com
1890.38	253.3	1.00	...	5*n*	Sp
1898.48	249.9	1.11	9.1... 9.9	4*n*	D

Discovered with the 9.4-inch at the Dartmouth College Observatory. It was again found with the 15½-inch of the Washburn Observatory, and inadvertently included as new in β (XII). It is possible

that H^I. 62 is identical with this pair, assuming an error of 1° in HERSCHEL's declination of his pair. His place is in the same R.A., but 1° south. There is no pair of his Class I in or near that place. HERSCHEL measured the position-angle twice, 234°.8 (1783.40) and 237°.1 (1802.80). If direct motion should be shown by later measures of β 269, there would be but little doubt as to the identity of the two pairs. The measures in Cin^5 of β 269 and β 70 are transposed.

[β (v, xii)...β (*Mon. Not.* xxxv, 31; xxxvii, 280)...β^a...Δ (1)...Cin^5...Comstock (*Pub. Washburn Obsy.* vi)...Sp (iii)...Doolittle (*Pub. Flower Obsy.* i)...]

β 1139. Groombridge 3375

R.A. 20^h 58^m 39^s
Decl. + 56° 36'

1889.37	138°.6	1".86	6.0...12.5	3*n*	β
1898.79	140.8	2.05	6.0...13.2	3*n*	A

Discovered with the 36-inch.

[β (xvi)...β (2956)...β (*Pub. L. O.* ii)...Aitken (35^85)...]

β 70. Lalande 40824

R.A. 20^h 58^m 52^s
Decl. + 11° 33'

B and C

1879.64	95°.0	3".59	10.0...11.0	1*n*	Cin
1891.63	96.7	5.16	10.2...10.4	2*n*	β
1898.69	96.3	5.38	11.0...11.0	2*n*	D
1899.50	96.2	5.33	11.0...11.0	2*n*	β

A and B

1891.64	238°.8	78".63	8.0...	2*n*	β
1899.50	239.1	79.06	...	2*n*	β

A and C

1898.69	237°.4	75".09	...	2*n*	D
1899.50	236.4	74.80	8.0...	2*n*	β

Discovered with the 6-inch. The measures in Cin^5 of β 269 and β 70 are transposed.

[β (1)...β (*Mon. Not.* xxxiii, 351)...β (3114)...β (*Pub. L. O.* ii)...Cin^5...Doolittle (*Pub. Flower Obsy.* i)...]

β 157. *Aquarii* 43

R.A. 21^h 0^m 31^s
Decl. − 14° 24'

A and C

1876.54	81°.9	21".36	...12.0	1*n*	Δ
1878.59	83.7	20.99	...12.0	1*n*	β
1879.64	80.7	20.10	...12.0	1*n*	Cin
1898.52	74.7	13.90	...	2*n*	β

A and B (= Σ 2752)

1827.62	145°.2	5".17	6.7...10.7	3*n*	Σ
1848.67	145.3	5.61	...	1*n*	Mh
1866.68	149.4	5.55	7.0...10.5	3*n*	Δ
1878.59	151.9	5.60	...	1*n*	β
1879.64	151.4	5.35	8.0...10.5	1*n*	Cin
1898.52	155.0	5.51	...	2*n*	β

The faint star, C, was noted with the 6-inch. The principal star has a proper motion of 0".339 in the direction of 90°.0 (PORTER), and evidently the Σ companion, B, is moving with it. The change in C corresponds to this movement, and therefore that star does not belong to the system. It will finally be nearer to A than B now is, the minimum distance of 3" being reached about 1939. All the measures of AB are given above. MADLER (*Dorpat Obsns.* xi) has an angle, 26°.5, which must belong to some other pair.

[β (iii)...β (*Mon. Not.* xxxiv, 59)...β^2...Cin^5...Mitchell (Cin^2)...Δ (ii)...]

β 368. *Aquarii* 45

R.A. 21^h 1^m 1^s
Decl. − 8° 43'

A and B

1876.10	99°.3	0".49	7.4...7.7	3*n*	Δ
1877.76	91.0	...	7.5...9.0	1*n*	Cin
1878.11	89.9	0.69	7.2...7.5	3*n*	Δ
1879.24	89.6	0.67	7.5...8.6	4*n*	Cin
1880.73	91.3•	0.87	...	1*n*	Pt
1881.63	90.4	0.63	6.9...7.7	3*n*	β
1882.67	89.4	0.5	7.0...7.5	1*n*	W
1886.69	90.1	0.70	8.1...8.6	2*n*	LM
1886.60	93.3	0.66	7.1...8.0	2*n*	Lv
1890.64	88.7	0.58	6.9...7.8	3*n*	β
1892.10	90.2	0.58	...	4*n*	Sp
1892.68	92.1	0.60	7.5...7.5	3*n*	T
1898.58	89.0	0.61	7.2...8.0	1*n*	A

C and D

	°	"			
1890.65	317.9	6.15	14.0 ... 14.7	2n	β
1898.58	316.1	5.14	14.0 ... 14.5	1n	A

AB and C

	°	"			
1890.65	27.2	12.02	...	2n	β
1898.58	30.9	12.20	...	1n	A

The bright star was suspected to be a close pair with the 6-inch in 1873, and verified with the same instrument in 1875. In measuring this with the 36-inch, the double companion, CD, was detected. These are very faint stars, and require a large aperture. There seems to be no sensible change thus far in the close pair. Lalande 40892.

[β (VI)...β (2062,3048)...β⁴...β (*Pub. L. O.* II)...Δ (I)...Cin⁴...Cin⁵...Pritchett (*Pub. Morrison Obsy.* I)...Wilson (Cin¹⁰)...LM...Lv¹...Sp (III)...Tarrant (3186)...Aitken (3585)...]

β 679.

R.A. 21ʰ 1ᵐ 24ˢ }
Decl. + 43° 12′ }

	°	"			
1878.10	68.1	0.38	10 ... 10	2n	β
1889.45	65.6	0.52	10 ... 10	3n	β
1896.56	54.0	0.42	...	1n	L

This close and exceedingly minute pair was discovered with the 18½-inch. It is too faint for the D.M. It is in a low-power field *sp* D.M. (43°) 3802, 8.8 m.

[β (X)...β¹...β (2957)...β (*Pub. L. O.* II)...Lewis (*Mon.* LIX, 400)...]

β 473. S.D. (10°) 5606

R.A. 21ʰ 1ᵐ 24ˢ }
Decl. − 10° 41′ }

	°	"			
1877.08	115.5	1.74	9.0 ... 10.2	3n	Δ
1893.53	114.9	1.88	8.5 ... 10.0	2n	Lv
1893.81	118.5	1.79	8.5 ... 9.5	1n	W
1898.65	118.0	1.82	8.2 ... 9.7	3n	Cg

Discovered with the 6-inch In S.D. 8.0 m. A 12.7 m star, COGSHALL 357°.2 : 25".37 (1898.67) 2n.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...Δ (I)...Lv (*A. J.* 382)...Wilson ( )...Cogshall ( )...]

β 158. Lalande 40984

R.A. 21ʰ 1ᵐ 37ˢ }
Decl. + 47° 19′ }

	°	"			
1875.72	314.9	10.44	7.3 ... 11.8	3n	Δ
1879.57	314.6	10.72	8.5 ... 12.5	1n	β
1891.57	314.1	10.84	8.0 ... 11.2	2n	β
1898.86	313.9	10.89	7.9 ... 11.1	4n	D

Discovered with the 6-inch. In the field *f* a new double nebula was found at the same time (DREYER 7026).

[β (III)...β (*Mon. Not.* XXXIV, 59)...β¹...β (3114)...β (*Pub. L. O.* II)...Δ (I)...Doolittle (*Pub. Flower Obsy.* I)...]

β 680. D.M. (53°) 2546

R.A. 21ʰ 1ᵐ 52ˢ }
Decl. + 53° 11′ }

A and B

	°	"			
1877.57	131.4	0.5±	8 ... 8+	1n	β
1877.70	128.3	0.63	8.1 ... 8.6	2n	Δ
1885.53	309.0	0.70	...	2n	HΣ
1890.74	306.7	0.58	...	6n	Sp
1891.65	310.1	0.64	8.4 ... 9.2	3n	β

AB and C

	°	"			
1890.58	34.2	23.95	...	1n	Sp
1885.52	33.6	23.41	...	1n	HΣ
1891.66	32.8	23.31	... 10.7	2n	β

Discovered with the 18½-inch. Further measures of the close pair are needed.

[β (X)...β¹...β (3114)...β (*Pub. L. O.* II)...Δ (I)...Sp (III)...HΣ ( )...]

β 836. W² XX. 1880

R.A. 21ʰ 2ᵐ 27ˢ }
Decl. + 47° 54′ }

A and B

	°	"			
1881.63	191.4	0.62	9.0 ... 9.1	3n	β
1888.08	189.6	0.65	9.2 ... 9.1	3n	Com
1889.29	191.4	0.63	9.1 ... 9.1	4n	β
1898.69	183.4	0.78	8.5 ... 8.6	4n	A

C and D

1889.29	65.°0	1.″27	10.2...11.2	3n	β
1898.69	67.0	1.32	10.8...11.5	2n	A

AB and CD

1881.63	219.°1	27.″38	...10.2	3n	β
1888.15	218.9	27.46	8.3... 9.5	3n	Com
1889.29	219.4	27.45	...	4n	β
1898.63	219.1	27.49	...	3n	A

The principal pair was discovered with the 15½-inch of the Washburn Observatory, and it was then stated that C might also be double. This was verified with the 36-inch in 1888, thus making a pretty but difficult quadruple group.

[β (XII)... β^{a}...β (2957)...β (*Pub. L. O.* II)...Comstock (*Pub. Washburn Obsy.* VI)...Aitken (35851...]

β 988. D.M. (30°) 4413

R.A. 21h 2m 28s
Decl. + 40° 56′

A and B

1880.63	238.°1	1.″20	8.9...11.7	3n	β
1893.81	226.2	1.28	9.0...12.0	2n	W
1898.48	223.9	1.46	9 ...9	1n	D

A and C

1880.58	55.°4	16.″07	... 8.9	3n	β
1893.81	53.3	15.08	... 9.2	2n	W
1898.45	51.2	15.16	... 9.8	1n	D

Discovered with the 18½-inch. Change in AB is probable.

[β (XIII)...β^{1}...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 837. D.M. (−0°) 4170

R.A. 21h 2m 43s
Decl. − 0° 16′

1881.73	189.°7	3.″70	8.4...10.1	3n	β
1886.84	186.1	3.33	...	4n	UL
1887.77	189.3	3.53	8.0...10.0	3n	Com
1898.54	187.1	3.41	8.5...10.1	5n	D
1898.84	187.0	3.47	8.3... 9.5	1n	β

Discovered with the 15½-inch at the Washburn Observatory. Without change.

[β (XII)...β^{a}...Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI)...Doolittle (*Pub. Flower Obsy.* I)...]

β 71. γ *Equulei*

R.A. 21h 4m 30s
Decl. + 9° 39′

A and C

1877.73	10.°0	41.″34	4.8...12	1n	β
1888.82	9.2	43.33	...	3n	β
1898.57	7.9	44.30	...10.5	3n	β

A and B (= Knott)

1867.50	276.°8	2.″13	...11.0	2n	Kn
1877.73	274.5	2.16	...	1n	β
1883.77	274.6	2.17	...	3n	Hl
1888.82	275.4	2.14	...	3n	β
1897.82	273.2	2.40	...	4n	A
1898.55	275.0	2.30	...	1n	β

The distant star was noted with the 6-inch. The bright star has a proper motion of 0.″165 in the direction of 165.°5. This corresponds to the change in C shown by the measures. KNOTT's companion has the same proper motion as the principal star, and hence this is probably a physical pair. The measures show no relative motion.

γ Equulei and 6 Equulei, about 5′ distant, make Σ 54, App. I.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β^{a}...β (2875)...β (*Pub. L. O.* II)...]

The following relate principally to B and D:

[Knott (*Mem. R. A. S.* XLIII) (*Mon. Not.* XXXIII, 473; XLVII, 11)...Δ (II)...Δ (1574)...Engelmann (*Mess. Neunzig Doppelsterne*, 1865)...*Radcliffe Obsns.* XXV...Hall (II)...Pritchett (*Pub. Morrison Obsy.* I)...Tarrant (2809)...Iedrzejewicz (2343)...Maielbckato (*Obsns.* 1802)...Aitken (*A. J.* 429)...]

β 251. O. Arg. S. 21193

R.A. 21h 4m 53s
Decl. − 31° 5′

1877.70	233.°6	2.″71	7.0... 9.5	1n	Cin
1879.69	234.4	....	8.0... 9.5	1n	β
1896.74	231.3	3.08	7.8... 9.6	3n	See

Discovered with the 6-inch.

[β (V)...β (*Mon. Not.* XXXV, 31)...β^{a}...Cin[a]...See (3496)...]

β 159. Lalande 41178

R.A. 21h 6m 21s
Decl. + 47° 12′

A and B

1876.69	318°.4	1″.33	6.1 . . . 9.2	6*n*	Δ
1882.68	300.0	1.34	. . .	1*n*	Perry
1889.53	316.7	1.28	7.1 . . . 9.7	3*n*	β
1898.56	316.6	1.22	6.7 . . . 9.8	4*n*	D

A and C (= OΣ (App.) 215)

1875.72	189°.6	134″.14	. . . 6.9	4*n*	Δ
1886.48	189.5	134.21	. . . 7.4	4*n*	Ff
1889.53	189.4	134.16	. . . 7.3	2*n*	β
1898.56	189.5	133.64	. . . 7.0	4*n*	D

The close pair was discovered with the 6-inch. There is a faint star about 14″ from AB in the direction of 147°. All the measures of OΣ (App.) 215 are given above. If there is any proper motion, it is evidently common to all the components.

[β (IV) . . . β (*Mon. Not.* XXXIV, 382) . . . β (2957) . . . β (*Pub. L. O.* II) . . . Δ (1) . . . Perry (*Eng. Mech.* XXXVI, 65) . . . Franz (3080) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 270. *Equulei* 19

R.A. 21h 7m 31s
Decl. + 6° 43′

A and B

1875.82	354°.6	0″.62	7.4 . . . 9.7	2*n*	Δ
1877.72	347.4	1.26	7.0 . . . 9.0	1*n*	β
1885.61	353.2	0.67	. . .	2*n*	HΣ
1889.44	350.0	0.5±	. . .	7*n*	Sp
1891.60	347.5	0.70	7.0 . . . 8.5	2*n*	β
1898.71	344.9	0.61	7.2 . . . 8.5	3*n*	A
1898.73	347.7	0.56	7.0 . . . 8.5	1*n*	β

A and C

1877.72	32°.4	20″±	. . . 13	1*n*	β
1898.70	32.7	32.55	. . . 12.7	2*n*	β
1898.71	32.1	32.80	. . . 12.8	2*n*	A

A and D (= S 781)

1824.99	173°.0	183″.24	6½ . . . 7	2*n*	S
1877.72	172.6	183.40	7.0 . . . 7.0	1*n*	β
1891.60	172.6	184.52	. . . 7.0	2*n*	β
1898.66	172.8	184.44	. . .	3*n*	β
1898.66	172.3	184.40	. . . 7.0	1*n*	A

The close pair was discovered with the 9.4-inch of the Dartmouth College Observatory. So far there is no material change. All the measures of SOUTH's pair are given. A and D are respectively Lalande 41173 and 41179. Each star was observed twice by LALANDE. The mean differences of R.A. and Decl. give for the position-angle and distance at that time 172°.9 : 184″.86.

[β (V) . . . β (*Mon. Not.* XXXV, 31) . . . β¹ . . . β (3114) . . . β (*Pub. L. O.* II) . . . Sp (III) . . . HΣ ( ) . . . Aitken (3585) . . .]

β 681. Rümker 9004

R.A. 21h 7m 40s
Decl. + 16° 26′

1878.64	239°.7	2″.51	7.0 . . . 11.3	3*n*	β
1884.61	232.9	2.86	. . .	2*n*	HΣ
1892.79	234.3	2.33	7.0 . . . 11.0	1*n*	Ho
1897.84	240.6	3.10	. . .	1*n*	Br
1898.57	235.9	2.89	7.2 . . . 11.2	4*n*	D
1899.50	238.2	2.94	7.1 . . . 11.0	2*n*	β

Discovered with the 18½-inch. Without change.

[β (X) . . . β¹ . . . Hough (3134) . . . HΣ ( ) . . . Brown ( ) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 160. Lalande 41242

R.A. 21h 7m 48s
Decl. + 45° 13′

B and C

1892.67	116°.7	6″.11	11.0 . . . 11.2	1*n*	W
1898.86	115.2	6.41	10.2 . . . 10.7	4*n*	D

A and B

1892.67	154°.3	56″.96	7.5 . . .	1*n*	W
1898.86	154.2	57.47	7.3 . . .	4*n*	D

Distant double companion noted with the 6-inch. Not likely to be of any special interest.

[β (III) . . . β (*Mon. Not.* XXXIV, 59) . . . Wilson ( ) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 682. Lalande 41222

R.A. 21h 8m 30s
Decl. + 4° 12′

1877.77	105°.6	5″.64	7.5 . . . 12.0	1*n*	β
1885.66	103.5	5.71	. . .	2*n*	HΣ

1891.63	103°.3	5".63	7.7 ... 12.2	2*n*	β
1898.53	100.7	5.67	7.4 ... 11.5	6*n*	D
1899.44	102.2	5.28	7.0 ... 13.0	1*n*	β

Discovered with the 18½-inch.

[β (x)...β^1...β (3114)...β (*Pub. L. O.* II)...HΣ ( )... Doolittle (*Pub. Flower Obsy.* I)...]

β 1261. D.M. (15°) 4384

R.A. 21h 10m 29s
Decl. + 15° 36′

1886.76	151°.5	1".39	8.5 ... 11.0	2*n*	Ho
1891.85	148.9	1.72	8.5 ... 9.7	3*n*	β
1895.88	150.6	...	...	1*n*	Sp
1897.84	148.2	1.57	...	3*n*	A

This pair was discovered with the 18½-inch in September 1884, but was not included in the lists of new pairs of that time.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Hough (2978) ...Sp (III)...Aitken (*A. J.* 429)...]

β 161. W[1] XXI. 197

R.A. 21h 10m 53s
Decl. − 4° 45′

B and C

1891.64	316°.8	7".10	10.2 ... 11.5	2*n*	β
1898.71	318.5	7.40	... 11.0	1*n*	β

A and B

1891.62	350°.2	101".01	8.1 ... 10.0	2*n*	β
1898.71	349.9	100.94	8.2 ... 9.0	1*n*	β

A and *a*

1891.65	315°.3	34".10	...	1*n*	β
1898.71	318.0	33.90	...	1*n*	β

a and *b*

1891.65	15°.8	11".66	13.5 ... 13.5	1*n*	β
1898.71	19.2	10.86	13.5 ... 12.0	1*n*	β

The distant double companion was found with the 6-inch. The declination was erroneously given − 5° 45′ in β (III). A and B are respectively S.D. (4°) 5404 and 5403, 8.3 and 9.3 m.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (3114)... β (*Pub. L. O.* II)...]

β 162. D.M. (35°) 4461

R.A. 21h 12m 14s
Decl. + 35° 16′

1875.11	240°.5	1".05	8.0 ... 8.5	4*n*	Δ
1880.77	241.5	0.98	8.0 ... 8.0	1*n*	β
1883.91	67.0	1.28	8.1 ... 8.3	5*n*	En
1891.63	243.5	1.09	8.5 ... 8.6	3*n*	β

Discovered with the 6-inch. Probably fixed. A 13m star in the direction of 138°.5.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β^1...β (3114)...β (*Pub. L. O.* II)...Δ (1)...Δ (2086)...Engelmann (2678)...]

β 163. Lalande 41386

R.A. 21h 12m 47s
Decl. + 11° 4′

1876.09	252°.3	1".15	7.1 ... 9.0	4*n*	Δ
1878.60	256.9	0.87	7.0 ... 9.0	1*n*	OΣ
1884.31	254.3	1.19	...	3*n*	HΣ
1887.79	251.3	0.68	7 ... 10	3*n*	Hi
1891.52	254.6	0.75	7.2 ... 9.8	3*n*	β
1892.91	248.1	0.57	...	2*n*	Sp
1895.46	251.9	0.56	...	5*n*	Sp
1895.69	246.9	0.63	7.2 ... 9.8	2*n*	Lew
1898.76	253.2	0.63	7.0 ... 9.6	3*n*	A

Discovered with the 6-inch. This star has a proper motion of 0".081 in the direction of 180°.0 (KUSTNER). There is no relative change, but the components have the same proper motion.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (3114)...β (*Pub. L. O.* II)...Δ (1)...OΣ (*Poulkowa Obsns.* X)...Hall (II)...Sp (III)...Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsns.* 1895)...Aitken (3585)...HΣ ( )...]

β 271. Lalande 41363

R.A. 21h 12m 49s
Decl. − 26° 51′

A and B

1876.68	226°.6	2".21	7.2 ... 9.7	1*n*	Cin
1877.66	233.3	2.14	7.5 ... 10.0	1*n*	Cin
1879.68	225.3	...	6.0 ... 10.0	1*n*	Cin
1879.69	231.8	2.30	6.5 ... 9.5	1*n*	Cin
1886.78	237.5	2.77	6.0 ... 9.0	1*n*	LM
1891.54	237.2	2.70	7.0 ... 10.4	2*n*	β
1897.24	241.4	3.19	7.7 ... 10.7	5*n*	See
1898.74	239.5	2.90	6.8 ... 9.1	4*n*	D
1898.84	236.3	3.37	...	1*n*	β

A and C

1898.84	74°.2	74″.57	...12.0	1*n*	*β*

Discovered with the 9.4-inch at the Dartmouth College Observatory. It is a most interesting binary from the large common proper motion of the components. The annual movement is 0″.693 in the direction of 245°.3 (PORTER). The relative motion is slow, so that the period must be a long one. The magnitude in GOULD is 6.7.

[*β* (v)...*β* (*Mon. Not.* XXXV, 31)...*β* (3114)...*β* (*Pub. L. O.* II) ...Cin³...Cin⁴...Cin⁵...Cin⁶...I.M...See (3496)... Doolittle (*Pub. Flower Obsy.* I)...]

β 252. Lalande 41364

R.A. 21ʰ 12ᵐ 58ˢ
Decl. — 27° 49′

1877.54	278.4	2″.53	8.2...	8.3	5*n*	Cin
1885.67	96.3	2.44	8.0...	8.1	2*n*	W
1888.65	277.7	2.65	8.2 ..	8.2	1*n*	Lv
1891.73	279.2	2.67	...		1*n*	Col
1896.89	276.9	2.59	8.5...	8.5	2*n*	See
1897.74	276.8	2.55	8¼...	8½	2*n*	Sc

Discovered with the 6-inch. Unchanged. The measures in Cin⁵ and Lv⁴ of this pair are erroneously credited to another double in the vicinity, 2ᵐ 16ˢ *p* and 4′ 47″ *n*.

[*β* (v)...*β* (*Mon. Not.* XXXV, 31)...Cin³...Cin⁴...Cin⁵... Wilson (Cin⁷)...Lv⁴...Collins (*Proc. Haverford Coll. Obsy.* 1892)...See (3496)...Scott (*Mon. Not.* LIX, 427)...]

β 289. W² XXI. 289

R.A. 21ʰ 13ᵐ 22ˢ
Decl. + 34° 25′

A and B

1878.53	137°.8	0″.90	8.2...10.0	1*n*	*β*
1881.64	130.4	0.67	9 ...11	1*n*	Ho
1898.76	140.5	0.89	8.3... 9.0	1*n*	*β*
1898.82	139.2	1.00	8.0...10.2	3*n*	A

A and C

1878.53	262°.1	5″.39	.. 13	1*n*	*β*
1898.75	261.5	6.28	.. 12	1*n*	*β*
1898.82	258.4	6.55	...13.0	2*n*	A

Discovered with the 26-inch at the Naval Observatory. In the field with *v Cygni* (OΣ 433), 24′ *f* and 1′.7 *n*.

[*β* (v)...*β* (*Mon. Not.* XXXV, 31)...*β*ᶜ...Hough (2978)... Aitken (3585)...]

β 1140. O. Arg. N. 22012

R.A. 21ʰ 14ᵐ 1ˢ
Decl. + 58° 6′

1889.58	276°.5	3″.89	6.7...12.3	3*n*	*β*
1893.80	274.1	4.40	...13.0	2*n*	Bar
1898.31	276.6	3.86	7.0...12.0	2*n*	*β*

Discovered with the 36-inch. This star is surrounded by a faint nebula, about 12′ in diameter, discovered by BARNARD by means of photography (*Mon. Not.* LIX, 369).

[*β* (XVI)...*β* (2950)...*β* (*Pub. L. O.* II)...Barnard (*A. J.* 447)...]

β 838. Lalande 41462

R.A. 21ʰ 14ᵐ 51ˢ
Decl. + 2° 37′

1881.66	90°.3	1″.29	7.6...	9.5	3*n*	*β*
1884.65	93.8	1.84	...		2*n*	HΣ
1886.84	93.9	1.69	...		3*n*	UL
1887.77	95.8	1.71	8.2...	9.8	3*n*	Com
1891.85	96.7	1.34	8.3...	9.2	3*n*	*β*
1893.59	97.1	1.48	7.8...10.2		3*n*	W
1894.57	101.1	1.82	...		1*n*	Bar
1894.87	98.1	1.22	...		3*n*	Sp
1895.74	101.3	1.36	...		1*n*	Lew
1896.66	98.7	1.66	8.0...	9.9	3*n*	Lv
1897.74	93.8	1.39	...		3*n*	A
1897.85	100.9	1.65	8 ...11		1*n*	Br

Discovered with the 15½-inch at the Washburn Observatory.

[*β* (XII)...*β*ᶜ...*β* (3114)...*β* (*Pub. L. O.* II)...Updegraff and Lamb (*Pub. Washburn Obsy.* V)...Comstock (*Sid. Mess.* IX, 78) (*Pub. Washburn Obsy.* VI)...Wilson ( )...Barnard (*A. J.* 447)...Sp (III)...Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsvn.* 1895)...Lv (*A. J.* 407)...Aitken (*A. J.* 429)...HΣ ( )...Brown ( )...]

β 1262. Lalande 41483

R.A. 21h 15m 40s
Decl. — 15° 26′

1878.02	113°.8	2″.07	8.0... 9.1	3n	Cin
1886.72	116.0	2.08	8.0... 9.2	2n	LM
1891.85	113.3	1.79	8.3... 9.0	3n	β
1897.72	112.3	1.98	...	3n	A

Discovered with the 6-inch in 1873. The double, H I N. 139, is undoubtedly identical with this pair. H I has no measures or description beyond giving it as Class I, and his place is some distance *sp*, but there is no double star there, and he probably saw the pair given above. There seems to be no relative motion.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Cin3...Cin4... Cin5...LM...Aitken (*A. J.* 429)...]

β 446. W* XXI. 344

R.A. 21h 15m 44s
Decl. + 32° 56′

1876.80	261°.7	2″.30	9.0...	1n	β
1893.65	265.4	2.96	8.5...12.5	3n	W
1898.22	255.1	2.88	8.4...13+	1n	D

Discovered with the 18½-inch. In the field with a 7m star.

[β (VIII)...β (*Am. Jour. Sci.* July 1877)...Wilson ( )... Doolittle (*Pub. Flower Obsy.* I)...]

β 839. D.M. (48°) 3348

R.A. 21h 16m 10s
Decl. + 48° 50′

A and B

1881.47	201°.7	15″.18	8.5...12.0	3n	β
1892.86	200.8	14.45	8 ...12	1n	Ho
1898.69	201.7	15.03	8.2...11.5	1n	β

A and C

1881.47	197°.0	21″.46	... 9.4	3n	β
1887.85	197.8	21.43	8.0... 9.8	3n	Com
1892.86	195.4	21.20	... 9	1n	Ho
1898.69	197.1	21.67	...10.5	1n	β

Discovered with the 15½-inch at the Washburn Observatory. Without change.

[β (XII)...β8...Comstock (*Pub. Washburn Obsy.* VI)...Hough (3234)...]

β 766. θ* *Microscopii*

R.A. 21h 16m 45s
Decl. — 41° 31′

1879.73	314°.1	0″.83	5 ... 6	2n	β
1886.71	302.0	...	6 ... 7	1n	Pol
1889.43	307.1	1.06	5 ... 7	1n	β
1894.76	292.3	0.63	6 ... 7	2n	Sel
1896.81	281.7	0.94	7 ... 8	3n	See
1896.81	286.1	0.86	...	1n	Cg
1897.79	272.7	0.98	...	1n	See
1898.71	293.4	1.08	5 ... 7	2n	A

Discovered with the 6-inch at Mt. Hamilton in 1879. Some change in the angle is very probable.

[β (XI)...β8...β (2957)...β (*Pub. L. O.* I, B)...Pollock (*Pub. Sydney Obsy.* 1891)(*Mon. Not.* XLVII, 473)...Sellors (3303) ...See (3496)...Aitken (3585)...]

β 1035. B.A.C. 7422

R.A. 21h 17m 16s
Decl. — 26° 4′

1888.74	198°.7	1″.05	8.0...10.7	3n	β
1898.72	205.6	1.21	8.5...11.0	1n	Cg
1898.74	207.0	1.09	8.0...10.3	3n	A

Discovered with the 12-inch. Apparently angular motion.

[β (XIV)...β (2875)...β (*Pub. L. O.* II)...Aitken (3585)... Cogshall ( )...]

β 272. Lalande 41564

R.A. 21h 17m 50s
Decl. — 13° 19′

1876.16	253°.8	4″.52	9.3...11.3	3n	Δ
1878.71	256.0	4.57	8.2...12.0	2n	Cin
1879.79	255.7	4.31	8.0...12.0	1n	Cin
1892.69	258.5	4.97	8.5...11.7	3n	W
1898.61	256.8	4.81	8.9... 9.8	4n	D

Discovered with the 6-inch. In the field with 18 *Aquarii*.

[β (V)...β (*Mon. Not.* XXXV, 31)...Δ (1)...Cin3...Cin8... Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 447. *Vulpeculae* 129

R.A. $21^h\ 18^m\ 46^s$
Decl. $+24°\ 48'$

1878.21	330°.4	8″.54	6.5...12.5	2*n*	β
1881.67	331.1	9.14	6.0...12.5	1*n*	Ho
1885.66	329.9	8.62	...	2*n*	HΣ
1892.80	330.7	9.41	6.0...12.0	1*n*	Ho
1898.63	330.2	8.74	6.3...13.0	3*n*	Bd
1898.73	328.3	8.91	6.2...12.3	3*n*	A

Discovered with the 18½-inch. Fixed. Lalande 41637.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β°...Hough (2978, 3234)...Boothroyd ( )...Aitken (3585)...HΣ ( )...]

β 164. Lalande 41645

R.A. $21^h\ 19^m\ 13^s$
Decl. $+8°\ 52'$

A and B

1874.40	244°.8	0″.64	...	1*n*	New
1875.48	241.6	0.57	8.0... 8.5	3*n*	J
1877.72	237.3	0.82	8.0... 8.5	1*n*	β
1878.60	62.6	0.59	7.5... 8.0	1*n*	OΣ
1886.69	63.0	0.78	...	6*n*	HΣ
1886.78	237.6	0.68	8.0... 8.1	2*n*	LM
1890.69	240.2	0.50	7.6... 7.8	3*n*	β
1891.79	240.0	0.57	8.0... 8.5	4*n*	T
1895.70	244.4	0.53	7.6... 7.6	3*n*	Cole
1896.73	246.0	....	...	1*n*	Cole
1898.68	238.0	0.70	7.5... 7.5	3*n*	A

AB and C (= Σ 2793)

1828.80	242°.2	26″.51	7.0... 8.7	3*n*	Σ
1842.89	241.5	....	...	1*n*	Ma
1865.14	241.2	26.62	6.8... 9.0	3*n*	J
1878.60	242.5	26.40	... 8.7	1*n*	OΣ
1890.69	241.5	26.99	... 8.7	3*n*	β
1892.81	243.0	26.66	6.5... 8.2	2*n*	Gl
1895.70	240.8	26.86	...	5*n*	Cole
1898.68	241.8	26.69	... 8.5	3*n*	A

The principal star of the wide pair, Σ 2793, was found to be a close pair with the 6-inch. The change, if any, is very slow. The distant star is fixed. All the measures of C are given.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β°...β (3048)...β (*Pub. L. O.* II)...Newcomb (*Wash. Obsns.* 1874)...J (II, p. 511)...J (2086)...LM...OΣ (*Poulkowa Obsns.* X)...Tarrant (3186)...HΣ ( )...Aitken (3585)...Glasenapp (II)...Madler (*Fixstern-Systeme* 1)...Coleman (*Mem. R. A. S.* LIII)...]

β 767. Lacaille 8809

R.A. $21^h\ 19^m\ 19^s$
Decl. $-43°\ 4'$

1879.70	146°.1	3″.40	6.0... 9.0	2*n*	β
1887.43	143.9	3.22	6 ... 8	4*n*	Pol
1890.94	142.6	2.73	6 ... 8	5*n*	Sel
1898.66	144.1	3.18	6.0...10.0	3*n*	A
1898.72	145.6	3.07	6.5...11.5	2*n*	Cg

Discovered with the 6-inch at Mt. Hamilton in 1879. In Cord. G. C. 6m (*Microscopium*).

[β (XI)...β°...Pollock (*Pub. Sydney Obsy.* 1891) (*Mon. Not.* XLVII, 473) (*Mem. R. A. S.* L)...Sellors (3154)...Aitken (3585)...Cogshall ( )...]

β 683. Lalande 41683

R.A. $21^h\ 20^m\ 43^s$
Decl. $-20°\ 44'$

1877.53	198°.4	2″.04	8.5...11.0	1*n*	β
1879.79	197.3	2.5±	8.5...12.0	1*n*	Cin
1882.71	193.1	1±	7.0...10.0	1*n*	W
1892.79	193.2	2.89	8.0...11.0	1*n*	Ho
1898.69	194.6	2.67	8.2...12.0	2*n*	Bd
1898.71	195.1	3.01	8.0...10.8	3*n*	A

Discovered with the 18½-inch. While the relative change is small, the components have a common proper motion of 0″.125 in the direction of 154°.7 (PORTER), and therefore form a physical system.

[β (X)...β°...Cin°...Wilson (Cin^{10})...Hough (3234)...Boothroyd ( )...Aitken (3585)...]

β 1141. O. Arg. N. 22270

R.A. $21^h\ 22^m\ 6^s$
Decl. $+57°\ 43'$

1889.58	165°.9	2″.72	7.7...13.2	3*n*	β
1898.68	171.9	3.13	7.5...13.8	3*n*	A

Discovered with the 36-inch.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 369. Radcliffe 5237

R.A. 21h 22m 31s
Decl. + 52° 14′

1885.55	33.4	16.03	...	1*n*	HΣ
1891.50	31.9	16.26	7.3...11.3	3*n*	β

Discovered with the 6-inch. The 36-inch shows a third star 14m, a little farther from A than this, in the direction of 330°.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...HΣ ( )...]

β 72. W° XXI. 511

R.A. 21h 23m 43s
Decl. — 5° 55′

1877.06	45.2	1.82	9.0...11.2	3*n*	J
1878.17	43.1	1.90	...	2*n*	β
1878.75	37.0	1.74	8.0...11.0	2*n*	Cin
1886.68	38.0	2.00	8.4...11.1	4*n*	LM
1890.68	42.2	1.84	8.3... 8.9	3*n*	β
1890.77	44.1	1.94	9.0...11.5	2*n*	T
1897.74	37.6	1.89	...	3*n*	A

Discovered with the 6-inch. β Aquarii is 11′ *n*, and β 684 in the field.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β°...β (3048)...β (*Pub. L. O.* II)...J (I)...Cin°...LM...Tarrant (3186)...Aitken (*A. J.* 429)...]

β 684. W° XXI. 517

R.A. 21h 23m 53s
Decl. — 5° 57′

1878.62	133.9	1.11	9.0... 9.2	1*n*	β
1886.78	126.1	1.16	9.4... 9.8	2*n*	LM
1890.68	126.7	1.12	8.7... 8.9	3*n*	β
1897.75	124.8	1.16	...	3*n*	A

Discovered with the 18½-inch. In the field with β 72. Angular motion is probable.

[β (X)...β°...β (3048)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429)...]

β 685. 2 *Pegasi*

R.A. 21h 24m 31s
Decl. + 23° 7′

1878.05	334.1	29.82	5.5...12.5	2*n*	β
1893.68	332.4	29.58	5.0...12.8	1*n*	W
1899.72	332.3	30.28	...13.0	3*n*	D

Discovered with the 18½-inch. The principal star has a proper motion of 0″.015 in the direction of 82°.5 (AUWERS).

[β (X)...β°...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 448. D.M. (44°) 3832

R.A. 21h 24m 36s
Decl. + 44° 24′

A double star, supposed to be in this place, was found with the 18½-inch October 1876, and the distance estimated 2″, and the magnitudes 7 and 11. I could not see this star double with the 18½-inch in 1879, nor with the 36-inch in 1891. HΣ found it single in 1885. There is no obvious error in the original entry, nor any doubt noted as to the existence of the companion. The magnitude of this star is 6.4 in A.G.C.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β°...HΣ ( )...]

β 1142. D.M. (56°) 2579

R.A. 21h 25m 7s
Decl. + 56° 39′

1889.59	353.9	0.41	8.7... 8.7	3*n*	β
1898.80	356.6	0.44	9.3... 9.3	3*n*	A

Discovered with the 36-inch.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 73. β *Aquarii*

R.A. 21h 25m 14s
Decl. — 6° 6′

A and C

1879.57	184.9	54.51	...11.5	3*n*	β
1893.82	185.0	54.95	...11.5	3*n*	W
1898.63	184.6	55.07	...11.2	3*n*	Cg
1898.90	185.4	55.73	...12.0	1*n*	β

A and B (= H 936)

1828	322.8	20±	3	...15	1*n*	H
1879.34	318.9	34.26		...10.9	2*n*	β
1893.82	318.5	34.92		...11.0	3*n*	W
1898.63	318.4	34.96		...10.5	3*n*	Cg
1898.90	319.1	34.72		...11.0	1*n*	β

The faint companion was noted with the 6-inch. All the measures of the HERSCHEL star are given. These stars are not likely to have any connection with the large star. The proper motion is very small, 0".009 in the direction of 263°.6.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β^2...β^3...Wilson ( )...Cogshall ( )...]

β 165. Lalande 41954

R.A. $21^h\ 27^m\ 55^s$
Decl. $-\ 3°\ 59'$

1876.10	176°.6	4".77	8.7...10.8	3*n*	J
1879.29	176.7	4.82	8.0...10.5	2*n*	Cin
1888.82	176.5	5.04	8.3...10.8	1*n*	Lv
1890.77	179.3	4.96	...	1*n*	Byers
1890.77	174.3	4.42	8.7...11.0	2*n*	T
1898.51	176.5	5.08	8.6... 9.8	4*n*	D

Discovered with the 6-inch. Probably fixed.

[β (III)...β (*Mon. Not.* XXXIV, 59)...J (I)...Cin^5...Cin^6...Lv^1...Byers (*Proc. Haverford Coll. Obsy.* 1891)...Tarrant (3186)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 370. O. Arg. N. 22429

R.A. $21^h\ 28^m\ 15^s$
Decl. $+\ 52°\ 13'$

1876.77	326°.5	3".46	8.5... 9.0	4*n*	J
1880.82	325.5	3.59	...	1*n*	Pt
1892.77	328.0	3.69	8.5... 9.4	4*n*	W
1898.60	326.7	3.68	8.7... 9.0	4*n*	D

Discovered with the 6-inch. ROGERS gives the proper motion, 0".045 in 90°.

[β (VI)...β (2062)...J (I)...Pritchett (*Pub. Morrison Obsy.* 1)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 273. W. XXI. 646

R.A. $21^h\ 28^m\ 33^s$
Decl. $+\ 10°\ 55'$

1875.84	93°.1	5".77	8.1...12.0	4*n*	J
1879.97	92.4	5.54	8.0...11.5	3*n*	β
1898.50	90.9	6.13	8.7...10.5	3*n*	D
1898.84	92.9	5.73	8.0...10.5	1*n*	β

Discovered with the 9.4-inch at the Dartmouth College Observatory. Unchanged.

[β (V)...β (*Mon. Not.* XXXV, 31)...β^1...β^3...J (I)...Doolittle (*Pub. Flower Obsy.* 1)...]

β 74. Lalande 42052

R.A. $21^h\ 29^m\ 40^s$
Decl. $+\ 20°\ 52'$

1874.67	321°.4	1".54	7.0... 9.0	1*n*	OΣ
1876.09	319.5	1.43	7.1... 9.0	5*n*	J
1882.68	325.0	1.6	6.5...10	1*n*	Perry
1884.38	321.7	1.62	...	3*n*	HΣ
1893.53	319.9	1.32	7.3... 8.9	3*n*	Lv

Discovered with the 6-inch. No relative motion.

[β (I)...β (*Mon. Not.* XXXIII, 351)...OΣ (*Poulkowa Obsns.* X)...J (I)...Perry (*Eng. Mech.* XXXVI, 65)...Lv (*A. J.* 382)...HΣ ( )...]

β 166. O. Arg. N. 22487

R.A. $21^h\ 30^m\ 17^s$
Decl. $+\ 59°\ 48'$

1875.54	259°.3	1".16	7.4...10.2	4*n*	J
1885.52	254.1	1.31	...	2*n*	HΣ
1893.77	256.6	1.44	7.8...11.0	2*n*	W
1898.57	256.9	1.46	8.7...10.5	3*n*	D

Discovered with the 6-inch.

[β (III)...β (*Mon. Not.* XXXIV, 59)...J (I)...Wilson ( )...HΣ ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 167. *Cygni* 363

R.A. $21^h\ 31^m\ 0^s$
Decl. $+\ 29°\ 31'$

1876.48	89°.2	2".08	7.0...11.4	4*n*	J
1881.73	88.0	1.97	7.0...11.0	3*n*	Ho
1882.68	91.0	2.17	...	1*n*	Perry
1885.66	92.2	2.33	...	2*n*	HΣ
1893.66	88.9	2.19	6.5...10.8	2*n*	W

Discovered with the 6-inch. Without change. *Piazzi* XXI. 215.

[β (III)...β (*Mon. Not.* XXXIV, 59)...J (I)...Perry (*Eng. Mech.* XXXVI, 65)...Hough (2078)...Wilson ( )...HΣ ( )...]

β 371. O. Arg. N. 22566

R.A. 21h 32m 58s
Decl. + 58° 10′

1876.58	4.0	8.39	8.2 ... 10.7	3n	⅃
1892.82	4.3	8.33	8.5 ... 11.2	3n	W
1898.19	3.2	8.78	8.2 ... 10.1	4n	D

Discovered with the 6-inch.

[β (VI) ... β (2062) ... ⅃ (1) ... Wilson ( ) ... Doolittle (*Pub. Flower Obsy.* 1) ...]

β 1212. 24 *Aquarii*

R.A. 21h 33m 20s
Decl. — 0° 36′

A and B

1890.75	254.5	0.45	6.5 ... 6.9	3n	β
1891.75	261.0	0.55	6.3 ... 7.1	4n	β
1892.40	256.2	0.38	...	2n	Sp
1893.68	260.5	0.55	7.1 ... 7.5	3n	W
1893.88	262.8	0.59	...	1n	Bar
1894.82	264.7	0.52	...	7n	Bar
1894.86	261.5	0.45	...	3n	Sp
1897.81	263.5	0.65	...	3n	A
1897.89	267.4	0.73	...	1n	Br
1898.78	269.0	0.49	6.5 ... 6.6	3n	A
1898.84	269.0	0.54	...	1n	β

AB and C

1891.76	141.0	44.46	... 10.9	2n	β
1893.83	141.2	43.92	... 11.5	2n	W
1897.89	143.4	43.13	...	1n	Br
1898.84	142.7	43.33	... 9.9	2n	β

Discovered with the 36-inch. It was evident at the time of discovery that the close pair was a binary from the common proper motion of the components, as otherwise the duplicity would have been seen long ago. This proper motion is given by AUWERS as 0″.215 in the direction of 82°.5. This corresponds, as might be expected, to the change in the distant star C. The motion of AB is slow so far, but it is probable that the components have about the maximum separation at this time, and that hereafter the angular motion will be more rapid.

[β (XVII) ... β (3047,3114) ... β (*Pub. L. O.* II) ... Wilson ( ) ... Sp (III) ... Barnard (*A. J.* 447) ... Aitken (*A. J.* 429) ... Aitken (3585) ... Brown ( ) ...]

β 686. Radcliffe 5329

R.A. 21h 33m 43s
Decl. + 55° 13′

A and B

1877.58	117.5	0.4	...	1n	β
1877.70	127.9	0.48	7.7 ... 8.0	1n	⅃
1885.52	296.5	0.80	...	1n	HΣ
1893.57	303.7	0.87	8.5 ... 11.0	1n	W
1898.70	289.9	0.87	8.0 ... 13.0	1n	A

AB and C (= OΣ App. 220)

1875.96	11.0	41.22	8.3 ... 8.3	3n	⅃
1878.65	11.0	41.67	...	1n	β
1883.23	10.9	41.53	8.1 ... 8.0	4n	Fr
1893.57	10.9	41.05	... 9.5	1n	W

The duplicity of the principal star of this wide pair was discovered with the 18½-inch. It is a difficult pair, and likely to prove an interesting one. The estimated magnitudes of B are very discordant. The foregoing are all the measures of C. This star is Radcliffe 5330.

[β (X) ... β′ ... ⅃ (1) ... Wilson ( ) ... Franz (2649) ... Aitken ( ) ... HΣ ( ) ...]

β 449. Radcliffe 5335

R.A. 21h 34m 42s
Decl. + 41° 11′

A and B

1876.80	19.1	6.78	...	1n	β
1891.51	15.6	6.09	7.1 ... 12.7	3n	β
1898.69	14.5	6.13	...	2n	Hu

A and D

1876.80	248.2	17.94	...	1n	β
1889.94	239.6	15.70	... 13	1n	Ho
1891.51	247.2	17.45	... 12.1	2n	β

A and C (= H′ III. 110 = OΣ 447)

1783.81	157.6	13.90	...	1n	H′
1848.30	169.4	13.96	7.0 ... 11.1	4n	OΣ
1866.58	170.5	13.69	7.0 ... 10.8	3n	⅃
1889.94	170.5	13.81	... 11.0	1n	Ho
1891.51	172.2	13.61	... 11.0	2n	β
1894.66	171.2	13.68	7.1 ... 10.8	2n	Gl

A and E

1783.81	49°.4	25″.97	...		1*n*	H¹
1848.30	45.3	29.00	...	7.9	4*n*	OΣ
1866.58	45.7	29.12	...	7.7	3*n*	Δ
1889.94	45.1	28.85	...	8.0	1*n*	Ho
1891.51	44.6	28.95	...	7.2	3*n*	β
1894.66	44.9	28.92	...	7.9	2*n*	Gl

The two small stars, B and D, were noted with the 18½-inch. The brighter stars, ACE, make H¹ III. 110 = OΣ 447. They are relatively fixed. All the measures are given.

[β (VIII)...β (*Am. Jour. Sci.* July 1877)...β (3114)...β (*Pub. L. O.* II)...Hough (2978)...Hussey ( )...OΣ (*Poulkowa Obsns.* IX)...Δ (1)...Glasenapp (III)...]

β 687. Radcliffe 5340

R.A. 21ʰ 34ᵐ 53ˢ
Decl. + 55° 15′

1878.65	8°.4	0″.89	8.0...	9.0	1*n*	β
1885.55	4.4	0.66	...		3*n*	HΣ
1890.74	4.9	0.64	...		6*n*	Sp
1893.70	1.8	0.76	7.2...	9.0	2*n*	W
1898.65	2.5	0.83	7.7...	9.3	4*n*	A

Discovered with the 18½-inch. My first angle was printed 188°.4. An examination of the original record shows that it should have been as given here.

[β (X)...β¹...Sp (III)...Wilson ( )...Aitken (3585)...HΣ ( )...]

β 1143. Piazzi XXI. 248

R.A. 21ʰ 35ᵐ 14ˢ
Decl. + 56° 57′

A and B

1889.62	323°.5	1″.55	6.0...	13.7	3*n*	β
1898.75	325.0	1.73	6.3...	14.0	2*n*	A

A and C (= Σ 2816)

1832.94	120°.1	11″.66	6.3...	7.9	5*n*	Σ
1866.65	121.2	11.77	5.8...	7.5	3*n*	Δ
1889.61	120.4	11.86	...	7.3	3*n*	β
1898.87	120.7	11.60	...		1*n*	A

A and D (= Σ 2816)

1832.94	339°.7	19″.96	...	8.0	5*n*	Σ
1866.65	339.8	19.81	...	7.5	3*n*	Δ
1889.61	339.5	19.94	...	7.3	3*n*	β
1898.87	339.4	20.15	...		1*n*	A

The close companion to the principal star of the wide triple Σ 2816 (= H¹ III. 71 = S 795) was discovered with the 36-inch. It is probably too difficult for any of the instruments with which the other stars have been observed. The old components appear to be relatively fixed. AUWERS gives the proper motion of the principal star 0″.0167 in the direction of 153°.9. This should increase the distance of D about 1″ in the interval covered by the measures. The measures indicate a common movement in space. This is a naked-eye star in *Cepheus* (= B.A.C. 7545). The Harvard photometric magnitude is 5.5.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3585)...]

There are other measures of the bright stars:

[Madler (*Fixstern-Systeme* I) (*Dorpat Obsns.* IX, XI, XIII)...Wrottesley (*Phil. Trans.* 1851)...*Radcliffe Obsns.* XXII...Δ (1125)...Δ (I, p. 118, II)...Herschel (*Mem. R. A. S.* IV)...Nobile (*Rend. Accad. Sci.* Napoli, Jan. 1875)...Gledhill, Wilson and Seabroke (*Mem. R. A. S.* XLII)...Glasenapp (III)...]

β 372. D.M. (50°) 3403

R.A. 21ʰ 35ᵐ 48ˢ
Decl. + 51° 1′

1876.93	352°.7	1″.89	8.5...	10.6	4*n*	Δ
1892.69	357.2	1.83	8.5...	11.0	2*n*	W

Discovered with the 6-inch. Near π *Cygni*, 2ᵐ *p* and 22′ *n*.

[β (VI)...β (2062)...Δ (1)...Wilson ( )...]

β 274. W° XXI. 881

R.A. 21ʰ 36ᵐ 26ˢ
Decl. + 38° 56′

1875.93	180°.7	3″.45	7.8...	10.9	7*n*	Δ
1880.83	182.4	3.54	...		1*n*	Pt
1892.95	181.7	3.99	8.0...	10.5	1*n*	W
1898.52	177.4	3.59	7.8...	9.0	2*n*	D

Discovered with the 9.4-inch at the Dartmouth College Observatory.

[β (V)...β (*Mon. Not.* XXXV, 31)...Δ (1)...Pritchett (*Pub. Morrison Obsy.* I)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 373.

R.A. 21h 37m 1s
Decl. + 48° 47′

1876.58	171.0	4.12	10.1 . . . 12.0	3n	J
1893.76	171.3	4.68	10.0 . . . 11 8	3n	W
1898.54	170.6	4.42	9.8 . . . 11.8	2n	D

Discovered with the 6-inch. The south star of a wide pair.

[β (VI) . . . β (2062) . . . J (1) . . . Wilson ( ) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 688. Radcliffe 5364

R.A. 21h 37m 43s
Decl. + 40° 30′

1878.36	208.7	0.35	7.6 . . . 7.6	5n	β
1884.95	201.4	0.38	. . .	3n	HΣ
1887.70	207.1	0.3±	8.0 . . . 8.0	1n	Ho
1890.13	202.6	0.4±	. . .	4n	Sp
1891.94	204.5	0.4±	. . .	3n	Sp
1898.74	200.8	0.52	7.7 . . . 7.7	3n	A

Discovered with the 18½-inch. There may be slow motion in angle. This star is a short distance *sf* 77 *Cygni*.

[β (X) . . . β′ . . . Hough (2978) . . . Sp (111) . . . Aitken (3585) . . . HΣ ( ) . . .]

β 1263. Lalande 42381

R.A. 21h 38m 40s
Decl. + 2° 17′

1891.60	212.6	0.48	8.5 . . . 10.2	3n	β
1898.68	220.3	0.45	8.0 . . . 10.0	1n	β

Discovered with the 36-inch. β 689 is 3s *f* and 9′.6 *n*.

[β (XVIII) . . . β (3113) . . . β (*Pub. L. O.* 11) . . . Aitken ( ) . . .]

β 689. *Aquarii* 88

R.A. 21h 38m 43s
Decl. + 2° 26′

1878.37	240.5	1.80	7.5 . . . 10.7	3n	β
1885.69	237.2	1.68	. . .	2n	HΣ
1891.60	241.6	1.71	7.3 . . . 11.4	5n	β
1898.68	240.8	2.56	7.0 . . . 10.0	1n	A

Discovered with the 18½-inch. Lalande 42384.

[β (X) . . . β″ . . . β (3114) . . . β (*Pub. L. O.* 11) . . . Aitken ( ) . . . HΣ ( ) . . .]

β 374. O. Arg. N. 22750

R.A. 21h 38m 59s
Decl. + 50° 27′

1877.03	143.3	1.86	8.4 . . . 10.3	5n	J
1893.54	141.3	1.86	8.3 . . . 10.5	3n	Lv

Discovered with the 6 inch. It is 70s *f* π′ *Cygni*, and 11′ *n*.

[β (VI) . . . β (2062) . . . J (1) . . . Lv (*A. J.* 382) . . .]

β 989. κ *Pegasi*

R.A. 21h 39m 13s
Decl. + 25° 6′

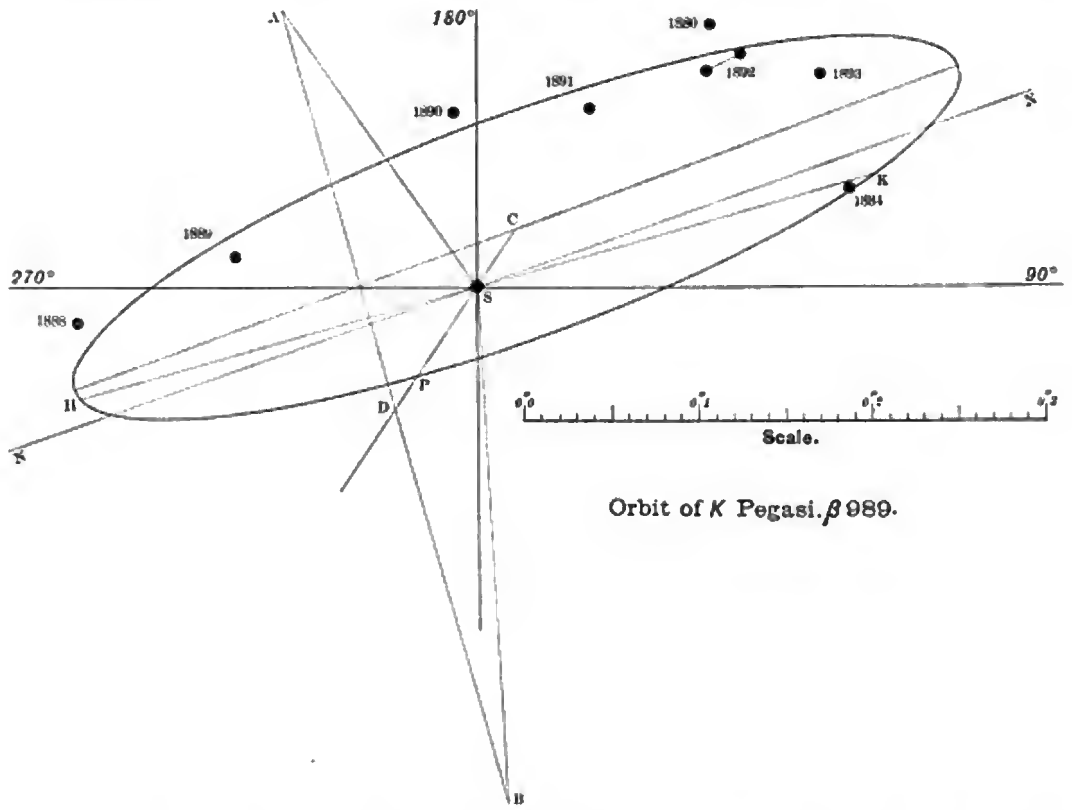
A and B

1880.68	137.9	0.2±	4.8 . . . 5.3	4n	β
1883.02	116.0	0.16	. . .	1n	En
1884.01	140.0	0.25	. . .	1n	En
1884.87	104.7	0.22	. . .	1n	β
1887.82	286.8	0.25±	. . .	1n	Sp
1888.78	274.7	0.23	. . .	3n	β
1888.89	298.9	0.25±	. . .	3n	Sp
1889.51	262.3	0.14	4.3 . . . 5.0	4n	β
1890.57	187.1	0.10	. . .	4n	β
1890.93	136.4	. . .	. . .	1n	Sp
1891.61	150.0	0.10	. . .	3n	β
1891.81	144.6	0.13	. . .	4n	β
1891.93	159.0	0.20±	. . .	3n	Sp
1892.39	132.8	0.18	. . .	4n	β
1892.88	131.0	0.20	. . .	1n	Bar
1892.97	135.1	0.20±	. . .	4n	Sp
1893.51	121.0	0.29	4.0 . . . 4.1	3n	Lv
1893.76	127.5	0.20	. . .	2n	Bar
1893.82	130.5	0.25±	. . .	1n	Com
1893.93	123.6	0.27±	. . .	8n	Sp
1894.50	117.6	0.19	. . .	5n	Bar
1894.84	114.8	0.14	. . .	4n	Lew
1894.88	114.7	0.25±	. . .	6n	Sp
1895.60	107.8	0.18	. . .	6n	Bar
1895.72	104.3	0.10	. . .	2n	Dyson
1895.74	104.6	0.12	3.5 . . . 9.0	7n	Lew
1895.73	103.0	. . .	. . .	1n	Christie
1895.79	112.7	0.15±	. . .	4n	Com
1895.91	108.1	0.20±	. . .	4n	Sp
1896.64	80.9	0.09	. . .	6n	Lew
1896.68	93.7	0.09	. . .	3n	A
1897.57	27.0	0.09	. . .	4n	Lew
1897.76	16.6	. . .	. . .	1n	Lew
1897.80	4.8	. . .	. . .	1n	Dyson

1897.90	342.0	...	...	1*n*	Lew
1898.50	294.5	0.16	5.7 ... 5.7	5*n*	A
1898.66	304.6	0.10	...	2*n*	Bar
1898.68	300.0	0.28	...	5*n*	Lew
1898.88	289.7	0.35	...	2*n*	Bow
1898.86	288.9	0.27	...	4*n*	Lew
1899.47	284.0	0.19	...	4*n*	A

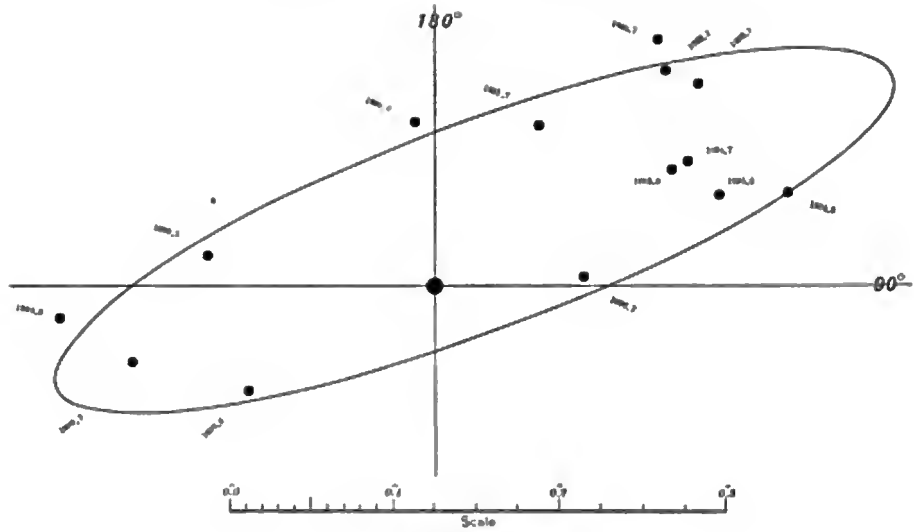
AB and C (= Σ 2824)

1828	306.4	....	4.2 ... 10.7	2*n*	H°
1831.56	308.5	11.01	3.9 ... 10.8	5*n*	Σ
1844.89	307.3	11.48	...	1*n*	Ma
1848.00	306.5	11.20	...	2*n*	Ma
1850.99	306.1	11.60	...	3*n*	Ma
1857.45	305.9	11.86	...	4*n*	Ma
1860.82	302.8	9.82	...	1*n*	Ma
1862.45	304.8	11.93	... 10.3	1*n*	Kn
1862.77	309.2	12.12	...	1*n*	Ma
1864.87	303.9	11.56	4.3 ... 10.5	6*n*	J
1866.61	301.3	12.03	...	1*n*	Hd
1872.62	301.7	11.7	4 ... 13	1*n*	WS
1874.80	302.5	12.1	4 ... 13	1*n*	Gled
1875.89	303.3	....	... 10	1*n*	WS
1880.60	303.1	11.76	... 9.1	4*n*	β
1881.37	302.3	12.47	...	2*n*	Sk
1888.81	300.0	12.13	4 ... 13	3*n*	Hl
1888.82	300.7	12.22	...	2*n*	β
1888.92	300.8	11.95	...	2*n*	Sp
1891.96	298.9	12.10	...	1*n*	Big
1892.81	297.7	12.09	...	2*n*	Maw
1893.66	297.5	11.86	3.9 ... 11.1	2*n*	Gl
1895.25	298.8	12.21	...	4*n*	Lew
1895.60	301.1	12.28	...	8*n*	Bar
1898.43	299.6	12.43	. .	1*n*	A
1898.71	298.8	12.45	. .	3*n*	Lew



Orbit of *K* Pegasi. β 989.

The close pair was discovered with the 18½-inch. It is not only a most important physical system, but has a period shorter than any other known binary in the heavens. It has been followed with the micrometer through more than one and a half revolutions. It is at all times a close pair, the



K Pegasi. *β* 989. *(Fig. 2.)*

maximum distance being but little more than 0".2; but as the components are of nearly the same magnitude, the elongation can be seen with a moderate aperture. Several orbits have been found which differ but little so far as the period is concerned. The several results, with the respective dates of the last measures used, are as follows:

1890	Burnham	11.13 years	*Pub. L. O.* II. 128
1892	Glasenapp	11.54 "	*Mon. Not.* LII. 548
1893	Burnham	11.37 "	*Pub. L. O.* II. 252
1895	See	11.42 "	*Evolution of Binary System*, I

My orbit of 1893 is shown in the accompanying diagram, reproduced from *Popular Astronomy* for April 1894.

Future investigations probably will not materially change the period, but may improve some of the other elements of the orbit. The principal positions to 1899.5 are shown in Fig. 2 with the same ellipse given in the other diagram. This apparent orbit appears so far to satisfy the recent measures.

As a wide pair this was discovered by HERSCHEL I. in 1786. He made no measures, but described it as "extremely unequal, the small star almost north, but a little preceding." It was not measured until 1831, when STRUVE observed it, and incorporated it in his great catalogue as Σ 2824. AUWERS gives the proper motion of *κ Pegasi* 0".021 in the direction of 60°.2. The change in the distant star is apparently due to rectilinear motion, but it does not correspond very closely to the proper motion referred to. A comparison of STRUVE's position with a mean of the three sets of measures in 1888, gives for the annual movement of the large star 0".034 in the direction of 68°. The discrepancy may be accounted for in three ways: the small star may be physically connected with the other, and the change due to orbital motion; or the small star may have some proper motion of its own; or the value of the proper motion of the principal star as found from meridian observations may have a small error. It is perhaps impossible at this time to say which of the explanations is the most probable.

[*β* (XIII)...*β*¹...*β* (2875,2957,3048,3114,3142)...*β* (*Pub. L. O.* II, pp. 128,252)...*β* (*Mon. Not.* XLI, 33; [illegible] 313)...*β* (*Pop. Asty.* I, 352)...Engelmann (2678,27[illegible]p (III)...Barnard (*A. J.* 447)...Comstock (*Pub.* [illegible] *Obsy.* X)...I.M...Lewis (*Greenwich Obsns.* [illegible] (*Mon. Not.* LV, 17; LVI, 359)...Lv (*A. J.* [illegible] (3285, 3314) (*A. J.* 378)...Aitken (3396,3[illegible]is and Bowyer (*Mon. Not.* LIX, 400)...Aitk[illegible]]

I have given above a comple[illegible]the m[illegible] ures of Σ 2824 (= H° N. 43). [illegible]erv[illegible] which are not included in th[illegible] ref[illegible] to AB, will be found as follo[illegible]

[Madler (*Fixstern Systeme* [illegible] XV)...Herschel (*Mem. R. A.* [illegible] broke and Gledhill (*Mem. R.* [illegible] ...*J* (1573)...*Annals Har*[illegible]

(*Etoiles Doubles et Multiples*)...Maw (*Mem. R. A. S.* LI)... Hall (II)...Everett (*Mon. Not.* LVI, 464)...Bigourdan (*Bul. Ast.* XVIII)...Glasenapp (III)...Coleman (*Mem. R. A. S.* LIII)...]

β 690. μ *Cephei*

R.A. 21h 39m 50s
Decl. + 58° 14'

A and B

1878.87	259.4	19.16	5.0...12.3	3*n*	β
1889.52	259.6	19.58	6 ...13.2	3*n*	β
1898.58	260.0	19.36	...12.6	2*n*	β

A and C

1878.42	299.4	41.19	...	1*n*	β
1898.58	298.7	41.14	...12.7	2*n*	β

This is HERSCHEL'S "Garnet star," variable 4 to 6 m in five or six years; and is No. 253 of SCHJELLERUP'S *Catalogue of Red Stars*. The companions were detected with the 18½-inch.

[β (x)...β^1....β^{11}...β (2957)...β (*Pub. L. O.* II)...]

β 691. D.M. (17°) 4529

R.A. 21h 40m 4s
Decl. + 17° 12'

1877.76	328.3	1.16	9.0...11.5	1*n*	β

Discovered with the 18½-inch. It should be remeasured.

[β (x)...β^1...]

β 1036. Yarnall 9529

R.A. 21h 40m 59s
Decl. — 17° 51'

1888.74	205.9	4.53	8.0...11.0	3*n*	β
1895.79	209.2	4.70	8.0...11.7	3*n*	A
1897.72	205.1	4.76	...	3*n*	A

Discovered with the 12-inch.

[β (XIV)...β (2875) ..β (*Pub. L. O.* II)... Aitken (*A. J.* 429) (*Ast. Soc. Pac.* VII, 305)...]

β 692. Lalande 42601

R.A. 21h 44m 49s
Decl. + 31° 17'

A and B

1878.24	10.8	2.48	7.5...11.0	2*n*	β
1881.72	12.7	2.79	8.0...11.0	1*n*	Ho
1885.66	11.0	2.76	...	2*n*	HΣ
1892.79	8.8	2.97	7.0...11.0	1*n*	Ho

A and C

1878.78	119.4	36.89	...11.0	1*n*	β
1892.79	298.9	37.13	...11.0	1*n*	Ho

Discovered with the 18½-inch. My record shows that C is on the *f* side.

[β (x)...β^1...Hough (2978,3234)...HΣ ( )...]

β 840. S.D. (2°) 5650

R.A. 21h 46m 43s
Decl. — 2° 9'

1881.83	39.4	2.57	8.7...10.0	3*n*	β
1886.84	39.1	2.92	...	3*n*	Ul.
1887.84	36.9	2.94	8.8... 9.8	3*n*	Com
1899.15	36.3	2.71	9.0...10.0	4*n*	D

Discovered with the 15½-inch at the Washburn Observatory. The magnitude in S.D. is 9.2.

[β (XII)...β^{12}...Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI)...Doolittle (*Pub. Flower Obsy.* I)...]

β 168. Lalande 42642

R.A. 21h 47m 7s
Decl. — 20° 35'

1868.84	73.6	6.10	7.5... 8.5	1*n*	Hd
1870.74	75.5	5.50	8.2... 9.5	2*n*	Cin
1877.69	73.7	5.50	8.1... 9.7	2*n*	Cin
1882.48	73.7	5.93	8.0... 9.5	1*n*	W
1893.80	70.2	4.78	8 ... 9	2*n*	Sel
1896.56	74.0	5.59	...	5*n*	Hu

Discovered with the 6-inch. Fixed. A distant companion *f*. This pair is also found in the subsequently published Harvard observations.

[β (III)...β (*Mon. Not.* XXXIV, 59)...*Annals Harvard Obsy.* XIII...Cin^3...Cin^4...Wilson (Cin^{10})...Sellors (3240)... Hussey (*A. J.* 307)...]

β 1213. D.M. (12°) 4710

R.A. 21h 48m 26s
Decl. + 13° 0′

B and C

1890.69	311°.9	0″.81	9.1 . . . 9.5	3*n*	β	

A and B

1890.69	258°.8	62″.29	8.0 . . .	3*n*	β	
1898.69	258.9	63.45	8.0 . . .	1*n*	A	

Discovered with the 18½-inch at Chicago, but not included in the catalogues of new pairs of that time.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . . Aitken ( ) . . .]

β 768. Lacaille 8964

R.A. 21h 49m 9s
Decl. — 37° 49′

This is a bright star (GOULD 5.8 m) closely following γ *Gruis*. It was suspected to be a close pair with the 6-inch at Mt. Hamilton in 1879. At the Sydney Observatory it was thought to be elongated in 90° in 1886. An examination with the 12-inch at the Lick Observatory in 1891, under favorable conditions, left the matter still in doubt, as no certain elongation could be seen. At all times the star was of course near the horizon, and it may not be double, but should be watched hereafter at favorable points of observation.

[β (XI) . . . β^W . . . β (3114) . . . β (*Pub. L. O.* II) . . . Russell (*Mon. Not.* XLVII, 473) . . .]

β 841. D.M. (53°) 2628

R.A. 21h 49m 21s
Decl. + 53° 43′

1881.56	194°.4	2″.03	8.5 . . . 11.5	3*n*	β	
1888.19	193.6	2.06	8.5 . . . 11.8	2*n*	Com	

Discovered with the 15½ inch at the Washburn Observatory. COMSTOCK measures another (place not given), "near β 841," 172°.7 : 2″.23 : 9 . . . 10.5 (1887.88). The place of H 3066 is given by H, 21h 48m 17s; + 53° 25′, which is described as "quadruple," and the angle of AB given 199°.8. I could not find this in 1873 in the assigned place. There is little doubt of its identity with β 841.

[β (XII) . . . β^S . . . Comstock (*Pub. Washburn Obsy.* VI] . . .]

β 75. Lalande 42736

R.A. 21h 49m 40s
Decl. + 10° 19′

1875.45	34°.3	1″.20	8.0 . . . 8.5	4*n*	J	
1882.68	34.0	1.23	8 . . . 9	1*n*	Perry	
1888.68	37.8	1.29	8.1 . . . 8.5	2*n*	Lv	
1891.73	39.1	1.15	8.1 . . . 8.3	3*n*	β	
1891.78	40.5	1.34	. . .	3*n*	Maw	
1894.69	40.2	1.12	. . .	5*n*	Sp	
1895.75	37.0	1.14	8.1 . . . 8.3	3*n*	Lew	
1896.69	37.8	1.17	8.0 . . . 8.2	3*n*	Lv	
1896.83	37.6	1.01	. . .	1*n*	Bow	
1896.83	40.0	1.05	. . .	2*n*	Lew	
1897.79	39.3	1.27	. . .	1*n*	Morgan	
1897.82	39.5	1.09	. . .	3*n*	A	
1898.73	40.4	1.07	. . .	2*n*	Bow	

Discovered with the 6-inch. Some change is probable. This system has a common proper motion of 0″.164 in the direction of 232°.4 (PORTER).

[β (I) . . . β (*Mon. Not.* XXXIII, 351) . . . β (3114) . . . β (*Pub. L. O.* II) . . . J (I) . . . Perry (*Eng. Mech.* XXXVI, 65) . . . Lv (*A. J.* 407) . . . Lv^S . . . Sp (III) . . . Maw (*Mem. R. A. S.* L, 75) . . . Lewis (*Mon. Not.* LVI, 359) . . . Morgan (*A. J.* 439) . . . Aitken (*A. J.* 429) . . . Lewis and Bowyer (*Mon. Not.* LIX, 400) . . .]

β 693. Lalande 42730

R.A. 21h 49m 54s
Decl. — 7° 33′

1878.37	54°.1	0″.93	7.8 . . . 10.3	3*n*	β	
1879.16	54.4	1.03	7.0 . . . 10.3	2*n*	Cin	
1886.78	48.7	1.15	7.0 . . . 9.8	1*n*	LM	
1893.82	57.9	1.43	7.0 . . . 10.5	1*n*	W	
1893.82	47.2	1.14	. . .	3*n*	Com	
1894.74	55.5	0.89	. . .	1*n*	Com	
1895.82	50.2	1.03	. . .	3*n*	Com	
1898.65	51.3	1.21	7.2 . . . 11.5	3*n*	Cg	

Discovered with the 18½-inch. Probably without change.

[β (X) . . . β^P . . . Cin^S . . . LM . . . Wilson ( ) . . . Comstock (*Pub. Washburn Obsy.* X) . . . Cogshall ( ) . . .]

β 169. O. Arg. S. 21760

R.A. 21h 50m 49s
Decl. — 21° 43'

1876.78	285°.7	1".93	9.0	9.0	1*n*	Cin
1877.68	275.9	2.01	8.6	8.7	1*n*	Cin
1892.70	282.6	2.10	9.0	9.2	2*n*	W
1893.81	279.6	2.26	9	9	1*n*	Sel
1898.91	279.7	1.92	9.2	9.2	3*n*	D

Discovered with the 6-inch. The south star of a wide pair about 95" apart.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Cin3...Cin4... Sellors (3240)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 1214. D.M. (33°) 4387

R.A. 21h 51m 23s
Decl. + 33° 45'

A and B

1890.65	205°.0	1".39	9.0	10.3	3*n*	β
1898.72	201.1	1.65	9.2	10.5	2*n*	A
1898.79	202.4	1.25	8.4	10.2	2*n*	β
1898.89	207.4	1.55	...		1*n*	Bar

C and D

1890.65	245°.8	5".06	9.8	10.8	3*n*	β
1898.72	243.2	4.88	10.0	10.8	2*n*	A
1898.79	246.7	4.93	8.5	11.2	2*n*	β
1898.89	245.1	5.04	...		1*n*	Bar

A and C

1890.65	18°.3	112".43	...		3*n*	β
1898.71	18.9	112.47	...		1*n*	A
1898.79	18.1	112.32	...		2*n*	β
1898.89	18.1	112.04	...		1*n*	Bar

This quadruple was discovered with the 18½-inch in 1884, but not included in the Chicago catalogues. The 36-inch shows a faint star about 20" from C in the direction of 285°, and also a 5" pair of faint stars between AB and CD, with many small stars in the field. C is D.M. (33°) 4388.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 275. Groombridge 3634

R.A. 21h 53m 38s
Decl. + 60° 43'

1876.04	2°.7	0".28	7.0	7.0	2*n*	J
1885.54	1.1	0.43	...		3*n*	HΣ
1889.70	5.5	0.27	...		7*n*	Sp
1890.68	3.8	0.39	7.6	7.8	3*n*	β
1898.67	182.4	0.52	7.5	7.6	3*n*	A

Discovered with the 9.4-inch at the Dartmouth College Observatory. A difficult pair with small apertures. The measures do not show the change which would be expected in a pair of this class.

[β (V)...β (*Mon. Not.* XXXV, 31)...β (3048)...β (*Pub. L. O.* II)...d (I)...Sp (III)...Aitken (3585)...HΣ ( )...]

β 276. η *Piscis Australis*

R.A. 21h 53m 56s
Decl. — 29° 2'

1876.78	117°.4	1".87	5.0	6.0	4*n*	Cin
1877.51	115.4	1.73	5.5	6.5	1*n*	Cin
1879.66	111.2	1.69	6.0	7.0	1*n*	Cin
1880.56	113.7	1.73	5.5	7.0	1*n*	Cin
1884.70	116.2	1.64	5.2	6.8	3*n*	W
1885.86	118.1	1.81	...		2*n*	HI
1886.78	115.9	...	...		1*n*	LM
1887.79	115.7	1.81	...		2*n*	HI
1888.78	118.5	1.61	5.5	5.9	3*n*	β
1888.89	113.3	1.50	5.0	6.7	2*n*	Lv
1892.67	112.4	1.16	6.4	6.8	2*n*	Gl
1893.78	115.0	1.80	...		2*n*	Sc
1894.75	111.3	1.70	...		4*n*	Sc
1895.77	110.1	1.68	...		5*n*	Sc
1897.02	117.3	1.84	6.5	7.0	3*n*	See
1898.14	115.8	1.75	6	7	6*n*	Sc

Discovered with the 6-inch. A fine easy pair, and visible with a much smaller aperture. Probably unchanged. The magnitude in Cord. G. C. is 5.7. The *Cape Catalogue* gives a proper motion of 0".026 in the direction of 270°. It is very probable that this motion belongs to both stars.

[β (V)...β (*Mon. Not.* XXXV, 31)...β (2875)...β (*Pub. L. O.* II)...Cin3...Cin4...Cin5...Cin6...Wilson (Cin56)... Hall (II)...LM...Lv1...Scott (*Brit. Ast. Asso.* V, 75; VI, 250,368) (*Mon. Not.* LIX, 427)...See (3496)...]

β 694. *Lacertae* 4

R.A. 21h 58m 6s
Decl. + 44° 4′

1878.66	352°.3	0″.50	6.0 . . . 8.5	2*n*	β
1885.57	354.2	0.60	. . .	2*n*	HΣ
1891.72	358.5	0.64	6.7 . . . 8.3	3*n*	β
1892.98	353.8	0.59	. . .	5*n*	Sp

Discovered with the 18½-inch. The 36-inch shows a 13m star, 328°.1 : 24″.1, and a 13.5 m, 277°.3 : 27″.1. B.A.C. 7681. In B.A.C. 6 m, Argelander 6.5 m.

[β (x) . . . β′ . . . β (3114) . . . β (*Pub. L. O.* II) . . . HΣ ( ) . . . Sp (III) . . .]

β 695. D.M. (60°) 2330

R.A. 21h 58m 33s
Decl. + 60° 31′

1878.54	147°.8	2″.54	8.0 . . . 12.3	2*n*	β
1885.54	144.8	2.93	. . .	2*n*	HΣ
1891.71	145.8	2.91	8.3 . . . 10.8	3*n*	β
1898.70	146.9	3.11	7.9 . . . 11.0	3*n*	A

Discovered with the 18½-inch. No sensible change.

[β (x) . . . β′ . . . β (3114) . . . β (*Pub. L. O.* II) . . . Aitken (3585) . . . HΣ ( ) . . .]

β 696. D.M. (15°) 4558

R.A. 21h 58m 43s
Decl. + 15° 17′

1877.32	355°.1	0″.50	8.0 . . . 8.0	2*n*	*J*
1878.21	353.8	0.65	8.5 . . . 9.0	2*n*	β
1883.80	354.0	0.5	. . .	1*n*	Perry
1889.85	361.9	0.5±	. . .	2*n*	Sp
1893.70	354.8	0.52	8.5 . . . 9.0	1*n*	W
1894.57	361.1	0.5±	. . .	3*n*	Sp
1899.49	352.8	0.50	8.1 . . . 8.5	3*n*	A

Discovered with the 18½-inch. Apparently fixed relatively. The *s* star of a small triangle. The *Berlin A. G. Catalogue* gives this star a proper motion of 0″.092 in the direction of 206°.0. Obviously the movement of both stars is the same.

[β (x) . . . β′ . . . *d* (1) . . . Perry (*Eng. Mech.* XXXVIII, 192) . . . Sp (III) . . . Wilson ( ) . . . Aitken ( ) . . .]

β 474. O. Arg. N. 23373

R.A. 22h 1m 2s
Decl. + 60° 25′

1878.67	345°.6	16″.28	8.5 . . . 12.0	1*n*	β
1891.71	346.6	16.42	8.1 . . . 11.8	3*n*	β

Discovered with the 6-inch.

[β (IX) . . . β (*Mon. Not.* XXXVIII, 78) . . . β′ . . . β (3114) . . . β (*Pub. L. O.* II) . . .]

β 697. 19 *Cephei*

R.A. 22h 1m 27s
Decl. + 61° 42′

1878.66	95°.8	19″.75	6.0 . . . 12.0	1*n*	β
1891.71	94.4	19.80	5.7 . . . 11.5	3*n*	β
1898.58	93.1	20.18	. . . 12.1	2*n*	β

Discovered with the 18½-inch. This star has a proper motion of 0″.081 in the direction of 114°.0 (AUWERS). It is probable that the small star does not share in this movement.

[β (x) . . . β′ . . . β (3114) . . . β (*Pub. L. O.* II) . . .]

β 990. D.M. (62°) 2030

R.A. 22h 1m 32s
Decl. + 62° 30′

1880.61	122°.3	0″.65	8.3 . . . 9.7	3*n*	β
1891.72	124.9	0.50	8.5 . . . 9.8	3*n*	β
1898.49	121.7	0.51	8.9 . . . 10.2	2*n*	D

Discovered with the 18½-inch in the course of an examination of Σ 2879 and the vicinity for the purpose of seeing whether there was any other pair to which certain discordant measures, credited to Σ 2879 might belong. These measures are as follows:

1840.61	129°.7	0″.91	1*n*	OΣ
1856.93	130.5	0.5	1*n*	Secchi

There has been no material change in either angle or distance of Σ 2879 since the first measures, as will be seen from the following:

1836.35	226°.2	0″.80	3*n*	Σ
1879.94	229.6	0.87	3*n*	β

It is certain that the measures of OΣ and SECCHI cannot belong to this star, unless by a curious coincidence each made the same error of about 100° in reading the position-angle. Apparently neither observer noted the discrepancy, or it would have been followed by further observations. It will be seen that the measures fairly well describe β 990, and there is at least a probability that they belong to that pair. It is a much more difficult double than Σ 2879. The magnitude of β 990 in the D.M. is 9.0. It is 5ᵐ 46ˢ *p* and 18′ *s* of Σ 2879.

[β (XIII)...β^3...β (3114)...β (*Pub. L. O.* II)... Doolittle (*Pub. Flower Obsy.* I)...]

β 170. Lalande 13158

R.A. 22ʰ 2ᵐ 31ˢ
Decl. − 19° 4′

1876.05	63°.7	1″.69	9.1...	9.1	4*n*	J
1877.50	60.5	1.68	8.1...	8.5	4*n*	Cin
1885.73	64.5	1.39	8.0...	9.0	1*n*	W
1886.67	59.6	1.75	7.8...	8.0	6*n*	LM
1888.73	62.5	1.71	9.0...	9.0	2*n*	T
1888.78	60.4	1.56	8.2...	8.2	2*n*	Lv
1893.82	58.2	1.17	8½...	8½	2*n*	Sel
1896.72	59.0	1.42	...		2*n*	Hu
1897.78	58.6	1.74	8.2...	8.4	3*n*	See

Discovered with the 6-inch. This star is a distant companion (40° : 160″) to 35 *Aquarii*. There is a faint star between. The wide pair in the field *nf* is H 3092.

[β (III)...β (*Mem. Nat.* XXXIV, 59)...J (1)...Cin³...Cin⁴...Cin⁵...Wilson (Cin¹⁰)...LM...Lv¹...Tarrant (2991)...Sellors (3240)...Hussey (*A.J.* 397)...See (3496)...]

β 842. D.M. (4°) 4811

R.A. 22ʰ 3ᵐ 31ˢ
Decl. + 5° 6′

1881.73	121°.1	1″.26	8.8...	9.1	3*n*	β
1886.84	118.7	1.28	...		3*n*	UL
1887.77	121.6	1.23	8.8...	9.7	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^4...Updegraff, Lamb, and Comstock (*Pub. Washburn Obsy.* V, VI)...]

β 375. O. Arg. N. 23503

R.A. 22ʰ 4ᵐ 29ˢ
Decl. + 50° 11′

1876.41	304°.7	0″.93	8.5...10.5	1*n*	J
1891.72	306.9	0.88	8.5... 9.2	2*n*	β

Discovered with the 6-inch.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...J (1)...]

β 769. Lacaille 9016

R.A. 22ʰ 4ᵐ 37ˢ
Decl. − 35° 3′

1879.69	348°.6	0″.6±	7.0...	8.0	1*n*	β
1891.85	351.6	0.91	7.4...	8.1	3*n*	β
1897.79	342.4	0.46	6.1...	8.1	1*n*	See
1898.76	357.4	0.66	7.0...	7.9	4*n*	A

Discovered with the 6-inch at Mt. Hamilton in 1879. Probably direct motion in angle. GOULD 6.8 m.

[β (XI)...β^3... β (3114)...β (*Pub. L. O.* II)...See (3496)... Aitken (3585)...]

β 698. Lalande 43303

R.A. 22ʰ 5ᵐ 55ˢ
Decl. + 6° 18′

1878.74	337°.6	9″.97	7.2...12.0		2*n*	β
1885.73	337.5	10.45	...		2*n*	HΣ
1891.63	337.9	10.55	6.8...11.0		2*n*	β
1898.88	337.8	10.33	8.0...10.8		2*n*	β

Discovered with the 18½-inch. Fixed.

[β (X)...β^1...β (3114)...β (*Pub. L. O.* II.)...HΣ ( )...]

β 475. Lalande 43305

R.A. 22ʰ 6ᵐ 15ˢ
Decl. − 8° 36′

1876.72	240°±	1″.5±	7.5...11.0		1*n*	β
1879.75	230.6	....	7.0...11.0		1*n*	Cin
1882.62	237.3	1.83	7.5... 9.2		2*n*	W
1886.76	236.5	1.62	7.0...11.2		2*n*	LM
1891.84	228.3	1.51	7.6...10.4		3*n*	β
1897.89	229.0	1.46	...		3*n*	Hu

Discovered with the 6-inch. The measures are not very accordant in angle, and change is doubtful.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β (3114)...β (*Pub. L. O.* II)...Cin^{3}...Wilson (Cin^{10})...LM...Hussey (*A. J.* 427)...]

β 436. O. Arg. N. 23612

R.A. $22^{h}\ 6^{m}\ 43^{s}$
Decl. $+\ 57^{\circ}\ 21'$

A and B

1876.56	327°.5	19".63	7.5...11.5	1*n*	J
1889.96	327.8	19.31	...12.5	1*n*	Ho
1898.58	328.1	19.68	7.2...10.2	2*n*	β

A and C

1889.66	100°.5	19".36	...13	1*n*	Ho
1898.58	100.1	19.54	...	2*n*	β

The small star, B, was noted with the 6 inch, and the third star, C, added by Hough with the 18½-inch. In 1889 he measured the principal star as a close pair, 208°.5 : 0".53, on a single night, the new component being 11 m. I could see no trace of any elongation with the 36-inch in 1890, nor at any subsequent time.

[β (VII)...β (2103,3048)...β (*Pub. L. O.* II)...J (1)...Hough (2978)...]

β 1215. S.D. (11°) 5781

R.A. $22^{h}\ 6^{m}\ 47^{s}$
Decl. $-\ 11^{\circ}\ 46'$

1890.82	90°.2	1".53	9.0... 9.0	3*n*	β
1896.78	91.0	1.54	9+... 9+	3*n*	A

Discovered with the 12-inch.

[β (XVII)...β (30471...β (*Pub. L. O.* II)...Aitken (3406)...]

β 690. W^{s} XXII. 114

R.A. $22^{h}\ 7^{m}\ 45^{s}$
Decl. $+\ 7^{\circ}\ 7'$

1878.44	187°.3	2".04	8.1...12.2	3*n*	β
1891.72	185.1	2.43	8.1...12.0	3*n*	β
1896.80	186.3	(0.96)	...	1*n*	L
1899.54	181.5	2.46	7.9...12.3	3*n*	A
1899.72	184.2	2.11	8.5...12.0	1*n*	D

Discovered with the 18½-inch.

[β (X)...β^{5}...β (3114)...β (*Pub. L. O.* II)...Lewis (*Mon. Not.* LIX, 400)...Aitken ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 171. Lalande 43350

R.A. $22^{h}\ 7^{m}\ 51^{s}$
Decl. $-\ 21^{\circ}\ 38'$

1878.75	258°.9	11".45	8.3...12.0	3*n*	Cin
1892.70	259.8	11.66	8.8...12.2	2*n*	W
1898.50	256.0	11.52	8.5...10.2	2*n*	D
1898.65	258.1	11.49	8.0...11.2	3*n*	Cg

Discovered with the 6-inch. This is a distant companion to 41 *Aquarii*.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Cin^{4}...Cin^{5}...Cin^{6}...Wilson ( )...Cogshall ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 376. Radcliffe 5607

R.A. $22^{h}\ 8^{m}\ 1^{s}$
Decl. $+\ 59^{\circ}\ 30'$

1876.24	149°.2	3".57	8.0...11.2	2*n*	J
1885.54	148.2	3.61	...	2*n*	HΣ
1892.75	150.7	3.68	7.7...10.8	3*n*	W

Discovered with the 6-inch. Σ 2880 is 22" *n*.

[β (VI)...β (2062)...β (*Pub. L. O.* II)...J (1)...Wilson ( )...HΣ ( )...]

β 476. W^{s} XXII. 180

R.A. $22^{h}\ 8^{m}\ 41^{s}$
Decl. $+\ 30^{\circ}\ 48'$

1877.57	93°.1	2".57	9.5...10.1	4*n*	J
1882.68	90.5	2.27	9.5...10	1*n*	Perry
1893.54	92.5	2.57	9.4...10.0	4*n*	Lv
1894.63	93.4	2.52	9.2...10.0	2*n*	W

Discovered with the 6-inch. β 477 is in a low power field.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...J (1)...Perry (*Eng. Mech.* XXXVI, 65)...Lv (*A. J.* 382)...Wilson ( )...]

β 991. Radcliffe 5619

R.A. $22^{h}\ 9^{m}\ 1^{s}$
Decl. $+\ 51^{\circ}\ 58'$

1880.16	150°.9	0".59	8.0... 8.0	5*n*	β
1893.55	143.4	0.57	8.0... 8.2	2*n*	Lv
1893.66	145.2	0.73	8.8... 8.8	2*n*	W
1893.82		Single			Com.
1896.66		Single			Com.
1899.59	145.0	0.59	...	3*n*	A

Discovered with the 18½-inch. There does not appear to be any material change.

[β (XIII)...β²...Lv (*A. J.* 382)...Wilson ( )... Comstock (*Pub. Washburn Obsy.* X)...Aitken ( )...]

β 477. W² XXII. 225

R.A. 22h 10m 28s
Decl. + 30° 49'

1877.45	45°.7	6".51	9.3...11.0	3*n*	J
1882.68	46.0	7.04	9 ...11	1*n*	Perry
1893.54	43.5	6.48	9.0... 9.8	3*n*	Lv
1894.63	43.4	6.48	9.2...10.5	2*n*	W
1899.12	43.6	6.64	9.2... 9.7	4*n*	D

Discovered with the 6-inch.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...J (1)...Perry (*Eng. Mech.* XXXVI, 65)...Lv (*A. J.* 382)...Wilson ( )... Doolittle (*Pub. Flower Obsy.* II...]

β 377. O. Arg. N. 23765

R.A. 22h 11m 23s
Decl. + 54° 4'

B and C

1891.54	302°.8	7".02	10.6...11.5	3*n*	β
1898.58	303.6	6.80	9.7...10.1	2*n*	β

A and B

1891.54	65°.9	63".88	8.0...	3*n*	β
1898.58	65.8	62.30	7.2...	2*n*	β

Distant double companion noted with the 6-inch. The large star has a proper motion of 0".226 in the direction of 81°.4 (*A. G. C.*). The measures of AB give for this movement 0".225 in 62°.0. The 36-inch shows six or eight stars nearer to A than B, including a faint pair, with distance less than BC, 16".5 from A in the direction of 263°.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...]

β 378. O. Arg. N. 23808

R.A. 22h 12m 50s
Decl. + 60° 16'

A and B

1876.55	90°.8	3".18	9.2...10.2	2*n*	J
1878.65	90.4	3.33	8.2... 8.5	1*n*	β
1892.75	90.9	3.39	8.5... 9.3	3*n*	W
1898.70	88.3	3.44	8.7... 9.5	2*n*	D

A and C

1878.65	29°.4	7".48	...11.8	1*n*	β
1892.74	31.6	7.06	...12.5	2*n*	W
1898.70	29.0	7.42	...10.5	2*n*	D

B was discovered with the 6-inch, and C added with the 18½-inch.

[β (VI)...β (2062)...β²...J (1)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 1216. Lalande 43605

R.A. 22h 14m 42s
Decl. + 28° 55'

1890.51	317°.7	0".64	8.4 .. 8.7	3*n*	β
1892.76	317.0	0.50±	..	6*n*	Sp
1895.74	312.5	0.52	...	3*n*	Lew
1896.73	314.5	0.46	...	2*n*	Lew
1896.90	315.7	0.57	...	4*n*	A
1897.69	310.9	0.54	...	2*n*	Bow
1897.76	311.4	0.35	...	1*n*	Lew
1898.67	314.2	0.54	...	3*n*	Lew

Discovered with the 16-inch of the Warner Observatory in 1885.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Sp (III)...Lewis and Bowyer (*Mon. Not.* LVI, 359; LIX, 400) (*Greenwich Obsns.* 1895)...Aitken (3466)...]

β 1217. Lalande 43635

R.A. 22h 15m 33s
Decl. + 30° 42'

1890.53	218°.9	0".61	7.4...10.3	3*n*	β
1892.93	225.9	0.55±	...	5*n*	Sp
1896.78	224.8	0.59	...	2*n*	A

Discovered with the 36-inch. A difficult pair, and therefore the change in angle requires verification. The magnitude in D.M. is 7.0.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)... Sp (III)...Aitken (3466)...]

β 379. Radcliffe 5658

R.A. 22h 16m 0s
Decl. + 53° 13'

1877.26	332°.0	1".11	8.3... 9.0	6*n*	J
1882.68	336.0	1.08	8.5... 9.0	1*n*	Perry
1891.65	333.7	1.02	8.4... 8.6	3*n*	β

Discovered with the 6-inch. Without change.

[β (VI)...β (2062,3114)...β (*Pub. L. O.* II)...Δ (1)...Perry (*Eng. Mech.* XXXVI, 65)...]

β 172. 51 *Aquarii*

R.A. $22^h\ 17^m\ 52^s$
Decl. $-\ 5^\circ\ 27'$

A and B

1875.66	20°.4	0".46	6.7...	6.7	6*n*	Δ
1877.76	20.9	....	6 0...	6.0	1*n*	Cin
1878.19	24.9	0.58	...		4*n*	β
1879.25	19.6	0.66	5.9...	6.0	4*n*	Cin
1879.30	19.1	0.52	6.8...	6.8	2*n*	Sp
1879.70	16.1	0.73	6.0...	6.0	1*n*	β
1886.72	16.8	0.78	6.2...	6.4	2*n*	LM
1888.65	14.1	0.60	6.8...	7.9	3*n*	Lv
1888.74	18.3	0.60	6.5...	6.5	7*n*	T
1889.53	12.8	0.53	...		2*n*	Sp
1890.78	16.2	0.67	6.5...	6.5	3*n*	T
1891.59	12.1	0.68	5.6...	6.0	3*n*	β
1892.71	12.9	0.68	...		2*n*	T
1893.82	9.4	0.55	...		3*n*	Com
1895.79	6.2	0.66	...		4*n*	Com
1895.83	7.3	0.57	5.5...	5.5	3*n*	A
1897.71	5.3	0.73	...		3*n*	A
1897.88	10.4	0.67	...		3*n*	Hu
1898.79	10.5	0.88	...		2*n*	Bry
1898.90	5.2	0.58	...		1*n*	β

Discovered with the 6-inch. It conclusively appears from the measures that it is a binary system in slow retrograde movement. The proper motion is very small, 0".015 in the direction of 277°.6.

The distant stars noted by HERSCHEL I (= H^1 v. 95) have never been measured before, and are too remote to be of any interest.

AB and C

1898.90	341°.9	54".44	...11.0	1*n*	β

AB and D

1898.90	190°.6	113".68	...10.0	1*n*	β

AB and E

1898.90	133°.3	132".39	... 9.3	1*n*	β

[β (III)...β (*Mon. Not.* XXXIV, 59)...β^2...β^6...β (3114)...β (*Pub. L. O.* II)...Δ (1)...Δ (2086)...Cin^4...Cin^5...LM...Lv^1...Tarrant (2991,3186)...Sp (II, III)...Comstock (*Pub. Washburn Obsy.* X)...Aitken (3390) (*A. J.* 4291...Hussey (*A. J.* 427)...Bryant (*Mon. Not.* LIX, 400)...]

β 843. D.M. (1°) 4606

R.A. $22^h\ 18^m\ 42^s$
Decl. $+\ 2^\circ\ 3'$

1881.65	236°.1	3".46	8.4...12.5	3*n*	β
1886.83	229.5	3.23	...	2*n*	UL
1888.01	233.6	3.26	8.5...11.7	3*n*	Com
1897.94	234.4	3.57	...	1*n*	Br

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^6...Comstock, Updegraff and Lamb (*Pub. Washburn Obsy.* V, VI)...Brown ( )...]

β 290. 34 *Pegasi*

R.A. $22^h\ 20^m\ 31^s$
Decl. $+\ 3^\circ\ 47'$

1875.77	223°.3	2".61	6.0...13.0	2*n*	HI
1878.49	218.9	2.62	6.0...12.5	5*n*	β
1885.74	214.0	3.07	...	1*n*	HΣ
1889.63	218.7	2.71	5.8...11.7	3*n*	β
1898.61	217.8	2.83	...12.0	3*n*	β
1898.73	218.4	3.08	6.0...12.8	2*n*	A

Discovered with the 26-inch at the Naval Observatory. The relative change is slow, but it is certain that this is a physical system. The components have a large proper motion of 0".259 in the direction of 81°.1 (PORTER). If the small star was fixed in space, the angle and distance would increase respectively 26° and 5".5 during the time covered by the measures.

[β (V)...β (*Mon. Not.* XXXV, 31)...β^5...β^6...β (2057)...β (*Pub. L. O.* II)...Hall (1)...Aitken (3585)...HΣ ( )...]

β 700. D.M. (48°) 3728

R.A. $22^h\ 21^m\ 35^s$
Decl. $+\ 49^\circ\ 5'$

1877.70	332°.4	10".33	8.0...12.0	1*n*	Δ
1878.19	333.8	9.83	8.2...12.0	2*n*	β
1893.78	335.8	9.96	8 3...12.0	3*n*	W

Discovered with the 18½-inch. β 380 is in the field 27° *f* and 1° *n*.

[β (X)...β^1...Δ (1)...Wilson ( )...]

β 291. W¹ XXII. 436

R.A. $22^h\ 21^m\ 39^s$
Decl. $+\ 3^\circ\ 55'$

1875.82	157°.8	0".33	8.4... 8.4	4*n*	J
1878.64	160.0	0.42	8.5... 8.8	1*n*	β
1880.08	165.5	0.50	8.2... 8.5	2*n*	β
1886.77	162.9	0.38	8.0... 8.3	1*n*	LM
1889.63	167.5	0.46	8.4... 8.7	3*n*	β
1890.58	164.8	0.40±	...	7*n*	Sp
1893.75	173.8	0.47	8.0... 8.2	2*n*	W
1894.74	168.4	0.30±	...	6*n*	Sp
1898.75	173.5	0.52	8.0... 8.0	3*n*	A
1898.77	173.2	0.52	...	2*n*	Bry

This star was suspected with the 6-inch to be a close pair in 1872, and verified by me with the 26-inch at Washington in August 1874. It is a difficult object with a small aperture. It is clearly a binary. Both angle and distance are increasing, and it is much easier now than it was at the time of discovery. AITKEN measures a 13.5m star, 125°.0 : 31".06 (1898.78) 1*n*. This pair is within the triangle of 6m stars formed by 34, 35, and 37 *Pegasi*. The first of these bright stars is β 290, and the last Σ 2912.

[β (V)...β (*Mon. Not.* XXXV, 31)...β'...β'...β (2957)...β (*Pub. L. O.* II)...J (I)...LM...Sp (III)...Wilson ( ) ...Aitken (3585)...Bryant ( )...]

β 380. Radcliffe 5693

R.A. $22^h\ 22^m\ 2^s$
Decl. $+\ 49^\circ\ 6'$

C and D

1877.60	245°.7	21".4	7.7...12.5	1*n*	β
1893.73	243.1	21.34	7.8...12.8	3*n*	W

A and B

1876.10	321°.6	24".37	...12.0	2*n*	J
1893.67	322.5	24.93	7.8...10.3	3*n*	W

A and C (= OΣ App. 234)

1874.97	134°.2	36".31	7.3... 7.7	3*n*	J
1886.52	134.2	36.36	8.0... 8.3	4*n*	Fr
1893.67	134.2	36.15	... 8.3	3*n*	W

Discovered with the 6-inch. All the measures of the OΣ stars are given.

[β (VI)...β (2062)...J (I)...Franz (3080)...Wilson ( )...]

β 701. Lalande 43867

R.A. $22^h\ 22^m\ 10^s$
Decl. $+\ 11^\circ\ 38'$

1877.82	283°.4	1".24	7.0...10.0	2*n*	J
1878.24	279.9	1.24	7.5...10.2	2*n*	β
1887.59	273.9	1.31	...	5*n*	HΣ
1893.69	277.2	1.18	7.3...10.7	3*n*	W
1897.89	268.0	1.42	...	1*n*	Br

Discovered with the 18½-inch. PORTER gives the principal star a proper motion of 0".166 in the direction of 79°.6. The companion is evidently moving with it.

[β (X)...β'...J (I)...Wilson ( )...HΣ ( )...Brown ( )...]

β 173. D.M. (56°) 2776

R.A. $22^h\ 22^m\ 24^s$
Decl. $+\ 56^\circ\ 35'$

1875.83	232°.8	2".88	8.4...10.7	5*n*	J
1892.75	232.1	2.90	8.2...10.5	3*n*	W

Discovered with the 6-inch.

[β (III)...β (*Mon. Not.* XXXIV, 59)...J (I)...Wilson ( )...]

β 1218. W¹ XXII. 476

R.A. $22^h\ 22^m\ 33^s$
Decl. $+\ 29^\circ\ 5'$

1890.52	53°.5	1".44	8.6... 8.8	3*n*	β
1890.95	51.0	1.15	8.7... 9.0	2*n*	Ho
1892.16	55.0	1.42	...	4*n*	Sp
1892.93	57.2	1.10	8.0... 8.5	2*n*	J
1893.94	54.5	1.42	...	3*n*	Sp
1895.77	52.8	1.76	...	2*n*	Lew
1896.73	52.1	1.72	...	1*n*	Lew
1896.77	52.7	1.33	...	3*n*	A
1896.86	55.2	1.46	...	2*n*	Bow
1897.67	55.2	1.53	...	4*n*	Bow
1897.76	54.6	1.61	...	1*n*	Lew
1898.67	50.8	1.59	...	3*n*	Lew
1898.68	52.2	1.48	...	2*n*	Bow

Discovered with the 12-inch. Evidently unchanged.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Hough (3234)... Sp (III)...Jones (*Proc. Haverford Coll. Obsy.* 1892)... Lewis (*Mon. Not.* LVI, 359) (*Greenwich Obsns.* 1895)... Aitken (3466)...Lewis and Bowyer ( )...]

β 174. Lalande 43888

R.A. 22h 22m 58s
Decl. − 10° 17′

1876.15	287°.9	7″.38	8.5...12.0	3*n*	J
1878.77	290.6	9.09	8.0...12.0	2*n*	Cin
1881.61	292.6	9.08	8.1...11.3	3*n*	β
1888.77	291.7	8.62	8.3...10.7	3*n*	β
1898.84	292.4	9.06	8.0...10.5	2*n*	β

Discovered with the 6-inch. Probably unchanged.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β (2875)...β⁴...β (*Pub. L. O.* II)...Δ (1)...Cin⁵...]

β 478. S.D. (8°) 5881

R.A. 22h 23m 8s
Decl. − 7° 56′

A and B

1878.20	32°.6	1″.32	9.0...11.0	2*n*	β
1886.80	32.2	1.38	9.6...11.2	1*n*	LM
1898.72	30.6	1.62	8.5...10.2	2*n*	Bd
1898.75	32.4	1.23	9.2...10.3	3*n*	A
1898.84	30.1	1.24	8.6... 9.3	1*n*	β

A and C

1877.80	239°.0	28″.55	... 9.0	1*n*	β
1898.72	239.4	28.69	... 8.7	3*n*	Cg
1898.74	239.2	29.08	... 9.0	2*n*	A
1898.84	239.7	28.67	... 8.7	1*n*	β

Discovered with the 6-inch. The middle of three stars in the field. Unchanged. BOOTHROYD measures a 13.5m star from A, 54°.7 : 18″.92 (1898.71) 2 *n*.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β⁵...LM...Boothroyd ( )...Aitken (3585)...]

β 76. Lalande 43906

R.A. 22h 23m 22s
Decl. − 0° 49′

1867.86	332°.1	1″.50	...	1*n*	IId
1876.24	335.3	1.47	8.2...10.1	4*n*	J
1879.18	333.6	1.48	7.7... 9.8	4*n*	Cin
1888.85	338.2	1.24	8.0... 9.7	1*n*	Lv
1890.77	334.4	1.41	8.0...10.0	2*n*	T
1892.65	333.6	1.44	...	2*n*	T
1898.65	337.1	1.46	8.0... 9.7	3*n*	Bd

Discovered with the 6-inch. In a low-power field with ζ *Aquarii*. No relative motion. An earlier observation is found in *Harvard Annals*, published after β (1).

[β (1)...β (*Mon. Not.* XXXIII, 351)...*Annals Harvard Obsy.* XIII...Δ (1)...Cin⁵...Lv¹...Tarrant (3186)...Boothroyd ( )...]

β 844. Lalande 43912

R.A. 22h 23m 32s
Decl. + 5° 2′

B and C

1881.73	317°.1	3″.20	9.3...10.9	3*n*	β
1886.84	317.7	3.25	...	4*n*	UL
1887.79	316.5	3.44	9.0...10.7	2*n*	Com
1888.88	310.7	...	8.8...11.2	3*n*	Lv
1891.86	316.1	3.30	9.7...10.8	1*n*	β

A and B

1881.73	34°.3	98″.34	8.1...	3*n*	β
1886.84	34.2	98.81	...	4*n*	UL
1891.86	34.3	98.25	8.1...	2*n*	β

Discovered with the 15½-inch at the Washburn Observatory. Without change.

[β (XII)...β⁶...β (3114)...β (*Pub. L. O.* II)...Lv¹...Comstock, Updegraff and Lamb (*Pub. Washburn Obsy.* V, VI)...]

β 1264. Lalande 43933

R.A. 22h 24m 1s
Decl. − 0° 29′

1891.70	21°.7	3″.85	7.8...13.3	3*n*	β
1898.83	19.8	4.17	7.9...13.3	3*n*	A

Discovered with the 36-inch. It is 1m 24s *f* and 9′ *n* of ζ *Aquarii*.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 702. δ *Cephei*

R.A. 22h 24m 43s
Decl. + 57° 48′

A and B

1878.65	285°.7	19″.37	...13.0	2*n*	β
1898.51	284.2	19.84	...13.0	3*n*	β

A and C (= Σ 58 App. 1)

1835.15	192.°0	40.″87	3.0...	5.3	6*n*	Σ
1867.78	191.9	40.83	3.2...	5.9	5*n*	J
1878.65	191.9	40.88	...		1*n*	β
1883.32	191.6	40.88	...		5*n*	Fr
1898.51	191.5	40.94	...		2*n*	β

The small star was discovered with the 18½-inch. The bright stars appear to have a common proper motion, but it is small, 0.″010 in the direction of 151.°9 (AUWERS). The larger star is supposed to be variable to the extent of about 1½ mag. in $5^h\ 8^m\ 47^s$.

[β (x)...β^1...]

The wide pair is Σ 58 App. I = H I v. 14 = Sh 347 = OΣ (App.) 235. A few only of the measures are given. The observations will be found in the double-star catalogues referred to, and in the following:

[Powell (*Mem. R. A. S.* XXV)...*Radcliffe Obsns.* XX, XXVI ...Schur (2255)...Golding (2257)...Ball (*Dunsink Obsns.* V) ...J (II)...Jedrzejewicz (2345)...Maichekio (*Double Star Meas.* 1892)...Franz (2650)...Glasenapp (II)...]

β 703. α *Lacertae*

R.A. $22^h\ 26^m\ 21^s$
Decl. + 49° 40′

1878.02	298.°8	30.″16	4	...12.0	2*n*	β
1888.71	297.8	31.59		...12.2	3*n*	β

Discovered with the 18½-inch. AUWERS gives the proper motion of this star, 0.″127 in the direction of 88.°2. The companion is not moving with it, and it is therefore only an optical pair.

[β (x)...β^1...β (2057)...β (*Pub. L. O.* II)...]

β 479. D.M. (67°) 1444

R.A. $22^h\ 26^m\ 29^s$
Decl. + 67° 36′

1877.10	29.°8	2.″41	9.7...11.2	2*n*	J
1893.83	31.5	2.39	10.0...11.0	3*n*	W
1898.70	29.8	2.22	9.8...10.5	1*n*	D

Discovered with the 6-inch. One of a small equilateral triangle of stars in the field; the other two brighter. This in D.M. is 9.2 m.

[β (1x)...β (*Mon. Not.* XXXVIII, 78)...J (1)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 704. D.M. (66°) 1518

R.A. $22^h\ 27^m\ 3^s$
Decl. + 66° 56′

1877.55	207.°3	2.″3±	9.0...11.5	1*n*	β
1892.76	205.4	2.27	9.0...11.5	1*n*	W

Discovered with the 18½-inch.

[β (x)...β^1...Wilson ( )...]

β 381. W² XXII. 580

R.A. $22^h\ 27^m\ 22^s$
Decl. + 32° 47′

1877.04	230.°6	1.″48	8.5...10.0	3*n*	J
1882.68	235.5	1.54	8.0...10.5	1*n*	Perry
1891.65	232.7	1.44	8.5... 9.9	3*n*	β

Discovered with the 6-inch. Fixed.

[β (VI)...β (2062.3114)...β (*Pub. L. O.* II)...Perry (*Eng. Mech.* XXXVI, 65)...]

β 770. Lalande 44060

R.A. $22^h\ 27^m\ 47^s$
Decl. − 23° 13′

1879.75	360.°0±	1.″2±	8.5...10.8	1*n*	β
1891.88	352.8	1.36	8.2...12.3	3*n*	β
1898.66	348.5	1.43	8.0...12.0	1*n*	Cg

Discovered with the 6-inch on Mt. Hamilton in 1879.

[β (x1)...β^1...β (3114)...β (*Pub. L. O.* I, II)...Cogshall ( )...]

β 77. S.D. (2°) 5780

R.A. $22^h\ 27^m\ 50^s$
Decl. − 2° 24′

A and B

1876.05	213.°0	2.″65	9.5...10.3	3*n*	J
1879.58	213.8	2.62	8.5... 9.0	1*n*	Cin
1885.82	213.3	2.65	8.0... 9.5	1*n*	W
1886.81	212.0	2.71	8.1... 8.7	4*n*	LM
1888.72	212.4	2.46	8.2... 9.3	2*n*	Lv
1888.75	213.3	2.77	8.5... 8.7	3*n*	β
1890.78	211.5	2.88	9.5...10.3	3*n*	T
1892.63	209.6	2.75	...	2*n*	T
1898.59	211.1	2.61	8.8... 9.5	4*n*	D
1898.62	215.0	2.75	...	1*n*	Cg
1898.63	214.0	2.71	8.0... 8.5	2*n*	Bd

A and C

1888.75	225°.6	28".80	...11.0	3*n*	β
1898.59	224.4	28.58	...10.8	4*n*	D
1898.62	226.0	28.23	...	1*n*	Cg
1898.63	225.1	28.33	...10	2*n*	Bd

Discovered with the 6-inch. No sensible change. This is 12′ *s* of 60 *Aquarii*.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β (2875)...β (*Pub. L. O.* II)...Δ (1)...Cin⁵...Wilson (Cin^m)...LM...Lv¹... Tarrant (3186)...Boothroyd and Cogshall ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 705. Lalande 44111

R.A. 22ʰ 28ᵐ 18ˢ
Decl. + 40° 12′

1878.53	158°.0	1".5±	7.0...12.5	1*n*	β
1885.64		Single		2*n*	HΣ

Discovered with the 18½-inch. A difficult object with that aperture. I could not see it on one night in 1898 with the 40-inch. It should be watched with large instruments.

[β (x)...β¹...HΣ ( )...]

β 707. Lalande 44138

R.A. 22ʰ 28ᵐ 40ˢ
Decl. + 38° 43′

1878.47	46°.6	1".86	8.0...12.5	1*n*	β
1899.55	52.5	1.45	8.5...12.0	1*n*	β

Discovered with the 18½-inch.

[β (x)...β¹...]

β 706. D.M. (67°) 1450

R.A. 22ʰ 29ᵐ 30ˢ
Decl. + 67° 53′

A and B

1877.55	18°.1	2".3	8.0...11.8	1*n*	β
1881.63	16.9	2.79	7.9...12.5	1*n*	β
1891.88	11.8	2.30	8.1...12.7	2*n*	β
1898.64	17.2	2.66	7.7...10.7	2*n*	β

A and C

1877.55	253°.5	28".5	...10.0	1*n*	β
1881.67	235.8	29.17	...11.0	2*n*	β
1891.88	252.9	29.95	...11.7	2*n*	β
1898.64	252.9	29.77	...10.2	2*n*	β

Discovered with the 18½-inch. The angle of AC in my measures of 1881 is undoubtedly an error in printing, and should be 255°.8, but I have not the original record to refer to. β 708 is closely *f*.

[β (x)...β¹...β⁴...β (3114)...β (*Pub. L. O.* II)...]

β 708. D.M. (67°) 1451

R.A. 22ʰ 30ᵐ 42ˢ
Decl. + 67° 53′

1877.55	288°.6	8".±	9.0...11.5	1*n*	β
1892.78	289.6	8.78	9.0...12.0	1*n*	W
1898.63	288.4	8.56	8.7...12.0	2*n*	β

Discovered with the 18½-inch. β 706 is in the field *p*.

[β (x)...β¹...Wilson ( )...]

β 175. D.M. (74°) 970

R.A. 22ʰ 29ᵐ 49ˢ
Decl. + 74° 24′

1875.65	138°.9	1".44	10.3...10.0	3*n*	Δ
1893.82	138.4	1.58	10.0...10.0	3*n*	W

Discovered with the 6-inch.

[β (III)...β (*Mon. Not.* XXXIV, 59)...Δ (1)...Wilson ( )...]

β 771. σ² *Gruis*

R.A. 22ʰ 29ᵐ 58ˢ
Decl. − 41° 13′

1879.64	270°.±	1".3±	6.0...10.5		β
1891.82	259.1	2 22	...	2*n*	Scl
1891.87	263.1	2.46	6.7...13.0	3*n*	β
1897.04	265.1	2.38	7.0...12.5	3*n*	See

Discovered with the 6-inch at Mt. Hamilton in 1879. The *Cape Catalogue* gives this star a proper motion of 0".096 in the direction of 339°.4. The Cordoba magnitude is 6.0.

[β (XI)...β²...β (3114)...β (*Pub. L. O.* I, II)...Sellors (3154) ...See (3496)...]

β 1092. Radcliffe 5777

R.A. $22^h\ 33^m\ 3^s$
Decl. $+72°\ 15'$

A and B

1889.30	237.1	0.32	7.5 ... 7.5	2*n*	β
1899.71	229.5	0.14	7+ ... 7+	1*n*	A

AB and C (= H 3133)

1830	272.0	12±	8.5 ... 13	1*n*	H²
1889.31	264.0	29.19	... 12.2	3*n*	β
1898.71	263.6	30.35	7.2 ... 12.3	3*n*	A
1898.77	263.2	30.07	7.0 ... 10.8	1*n*	β

AB and D (= H² V. 94)

1783.20	135.2	41.67	...	1*n*	H²
1830	40.4	30 ±	8.5 ... 9.5	1*n*	H²
1875.13	137.6	42.18	7.0 ... 7.7	3*n*	J
1883.18	137.7	42.19	7.0 ... 7.6	5*n*	Fr
1889.31	137.4	42.17	7.2 ... 7.2	3*n*	β
1898.66	137.8	42.42	7.2 ... 7.2	2*n*	A
1898.77	137.0	41.97	... 8.0	1*n*	β

The close pair was discovered with the 36-inch. The wide pair is evidently unchanged. This is, H² V. 94 = H 3133 = OΣ (App.) 236. There is an error of 90° in the angle of D as given by HERSCHEL II in his *Fifth Catalogue*. There is also an error of 7ᵐ R.A. and 29′ Decl. in the place of this star, as given by HERSCHEL I. The foregoing are all the measures of the distant companions. D is Radcliffe 5779. The very recent measures of AB by AITKEN with the 36-inch (power 1900) show decided change in angle and distance. It is probably in rapid motion.

[β (XV)...β (2929)...β (*Pub. L. O.* II)...Franz (2650)...d (I)...Aitken ( )...]

β 277. Lalande 44348

R.A. $22^h\ 34^m\ 14^s$
Decl. $+40°\ 45'$

1875.35	199.4	0.50	8.2 ... 8.4	2*n*	J
1879.46	199.3	0.59	8.0 ... 8.3	1*n*	β
1882.68	168.5	0.55	8.2 ... 8.4	1*n*	Perry
1893.54	201.9	0.49	8.0 ... 8.4	1*n*	Lv
1893.65	204.6	0.58	8.2 ... 8.4	3*n*	W

Discovered with the 6-inch. Very little, if any, change. A faint star about 30″ distant. It is the *p* star of a wide pair.

[β (V)...β (*Mon. Not.* XXXV, 31)...β³...d (I)...Perry (*Eng. Mech.* XXXVI, 65)...Lv (*A. J.* 382)...Wilson ( )...]

β 480. W¹ XXII. 716

R.A. $22^h\ 35^m\ 18^s$
Decl. $+4°\ 6'$

1877.51	65.6	0.86	9.0 ... 9.8	3*n*	J
1891.56	63.5	0.80	8.9 ... 9.2	3*n*	β

Discovered with the 6-inch. So far unchanged.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β (3114)...β (*Pub. L. O.* II)...d (I)...]

β 1265. D.M. (60°) 2425

R.A. $22^h\ 35^m\ 18^s$
Decl. $+60°\ 47'$

B and C

1891.58	251.4	0.56	9.1 ... 9.2	3*n*	β
1898.79	251.2	0.56	9.7 ... 9.7	3*n*	A

A and BC

1891.58	346.3	39.69	8.8 ...	3*n*	β
1898.79	346.7	39.76	9.0 ...	3*n*	A

Discovered with the 36-inch. So far without sensible change.

[β (XVIII)...β (3113)...β (*Pub. L. O.* II)...Aitken ( )...]

β 709. S.D. (4°) 5487

R.A. $22^h\ 35^m\ 26^s$
Decl. $-3°\ 11'$

1878.17	8.9	2.04	8.5 ... 9.7	3*n*	β
1886.79	6.0	2.13	8.2 ... 9.0	2*n*	LM
1888.89	5.1	1.50	8.3 ... 9.5	1*n*	Lv
1893.71	14.1	1.6 ±	9.1 ... 9.6	2*n*	Gl
1896.81	5.4	2.04	8.3 ... 9.4	3*n*	Lv
1898.64	6.0	1.99	8.0 ... 8.7	3*n*	Cg

Discovered with the 18½-inch. Apparently unchanged.

[β (X)...β³...LM...Lv¹...Lv (*A. J.* 407)...Glasenapp (III) ...Cogshall ( )...]

β 845. O. Arg. N. 24536

R.A. 22h 36m 27s
Decl. + 67° 53′

A and B

1881.53	195°.4	5″.69	8.2...12.1	3*n*	β
1888.06	197.1	6.13	8.5...11.9	3*n*	Com
1892.92	195.3	6.02	8.0...11.5	1*n*	W

A and C

1881.54	9°.1	15″.50	...13.2	2*n*	β
1887.79	11.9	15.38	...11.7	3*n*	Com
1892.92	12.0	15.39	...12.0	1*n*	W

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β⁴...Comstock (*Pub. Washburn Obsy.* VI)...Wilson ( )...]

β 710. D.M. (28°) 4439

R.A. 22h 36m 57s
Decl. + 29° 5′

1878.66	231°.2	0″.59	8.5... 8.6	1*n*	β
1889.89	232.5	0.4 ±	...	9*n*	Sp
1891.76	235.3	0.39	8.3... 8.5	2*n*	β
1895.81	232.3	0.43	...	1*n*	Lew
1897.76	237.8	0.47	...	1*n*	Lew
1898.64	239.3	0.32	8.8... 8.8	3*n*	A
1898.67	235.1	0.39	...	3*n*	Lew

Discovered with the 18½-inch. There is little change in the angle, but the distance is less, and it is probably a binary. It is about 30′ *s* of η *Pegasi*.

[β (X)...β⁵...β (3114) (*Pub. L. O.* II)...Sp (III)...Lewis (*Mon. Not.* LVI, 359; LIX, 400) (*Greenwich Obsvt.* 1895) ...Aitken (3585)...Lewis ( )...]

β 176. D.M. (38°) 4848

R.A. 22h 37m 5s
Decl. + 38° 40′

1877.78	42°.0	2″.50	8.7... 9.0	1*n*	β
1878.18	39.7	1.89	8.8... 9.3	3*n*	J
1883.69	49.3	1.84	8.9... 9.9	5*n*	En
1892.73	41.9	2.21	9.0... 9.3	1*n*	W
1899.13	43.2	2.26	8.8... 9.1	4*n*	D

Discovered with the 6-inch. Σ 2942 (= OΣ 478) is 1m 35s *f* and 10′ *n*.

[β (III)...β (*Mon. Not.* XXXIV, 59)...β⁵...Δ (1)... Engelmann (2678)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

β 1144. η *Pegasi*

R.A. 22h 37m 23s
Decl. + 29° 36′

B and C

1889.53	83°.3	0″.29	10.1...10.1	4*n*	β
1890.23	63.9	0.3 ±	...	12*n*	Sp
1892.13	62.0	0.3 ±	...	4*n*	Sp
1893.73	77.3	0.3 ±	...	1*n*	W
1894.06	82.3	0.33	...	9*n*	Bar
1897.76	82.9	0.24	...	1*n*	Lew
1898.63	81.6	0.28	9.3... 9.3	4*n*	A
1898.67	90.0	0.36	...	3*n*	Lew

A and BC (= H⁴ VI. 21 = S 816)

1824.85	338°.9	89″.82	4 ...12–15	2*n*	S
1889.53	339.0	90.38	...	4*n*	β
1893.73	339.0	90.25	...	1*n*	W
1897.76	339.1	90.42	...	2*n*	Bar
1898.60	338.6	91.04	...	2*n*	A

The close pair was discovered with the 36-inch. The measures show no change. The wide pair was first noted by H⁴, but not measured. The only measures preceding my own are those of SOUTH in 1824. The principal star has a proper motion of 0″.038 in the direction of 183°.9 (AUWERS).

[β (XVI)...β (2056)...β (*Pub. L. O.* II)...Sp (III)...Wilson ( )...Barnard (*A. J.* 447)...Lewis (*Mon. Not.* LIX, 400)... Aitken (3585)...Barnard ( )...]

β 450. B.A.C. 7931

R.A. 22h 38m 40s
Decl. + 38° 50′

A and C

1876.79	232°.0	10″.23	7.0...12	1*n*	β
1878.13	232.4	10.93	...12	2*n*	β
1879.47	233.4	11.08	...12.5	1*n*	β
1893.53	231.8	10.86	...12.5	1*n*	Lv

A and B (= Σ 2912)

1831.61	282°.1	2".66	7.0...	9.2	4*n*	Σ
1869.52	280.3	2.83	6.2...	8.5	6*n*	⊿
1878.97	280.2	2.68	6.8...	8.5	2*n*	β
1883.21	282.0	3.04	6.8...	9.6	6*n*	En
1895.91	277.1	2.85	...		2*n*	Maw

The small star was noted with the 18½-inch. There is no change in AB (=Σ 2942 = H 1802 = OΣ 478). Only a few of the measures are given.

[β (VIII)...β (*Am. Jour. Sci.* July 1877)...β^2...β^3...Lv (*A. J.* 382)...Madler (*Fixstern-Systeme* 1) (*Dorpat Obsns.* XII)... Dawes (*Mem. R. A. S.* XXXV)...*Obsns. at Barclay's Obty.* 1 ...OΣ (*Poulkowa Obsns.* IX)...⊿ (II)...⊿ (1736,1979) ...Wilson and Seabroke (*Mem. R. A. S.* XLIII)...Bigourdan (*Paris Obsns.* 1883)...Engelmann (2678)...Glasenapp (III)...Maw (*Mem. R. A. S.* LIII)...]

β 711. D.M. (10°) 4812

R.A. 22h 39m 29s
Decl. + 10° 34'

1878.59	79°.9	0".72	8.5...10.5		1*n*	β
1891.88	55.3	0.83	9.0...	9.9	3*n*	β
1893.70	53.4	1.24	9.5...10.5		1*n*	W
1897.76	46.4	0.72	...		1*n*	Bow
1897.83	46.6	0.96	10 ...11		1*n*	Br
1898.73	42.7	1.00	...		1*n*	Bow
1898.74	47.6	0.99	...		3*n*	A
1898.79	45.1	1.00	...		1*n*	Bry
1898.89	39.8	0.82	...		1*n*	Lew

Discovered with the 18½-inch. There is considerable angular motion, an unusual condition in a pair of stars of this magnitude, and suggesting comparative nearness. The magnitude in D.M. is 9.1. It is 27s *p* a 7 m star.

[β (X)...β^1...β (3114...β (*Pub. L. O.* II)...Wilson ( )... Aitken (3585)...Lewis, Bowyer and Bryant (*Mon. Not.* LIX, 400)...Brown ( )...]

β 1037. W^2 XXII. 854

R.A. 22h 41m 56s
Decl. + 12° 22'

1888.81	224°.4	0".66	8.7...10.8		4*n*	β
1899.52	215.2	0.72	8.9...11.5		1*n*	A

Discovered with the 36-inch. The *p* star of a wide pair. Change in angle?

[β (XIV)...β (2875)...β (*Pub. L. O.* II)...Aitken ( )...]

β 1219. S.D. (11°) 5931

R.A. 22h 42m 27s
Decl. − 11° 42'

1890.82	307°.9	0".54	8.7...	9.4	3*n*	β
1896.87	299.3	0.48	...		3*n*	A

Discovered with the 12-inch; a difficult pair with that aperture. There is a 6m pair *np* 5'.

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Aitken (3466)...]

β 1145. O. Arg. N. 24690

R.A. 22h 42m 45s
Decl. + 57° 55'

A and B

1889.59	153°.0	1".03	8.2...11.0		3*n*	β
1898.88	156.3	1.06	8.0...11.2		2*n*	A

A and C

1889.59	179°.5	21".99	...	9.5	3*n*	β
1898.82	179.7	22.27	...10.0		3*n*	A

Discovered with the 36-inch.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Aitken (3585)...]

β 1146. W^2 XXII. 971

R.A. 22h 42m 49s
Decl. + 30° 28'

1889.55	335°.3	0".23	7.2...	8.2	3*n*	β
1897.80	331.1	0.15	...		1*n*	Lew
1899.56	313.6	0.18	7.6...	8.0	4*n*	A

Discovered with the 36-inch. Change in angle is probable.

[β (XVI)...β (2956)...β (*Pub. L. O.* II)...Lewis (*Mem. Not.* LIX, 400)...Aitken ( )...]

β 846. Lalande 44688

R.A. 22h 44m 34s
Decl. + 23° 51'

1881.57	93°.4	1".73	8.6...12.2		3*n*	β
1886.84	94.8	2.11	...		3*n*	Ul.
1888.82	92.2	1.67	8.2...12.3		3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^6...Updegraff, Lamb and Comstock (*Pub. Washburn Obty.* V, VI)...]

β 177. O. Arg. S. 22454

R.A. 22h 45m 55s
Decl. — 22° 21′

1867.86	276°.6	3″.07	9 ... 9	1*n*	Hd
1876.51	278.7	2.63	7.5... 8.0	3*n*	Cin
1877.71	278.6	2.78	8.0... 8.0	2*n*	Cin
1892.70	278.6	2.94	8.2... 8.2	2*n*	W
1893.84	276.1	2.55	8 ... 8	2*n*	Sel
1898.68	276.4	2.79	8.0... 8.1	3*n*	Bd

Discovered with the 6-inch. Without change.

[β (III)...β (*Mon. Not.* XXXIV, 59)...*Annals Harvard Obsy.* XIII...Cin³...Cin⁴...Sellors (3240)...Wilson ( )... Boothroyd ( )...]

β 451. 15 *Lacertae*

R.A. 22h 46m 37s
Decl. + 42° 40′

1888.71	128°.5	29″.60	5 ...12.0	3*n*	β
1898.61	130.6	29.24	5.4... 9.6	4*n*	D
1899.55	131.1	28.84	...12.5	2*n*	β

Discovered with the 18½-inch. This star has a proper motion of 0″.097 in the direction of 85°.9 (AUWERS).

[β (VIII)...β (*Am. Jour. Sci.* July 1877)...β (2875)...β (*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

β 382. B.A.C. 7083

R.A. 22h 48m 18s
Decl. + 44° 7′

A and B

1876.39	205°.7	1″.07	6.0... 8.0	7*n*	J
1881.70	210.1	1.09	6.9 .. 8.5	3*n*	β
1882.68	219.0	1.13	6 ... 8	1*n*	Perry
1883.74	217.1	1.33	6.1... 8.0	6*n*	En
1885.64	210.3	1.11	...	2*n*	HΣ
1889.44	219.3	1.03	...	2*n*	Maw
1889.53	217.6	0.98	7.3... 8.8	3*n*	β
1893.53	221.3	0.91	6.2... 8.0	3*n*	Lv
1893.97	226.0	1.00	...	8*n*	Bar
1893.99	223.5	0.87	.	5*n*	Sp
1896.56	223.8	0.73	...	1*n*	Lew
1897.82	225.7	0.97	...	1*n*	Dy
1897.86	221.2	1.07	..	3*n*	A
1897.96	225.1	0.64	...	1*n*	Bow
1898.00	228.9	1.06	...	1*n*	Maw

AB and C (= H 1828)

1828	350°.4	20″±	6.7...11	1*n*	H²
1876.24	353.6	26.43	...10.7	3*n*	J
1881.70	353.8	27.01	...10.7	3*n*	β
1882.68	357.0	27.78	...	1*n*	Perry
1885.68	354.3	26.85	...	1*n*	HΣ
1889.53	353.7	26.92	...10.0	2*n*	β
1898.02	354.4	27.18	...	1*n*	Maw

The close pair was discovered with the 6-inch. This is a binary in direct angular motion. A naked-eye star in *Lacerta;* the Harvard photometric magnitude is 5.7. The distant companion discovered by HERSCHEL is evidently fixed. It is called blue by J. All the measures of this star are given. The principal star is Groombridge 3918.

[β (VI)...β (2062,2057)...β²...β (*Pub. L. O.* II)...J (I)... Perry (*Eng. Mech.* XXXVI, 65)...Engelmann (2078)... Maw (*Mem. R. A. S.* L)...Lv (*A. J.* 382)...Barnard (*A. J.* 447)...Sp (III)...Aitken (*A. J.* 429)...Lewis, Dyson and Bowyer (*Mon. Not.* LIX, 400)...HΣ ( )...Maw (*Mem. R. A. S.* LIII)...]

β 847. W² XXII. 1103

R.A. 22h 48m 45s
Decl. + 19° 42′

1881.64	37°.4	6″.39	8.5... 9.2	3*n*	β
1883.79	37.5	6.51	8.5... 9.7	5*n*	En
1886.85	36.4	6.69	...	4*n*	UL
1887.82	36.0	6.75	8.3... 9.2	3*n*	Conn
1891.88	35.5	6.41	8.6...10.7	1*n*	β

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β²...β (3114)...β (*Pub. L. O.* II)...Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI)... Engelmann (2678)...]

β 178. *Aquarii* 252

R.A. 22h 48m 57s
Decl. — 5° 38′

1875.37	324°.6	C̈un	6.0... 8.0	3*n*	J
1877.84	326.1	...	6.2... 8.2	2*n*	Cin
1879.58	319.0	0.78	6.0... 8.0	1*n*	Cin
1884.87	321.5	0.68	6.0... 9.0	1*n*	Ho
1886.77	322.1	0.86	6.0... 8.5	3*n*	LM
1888.87	322.2	0.70	6.0... 8.0	2*n*	Lv
1889.47	320.4	0.59	...	4*n*	Sp
1890.78	321.3	0.80	6.0... 8.0	2*n*	T
1898.66	324.5	0.79	6.5... 9.0	1*n*	Cg

Discovered with the 6-inch. The change, if any, is slow, but it can hardly fail to prove a binary. This is a naked-eye star in *Aquarius*. The Harvard photometric magnitude is 5.8. This star is B.A.C. 7986 (= Piazzi XXII. 250).

[β (III)...β (*Mon. Not.* XXXIV, 59)...Δ (1)...Cin^4...Cin^5... Hough (2978)...LM...Lv^4...Sp (III)...Tarrant (3186) ...Cogshall ( )...]

β 1010. Lalande 41832

R.A. $22^h\ 49^m\ 17^s$
Decl. $-\ 6^\circ\ 13'$

1881.85	136°.5	1".21	8.5... 8.9	2*n*	β
1886.55	....	1.28	9.0... 9.2	1*n*	LM
1892.89	134.8	1.28	8.7... 9.0	1*n*	Ho
1899.72	136.8	1.11	8.8... 9.3	2*n*	D

Discovered with the 12-inch at Mt. Hamilton in 1881.

[β (XIII)...β^3... LM... Hough (3234)... Doolittle (*Pub. Flower Obsy.* 1)...]

β 772. δ *Piscis Australis*

R.A. $22^h\ 49^m\ 18^s$
Decl. $-33^\circ\ 11'$

1877.70	236°.5	4".73	5.0...10.5	1*n*	Cin
1879.69	238.4	5 ±	5.5...12.2	5*n*	β
1881.84	235.8	4.91	5.0...11.0	5*n*	β
1891.88	239.7	4.78	5.0...11.8	3*n*	β
1896.71	235.6	5.14	...	2*n*	See
1898.64	236.9	5.21	3.8...11.0	3*n*	Cg

Discovered with the 6-inch at Mt. Hamilton. There seems to be no material change. The *Cape Catalogue* gives the large star a proper motion of 0".09 in the direction of 360°.

[β (XI)...β^2...β^3...β (3114)...β (*Pub. L. O.* 11)...Cin^4... See (3496)...Cogshall ( )...]

β 383. Lalande 44855

R.A. $22^h\ 49^m\ 57^s$
Decl. $+\ 8^\circ\ 49'$

A and B

1877.82	119°.6	2".67	8.0...11.0	1*n*	β
1891.80	118.7	2.58	8.0...12.7	3*n*	β

A and C

1877.81	240°.3	15".59	...	2*n*	β
1891.80	239.0	15.43	...12.4	3*n*	β

The distant star, C, was discovered with the 6-inch, and B added subsequently with the 18½-inch.

[β (VI)...β (2062,3114)...β^1...β (*Pub. L. O.* 11)...]

β 848. D.M. (57°) 2639

R.A. $22^h\ 49^m\ 55^s$
Decl. $+\ 57^\circ\ 44'$

1881.67	5°.8	2".77	8.4...12.8	3*n*	β
1888.94	0.4	2.35	8.3...12.3	3*n*	Com
1895.84	358.9	2.64	...	2*n*	Com
1896.66	2.4	2.50	...	1*n*	Com
1898.82	359.6	2.80	8.5...12.5	1*n*	A

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^4...Comstock (*Sid. Mess* IX, 77) (*Pub. Washburn Obsy.* VI, X)...Aitken ( )...]

β 712. D.M. (58°) 2508

R.A. $22^h\ 49^m\ 58^s$
Decl. $+\ 58^\circ\ 36'$

1877.58	291°.6	1".02	9.0... 9.5	1*n*	β
1877.70	290.3	1.14	9.7...10.2	1*n*	Δ
1893.72	293.5	1.24	9.5...10.1	3*n*	W
1899.66	288.7	0.94	9.0...10.0	1*n*	D

Discovered with the 18½-inch. In a small cluster.

[β (X)...β^2...Δ (1)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* 1)...]

β 713. Lalande 44872

R.A. $22^h\ 50^m\ 55^s$
Decl. $-\ 3^\circ\ 53'$

B and C

1877 95	95°.9	8".31	...12.5	1*n*	β
1891.82	94.1	10.18	...13.3	3*n*	β
1898.54	95.9	10.51	...12.5	2*n*	β

A and B (= H I N. 15 = Σ 2959)

1832.10	96°.7	15″.66	6.5 . . . 10.5	4*n*	Σ
1864.78	102.7	14.21	6.5 . . . 10.7	5*n*	J
1877.87	102.2	13.77	. . .	2*n*	β
1891.82	103.3	13.31	. . . 10.7	3*n*	β
1898.54	105.7	13.13	. . . 9.7	2*n*	β

The faint star, C, was detected with the 18½-inch. The change in AB is obviously due to proper motion, and curiously this movement seems to belong, not to the large star, but to the small star B. The measures of 1832 and 1898 give for the apparent movement of B, 0″.051 in the direction of 239°.4, and this substantially accounts for the change in BC. A few of the measures of AB are given above.

[β (X) . . . β^1 . . . β (3114) . . . β (*Pub. L. O.* II) . . . Madler (*Fixstern-Systeme* I) (*Dorpat Obsns.* XI, XIII) . . . J (II) . . . J (1573) . . . Pritchett (*Pub. Morrison Obsy.* I) . . . Cin^4 . . . Hall (II) . . . Glasenapp (II) . . . Solá (3497) . . .]

β 849. O. Arg. N. 21920

R.A. $22^h\ 51^m\ 47^s$
Decl. $+66°\ 11'$

1881.53	127°.0	3″.74	8.4 . . . 12.3	4*n*	β
1888.39	128.0	4.15	8.2 . . . 11.9	4*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII) . . . β^6 . . . Comstock (*Pub. Washburn Obsy.* VI) . . .]

β 452. Lalande 44915

R.A. $22^h\ 51^m\ 58^s$
Decl. $+42°\ 22'$

1877.71	255°.3	6″.29	7.0 . . . 12.0	1*n*	J
1880.71	256.6	6.74	7.0 . . . 11.1	2*n*	β
1885.64	254.9	6.67	. . .	2*n*	HΣ
1892.84	256.2	6.78	7.0 . . . 11.5	2*n*	W

Discovered with the 18½-inch.

[β (VIII) . . . β (*Am. Jour. Sci.* July 1877) . . . β^3 . . . J (I) . . . Wilson ( ) . . . HΣ ( ) . . .]

β 850. Lalande 44985

R.A. $22^h\ 54^m\ 22^s$
Decl. $+13°\ 13'$

1881.57	119°.8	3″.05	8.1 . . . 10.6	3*n*	β
1886.84	118.1	3.08	. . .	3*n*	UL
1888.03	119.1	3.29	8.0 . . . 10.0	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII) . . . β^6 . . . Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI) . . .]

β 179. O. Arg. S. 22553

R.A. $22^h\ 54^m\ 20^s$
Decl. $-22°\ 54'$

1878.10	115°.7	13″.35	8.4 . . . 9.2	3*n*	Cin
1892.70	116.9	13.26	8.5 . . . 9.5	2*n*	W
1892.75	114.7	12.74	8.2 . . . 9.4	2*n*	Gl
1896.84	115.3	13.65	7.9 . . . 9.3	2*n*	See

An unimportant pair noted with the 6-inch. KUSTNER gives the principal star a proper motion of 0″.09 in the direction of 180°.

[β (III) . . . β (*Mon. Not.* XXXIV, 59) . . . Cin^3 . . . Cin^4 . . . Cin^5 . . . Wilson ( ) . . . See (3496) . . . Glasenapp (II) . . .]

β 1011. Lacaille 9343

R.A. $22^h\ 55^m\ 53^s$
Decl. $-37°\ 4'$

1881.85	301°.7	2″.16	7.2 . . . 10.5	3*n*	β
1886.95	301.2	2.26	7.0 . . . 10.0	1*n*	Pol
1891.81	293.0	1.94	7.0 . . . 10.0	1*n*	Sel
1896.72	291.5	1.61	6.3 . . . 8.2	4*n*	See
1898.73	297.4	2.14	7.0 . . . 11.0	1*n*	Bd
1898.74	300.9	2.28	7.0 . . . 10.0	3*n*	A

Discovered with the 12-inch at Mt. Hamilton in 1881. Apparently fixed. The Cordoba magnitude is 6.6; YARNALL 6.4.

[β (XIII) . . . β^3 . . . Pollock (*Pub. Sydney Obsy.* 1891) (*Mem. R. A. S.* L) . . . Sellors (3154) . . . See (3496) . . . Boothroyd ( ) . . . Aitken (3585) . . .]

β 384. *Aquarii* 265

R.A. $22^h\ 56^m\ 14^s$
Decl. $-19°\ 10'$

1876.78	75°.0	1″.08	7.0 . . . 9.0	1*n*	Cin
1877.14	72.2	1.27	7.2 . . . 9.2	3*n*	J
1877.63	72.4	1.23	6.7 . . . 9.0	2*n*	Cin
1886.81	70.4	1.27	6.8 . . . 8.8	1*n*	LM
1888.85	73.4	1.03	7.0 . . . 9.4	1*n*	Lv
1897.66	69.1	1.37	6.0 . . . 9.2	1*n*	See
1898.68	66.7	1.32	7.7 . . . 9.5	2*n*	Bd

Discovered with the 6-inch. In GOULD 6.9 m. Lalande 45047.

[β (VI)...β (2062)...Δ (1)...Cin^3...Cin^4...LM...Lv^1... See (3496)...Boothroyd ( )...]

β 481. W^1 XXII. 1162

R.A. 22^h 56^m 23^s
Decl. − 11° 53′

1878.19	51°.8	1″.30	9.0... 9.5	2*n*	β
1886.74	54.9	....	9.5...10.5	1*n*	LM
1891.88	53.1	1.19	9.1... 9.6	3*n*	β
1898.76	51.7	1.31	9.7...10.0	3*n*	Cg

Discovered with the 6-inch. Σ 2970 is 17° *p* and 4′ *s*.

[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β^3...β (3114)...β (*Pub. L. O.* II)...LM...Cogshall ( )...]

β 1147. 2 *Andromedae*

R.A. 22^h 57^m 5^s
Decl. + 42° 7′

1889.54	317°.8	0″.28	5.0... 8.7	3*n*	β
1890.62	313.0	0.27	5.2... 9.0	3*n*	β
1891.72	323.4	0.23	5.7... 8.5	3*n*	β
1892.99	318.2	0.40±	...	3*n*	Sp
1893.46	323.9	0.50±	...	2*n*	Sp
1896.03	322.0	0.42±	...	1*n*	Sp
1898.79	329.6	0.36	...	2*n*	A

This star was suspected to be a close pair with the 12-inch, and verified with the 36-inch. It is difficult with the large aperture. AUWERS gives the proper motion of 2 *Andromedae*, 0″.041 in the direction of 109°.8. This belongs to both stars. It is a physical system, and should be in rapid motion.

[β (XVI)...β (2056,3048,3114)...β (*Pub. L. O.* II)...Sp (III) ...Aitken (3585)...]

β 851. O. Arg. N. 25054

R.A. 22^h 57^m 36^s
Decl. + 75° 29′

1881.67	158°.0	1″.69	7.5...13.0	3*n*	β
1885.58	157.0	2.02	...	2*n*	HΣ
1888.92	160.4	2.14	7.3...13.0	3*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^3...Comstock (*Pub. Washburn Obsy.* VI)...HΣ ( )...]

β 773. υ *Gruis*

R.A. 23^h 0^m 12^s
Decl. − 39° 32′

This star was suspected to be a close pair with the 6-inch at Mt. Hamilton in 1879. With the 12-inch in 1891 I could not be certain of any real elongation. It should receive further attention in southern latitudes.

[β (XI)...β^3...]

β 1025. Lalande 45242

R.A. 22^h 1^m 38^s
Decl. + 12° 1′

A and B

1891.57	268°.6	0″.77	8.0...10.8	3*n*	β
1897.82	271.4	0.88	...	3*n*	A
1898.61	273.1	0.82	8.0... 9.7	2*n*	β

A and C

1891.57	84°.3	22″.16	...11.9	3*n*	β
1898.29	83.9	21.96	...12.0	3*n*	β

Discovered with the 18½-inch.

[β (XIII)...β^3 (App.)...β (3114)...β (*Pub. L. O.* II)...Aitken (*A. J.* 429)...]

β 78. W^3 XXII. 1393

R.A. 23^h 2^m 9^s
Decl. + 30° 49′

A and B

1879.57	55°.0	17″.22	7.2...11.0	1*n*	β
1893.25	54.9	18.18	7.0...11.0	2*n*	W

A and C

1879.57	61°.9	48″.07	...11.5	1*n*	β
1893.25	62.2	47.28	...11.5	2*n*	W

Two distant companions noted with the 6-inch. In my measure of AB, the double distance, 34″.44, is given in β^3.

[β (I)...β (*Mon. Not.* XXXIII, 351)...β^3...Wilson ( )...]

β 180. O. Arg. N. 25161

R.A. 23h 2m 9s
Decl. + 60° 11′

A and B

1875.08	176°.8	0″.57	7.5 ... 8.0	3n	J
1885.55	177.5	0.71	...	3n	HΣ
1888.95	177.5	0.55±	...	4n	Sp
1890.65	175.2	0.62	8.0 ... 9.2	3n	β
1891.98	176.4	0.42±	...	1n	Sp

AB and C

1875.54	106°.3	34″.30	... 10.5	2n	J
1885.54	106.8	34.29	...	1n	HΣ
1890.65	106.6	34.43	... 9.4	3n	β
1891.98	105.6	...	...	1n	Sp

Discovered with the 6-inch. Apparently unchanged.

[β (111)...β (*Mon. Not.* XXXIV, 59)...β (3048)...β (*Pub. L. O.* II)...J (2086)...J (1)...Sp (111)...HΣ ( )...]

β 385. W° XXIII. 40

R.A. 23h 4m 31s
Decl. + 31° 50′

A and B

1876.40	135°.8	0″.42	7.1 ... 7.9	6n	J
1880.77	128.9	0.51	...	1n	Perry
1881.75	139.0	....	...	1n	Big
1882.62	131.4	0.50	7 ... 8	1n	OΣ
1883.82	131.0	0.4	...	1n	Perry
1885.46	143.2	0.41	7.2 ... 7.2	4n	En
1885.73	131.2	0.54	...	2n	HΣ
1888.69	132.3	0.4±	...	8n	Sp
1890.68	130.4	0.46	7.6 ... 8.1	3n	β

AB and C (= H 5532)

1825	105°±	Cl. VI	7 ... 9	1n	H'
1876.72	77.1	58″.05	... 9.0	2n	J
1882.62	77.5	57.81	... 8.5	1n	OΣ
1885.71	77.1	57.93	...	1n	HΣ
1886.01	77.4	58.15	... 9.3	2n	En
1890.68	77.3	58.03	... 8.8	3n	β

Discovered with the 6-inch. Change is doubtful. The foregoing are all the measures of the distant star making H 5532.

[β (VI)...β (2062,3048)...β (*Pub. L. O.* II)...J (1)...Perry (*Eng. Mech.* XXXV, 65; XXXIX, 11)...Bigourdan (*Paris Obsns.* 1883)...OΣ (*Poulkowa Obsns.* X)...Engelmann (2786)...Sp (III)...HΣ ( )...]

β 852. *Pegasi* 306

R.A. 23h 4m 51s
Decl. + 25° 52′

A and BC

1881.61	282°.6	58″.55	7.0...	3n	β
1881.80	283.3	58.25	7.0...	2n	Ho
1886.86	283.0	58.32	...	1n	UL
1887.80	283.1	58.62	7.0...	3n	Com
1898.83	282.9	58.75	7.0...	3n	A

B and C

1881.62	11°.2	1″.20	10.8...11.3	3n	β
1881.79	10.0	1.47	9.0... 9.5	2n	Ho
1886.86	10.6	1.24	...	1n	UL
1888.21	9.9	1.66	10.3...10.8	3n	Com
1898.84	5.3	1.49	10 8...11.7	3n	A

Discovered with the 15½-inch of the Washburn Observatory. AITKEN measures a 14 m star from BC, 207°.8 : 18″.0 (1898.87) 1n. Lalande 45362.

[β (XII)...β...Hough (2978)...Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI)...Aitken (3585)...]

β 181. *Aquarii* 286

R.A. 23h 7m 31s
Decl. − 14° 3′

A and B

1876.26	309°.2	1″.51	7.1...10.4	4n	J
1878.75	307.8	1.44	6.9... 8.7	2n	Cin
1884.87	307.7	1.46	7.0...11.0	2n	Ho
1885.16	314.6	1.47	7.2... 9.1	4n	W
1886.82	309 1	1.57	7.0... 9.3	3n	LM
1888.77	305.3	1.31	7.2... 9.8	1n	Lv
1892.68	308.8	1.63	7.0...10.5	3n	T
1898.86	311.6	1.45	7.0...10.0	1n	β

A and C

1877.74	234°.9	18″.78	...12	1n	β
1878.75	237.1	19.24	...12.2	2n	Cin
1884.87	236.3	19.74	...13	1n	Ho
1898.90	239.1	19.18	...11.4	3n	β

Discovered with the 6-inch. Probably unchanged. Lalande 45443.

[(III)... β (*Mem. Not.* XXXIV, 59)... β^3... Δ (I)... Cin^5... Hough (2978)... Wilson (Cin^{10})... LM... Lv^4... Tarrant (3186)...]

β 714. B.A.C. 8084

R.A. 23^h 7^m 56^s
Decl. — 3° 17′

1878.64	145°.5	0″.57	7.0... 10.0	1*n*	β
1877.79	150.1	...	6.5... 10.0	1*n*	Cin
1879.76	156.6	...	7.0... 11.0	1*n*	Cin
1886.73	146.4	0.48	7.1... 10.4	2*n*	LM
1898.84	139.5	0.59	7.0... 9.7	2*n*	A

Discovered with the 18½-inch.

[β (x)... β^3... Cin^4... Cin^5... LM... Aitken (3585)...]

β 715. *Aquarii* 290

R.A. 23^h 8^m 25^s
Decl. — 11° 20′

1877.79	258°.0	3″.47	7.0... 11.0	1*n*	Cin
1878.29	256.0	3.35	7.0... 11.5	4*n*	β
1879.77	257.2	3.08	6.0... 11.5	2*n*	Cin
1890.65	256.9	3.50	6.6... 11.7	3*n*	β
1898.69	257.2	3.51	6.8... 13.2	3*n*	Bd

Discovered with the 18½-inch. The Cin observers in 1879 thought the principal star was a close pair. This star was perfectly round with the 36-inch in 1891, and Lv found it so in 1886. BOOTHROYD thought there might be an elongation in 280° (1898). Lalande 45490.

[β (x)... β^1... β (3048)... β (*Pub. L. O.* II)... Cin^4... Cin^5... LM... Boothroyd ( )...]

β 716.

R.A. 23^h 9^m 15^s
Decl. — 9° 43′

1877.61	208°.6	1″.70	9.5... 10.5	1*n*	β
1891.88	204.1	1.79	9.3... 10.0	3*n*	β
1898.81	207.9	1.35	9.0... 11.5	2*n*	Cg

Discovered with the 18½-inch. It is 21′ *p* ψ^1 *Aquarii* (β 1220). This star is not in the S.D.

[β (x)... β^1... β (3114)... β (*Pub. L. O.* II)... Cogshall ( )...]

β 1220. ψ^1 *Aquarii*

R.A. 23^h 9^m 36^s
Decl. — 9° 44′

B and C

1890.63	101°.1	0″.22	9.1... 9.2	3*n*	β
1891.57	94.3	0.22	9.5... 9.5	4*n*	β
1894.66	99.1	0.28	...	5*n*	Bar
1898.84	94.8	0.39	9.2... 9.3	4*n*	A

A and BC (= Σ 12 App. II)

1836.66	312°.2	49″.63	4.5... 8.5	4*n*	Σ
1868.20	312.1	49.39	... 8.5	5*n*	Δ
1880.88	312.6	49.66	.. 8.5	4*n*	β
1889.68	311.8	49.33	...	3*n*	β

A and D

1877.69	275°.0	63″.0	...	1*n*	β
1880.91	274.3	64.96	... 13.5	1*n*	β
1891.89	274.6	68.45	... 11.5	2*n*	β

BC and E

1877.69	34°.9	18″.4	...	1*n*	β
1891.89	16.7	19.25	... 12.5	2*n*	β
1898.98	9.2	18.26	... 13.5	1*n*	A

As a wide pair this is H′ IV. 12 = Σ 12 App II = S 827. The duplicity of the HERSCHEL companion was discovered with the 36-inch. It is a difficult pair and beyond the reach of ordinary apertures. The large star has considerable proper motion, 0″.348 in the direction of 92°.1 (PORTER), and the old companion is traveling at precisely the same rate, so that it is certain that ABC constitute a vast physical system. The two small stars, D and E, on the contrary, are strangers to the system, and are fixed in space, the change shown by the measures being due to the proper motion of the other stars.

[β (XVII)... β (3047,3114)... β^1... β^2... β (*Ast. Reg.* XIX, 41)... Barnard (*A. J.* 447)... Aitken (3585)...]

The following references include the measures of the HERSCHEL star:

[Herschel (*Cape Obsns.*)... Jacob (*Mem. R. A. S.* XVII)... *Radcliffe Obsns.* XXI, XXV... Engelhardt (*Obsns. Astron.* II)... OΣ (*Poulkowa Obsns.* X)... Jedrzejewicz (2407)... Glasenapp (II)...]

β 992. O. Arg. N. 25354

R.A. 23h 10m 48s
Decl. + 63° 28′

1880.59	170°.5	0″.41	8.0 . . .	8.2	5*n*	β
1890.64	161.5	0.34	8.2 . .	8.3	3*n*	β
1894.20	157.1	0.23±	. . .		5*n*	Sp
1898.94	159.5	0.33	8.0 . . .	8.0	3*n*	A

Discovered with the 18½-inch. Retrograde motion.

[β 1XIII). . .β³. β (3038). . .β *Pub. L. O.* II). . .Sp (III). . . Aitken (. .]

β 182. W¹ XXIII. 175

R.A. 23h 10m 52s
Decl. — 14° 28′

1876.28	42°.3	0″.83	8.7 . .	8.9	3*n*	J
1877.79	44.3	. . .	8.0 . . .	8.3	1*n*	Cin
1879.68	44.6	0.72	8.5 . . .	8.5	1*n*	Cin
1884.87	44.1	0.62	8.0 . . .	8.0	1*n*	Ho
1886.77	43.1	0.85	8.0 . . .	8.2	3*n*	LM
1888.77	45.4	0.74	8.2 . . .	8.2	2*n*	Lv
1891.59	48.8	0.63	8.3 . . .	8.4	3*n*	β
1892.63	45.4	0.79	8.5 . .	8.5	2*n*	T
1898.66	48.0	0.58	8.2 . . .	8.6	2*n*	β

Discovered with the 6-inch. It is the preceding star of a small equilateral triangle. The *Radcliffe Catalogue* for 1890 gives the star a large proper motion, 1″.331 in the direction of 202°.5. This is undoubtedly a binary, and one of more than ordinary interest if this motion in space is correct. For the purpose of a speedy determination of this, I have measured a 12.5 m star:

1898.66	79.9	68″.04	2*n*	β
1899.75	78.5	68.66	3*n*	Bar

An interval of only a year is too short to give a reliable proper motion from two sets of measures; but they confirm the movement given from the meridian observations both as to direction and amount.

[β (III). . .β (*Mem. Not.* XXXIV, 59). . .β (3114). . .β (*Pub. L. O.* II). . .J (I). . .Cin⁴. . .Cin⁵. . .Hough (2078). . .LM. . . Lv¹. . .Tarvant (3186). . .Barnard ( ). . .]

β 79. Lalande 45585

R.A. 23h 11m 24s
Decl. — 2° 10′

A and B

1876.35	115°.3	1″.03	7.9 . .	9.6	4*n*	J
1877.81	114.3	. . .	8.2 . . .	10.0	1*n*	Cin
1879.64	108.5	0.81	7.5 . .	8.5	2*n*	Cin
1886.63	102.4	1.02	7.5 . . .	9.2	2*n*	LM
1891.54	94.6	0.88	8.0 . . .	8.6	3*n*	β
1893.54	87.7	0.86	8.0 . . .	9.0	1*n*	Lv
1893.63	90.3	1.03	7.8 . .	9.8	2*n*	W
1893.95	94.0	0.82	. . .		4*n*	Sp
1894.64	90.7	1.01	. . .		4*n*	Bar
1895.88	89.8	0.63	. . .		1*n*	Sp
1897.71	86.4	0.98	. . .		3*n*	A
1897.88	85.3	1.08	. .		1*n*	Br
1898.79	84.1	0.81	. . .		1*n*	Bry
1898.82	105.0	0.74	. . .		3*n*	Bow
1898.85	87.8	0.75	8.0 . .	9.1	2*n*	β

AB and C

1894.67	157°.3	16″.00		. . . 16.5	2*n*	Bar

Discovered with the 6-inch. A binary in retrograde movement, with a common proper motion of the components.

Stumpe	0″.212	in 119°.7
Bossert	0.232	in 115.5
Porter	0.239	in 107.5

More rapid angular motion may be expected hereafter. The very faint star, C, was detected by Barnard with the 36-inch. Σ 2995 is in the field, 1m *p* and 5′ *s*.

[β (I). . .β (*Mem. Not.* XXXIII, 351). . .β (3114). . .β (*Pub. L. O.* II). . .J (I). . .Cin⁴. . .Cin⁵. . .LM. . .Lv. . . (*A. J.* 352). . . Wilson ( ). . .Sp (III). . .Barnard (*A. J.* 447). . .Aitken (*A. J.* 429). . .Bryant and Bowyer ( ). . .Brown ( ). . .]

β 853. O. Arg. N. 25370

R.A. 23h 11m 37s
Decl. + 61° 9′

A and B

1881.64	228°.8	0″.62	8.7 . . .	8.7	2*n*	β
1888.37	224.5	0.55	8.2 . . .	8.6	3*n*	Com
1899.27	225.8	0.74	9.0 . . .	9.1	2*n*	A

AB and C

1881.67	67°.3	7".34	...13.0	1*n*	β
1888.00	69.8	6.74	...12.5	2*n*	Com
1899.27	69.6	7.02	..12.0	2*n*	A

Discovered with the 15½-inch at the Washburn Observatory. So far without change.

[β (XII)...β¹...Comstock (*Pub. Washburn Obsy.* VI)...Aitken ( )...]

β 717. 8 *Andromedæ*

R.A. 23ʰ 12ᵐ 11ˢ
Decl. + 48° 22′

1878.88	161.4	7".55	5.0 ..13.0	4*n*	β
1885.61	159.8	7.84	...	1*n*	HΣ
1891.81	161.8	7.43	5.3. .12.7	3*n*	β
1898.76	162.3	7.62	5.5...13.0	2*n*	β

Discovered with the 18½-inch. The large star has a proper motion of 0".024 in the direction of 119°.8 (AUWERS). The measures appear to indicate a common movement of the components. The principal star is No. 267 of SCHJELLERUP'S *Catalogue of Red Stars.*

[β (x1...β¹...β²..β (3114)...β (*Pub. L. O.* II)...HΣ ( )...]

β 80. Lalande 45638

R.A. 23ʰ 12ᵐ 45ˢ
Decl. + 4° 45′

1875.80	300.4	1".07	8.2... 9.1	4*n*	J
1877.79	306.1	1.24	8.5 ..11	2*n*	β
1881.69	312.2	0.91	8.0... 8.8	3*n*	β
1886.94	316.1	0.84	7.7... 8.7	1*n*	LM
1888.71	319.5	0.92	8.2... 8.9	4*n*	β
1888.79	319.5	0.84	8.0 .. 9.1	3*n*	Lv
1891.57	322.5	0.69	8.0... 8.6	3*n*	β
1892.97	327.2	0.60	...	3*n*	Sp
1893.54	328.0	0.81	8.4... 9.0	1*n*	Lv
1893.66	329.1	0.85	8.3... 9.2	3*n*	W
1893.96	325.8	0.55±	...	3*n*	Sp
1894.84	325.1	0.63	8.1 .. 8.7	1*n*	Lew
1898.76	347.8	0.56	8.2 .. 8.5	1*n*	β
1898.78	330.0	0.60	. .	1*n*	Bow
1898.78	343.1	0.62	8.1... 9.0	4*n*	A
1898.99	339.6	0.51	...	1*n*	Bry

AB and C

1891.80	5°.3	103".81	8.0...10.5	2*n*	Eng
1898.66	4.1	104.08	...10.5	2*n*	β

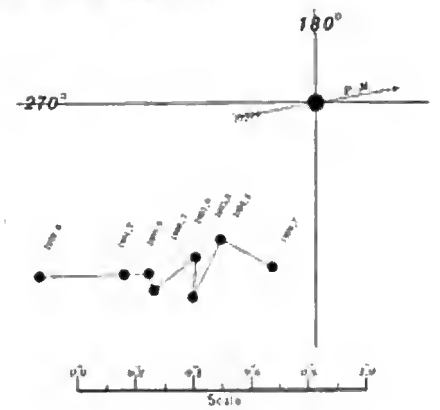
AB and D

1891.80	333°.2	183".57	... 9.5	2*n*	Eng
1898.66	332.4	186.36	... 9.0	2*n*	β

Discovered with the 6-inch. One of the most interesting binaries from the rapid relative motion, and the large movement of the system in space. The components have a large common proper motion:

Stumpe	0".534 in 102°.3
Boss	0.509 in 101.2
Porter	0.480 in 100.5
Bossert	0.478 in 104.5

The distance is decreasing, with a corresponding increase in the angular motion. It will probably soon become a difficult object to measure. The principal measured positions are shown on the accompanying diagram:



β 80.

A continuation of the measures of the distant stars will give independent data for the determination of the proper motion. The above observations give for the movement of A, 0".44 in the direction of 105°.9.

[β (1)...β (*Mon. Not.* XXXIII, 351)...β¹...β¹...β (2875,3114) β (*Pub. L. O.* II)...J (1)...LM...Lv¹...Lv (*Sid. Mess.* VIII, 77)...Sp (III)...Lv (*A. J.* 382)...Wilson ( ). Lewis, Bowyer and Bryant (*Greenwich Obsns.* 1894) (*Mon. Not.* LVI, 359; LIX, 400)...Aitken (3585)...Engelhardt (*Obsns. Astron.* III)...]

β 229. Lalande 15726

R.A. 23h 13m 27s
Decl. + 56° 35′

1876.68	37°.9	17″.55	7.0.	11.7	2*n*	Δ
1888.69	36.7	17.93	7.0.	11.9	2*n*	T
1898.99	36.7	17.75	6.9...	11.0	4*n*	D

Discovered with the 6-inch. No change.

[β (IV)...β (*Mem. Not.* XXXIV, 382)...Δ (1)...Tarrant (2991)...Doolittle (*Pub. Flower Obsy.* I)...]

β 278. B.A.C. 8138

R.A. 23h 15m 20s
Decl. + 61° 33′

1876.45	351°.9	14″.76	6.5	11.5	1*n*	OΣ
1890.64	173.9	12.66	6.6.	11.8	3*n*	β
1898.59	174.8	12.86	6.7...	12.1	3*n*	β

Discovered with the 9.4-inch at the Dartmouth College Observatory. Evidently an error of 180° in the measure of OΣ. The proper motion of this star is very small, 0″.015 in the direction of 247°.2 (Auwers). A naked-eye star in *Cassiopeia*; Heis 6m; Harvard photometry 6.3m.

[β (V)...β (*Mem. Not.* XXXV, 31)...β (3048)...β (*Pub. L. O.* II)...OΣ (*Poulkova Obsns.* X)...]

β 718. 64 *Pegasi*

R.A. 23h 16m 3s
Decl. + 31° 9′

1878.74	88°.3	0″.47	5.0...	8.7	4*n*	β
1878.74	88.7	0.56	5.0...	7.0	1*n*	Δ
1882.62	85.9	0.60	6.0.	8.0	1*n*	OΣ
1884.72	86.5	0.73	...		2*n*	HΣ
1888.73	85.8	0.63	.		3*n*	Sp
1888.80	85.4	0.67	5.8.	7.8	4*n*	β
1889.50	86.2	0.69	5.8.	8.8	3*n*	β
1898.59	85.5	0.72	5 ..	8	1*n*	A

Discovered with the 18½-inch. There is no material relative change, but the components have a common proper motion of 0″.020 in the direction of 144°.2 (Auwers), and they therefore form a binary system.

[β (X)...β[v]...β[vi]...β (2875,2957)...β (*Pub. L. O.* II)...Δ (1)...OΣ (*Poulkova Obsns.* X)...Sp (III)...Aitken ( ).. HΣ ( )...]

β 854. D.M. (5) 5164

R.A. 23h 18m 14s
Decl. + 5° 23′

1881.66	90.0	2″.10	8.7.	8.7	3*n*	β
1886.86	89.7	2.44	...		5*n*	UL
1887.70	87.9	2.38	8.4...	8.6	3*n*	Com
1888.82	88.3	1.89	8.5...	8.5	1*n*	Lv
1899.32	88.3	2.47	9.9...	9.0	6*n*	D

Discovered with the 15½-inch at the Washburn Observatory. Apparently without change.

[β (XII)...β[x]...Updegraff, Lamb and Comstock (*Pub. Washburn Obsy.* V, VI)...Lv[1]...Doolittle (*Pub. Flower Obsy.* I)...]

β 719. W[1] XXIII. 342

R.A. 23h 18m 22s
Decl. + 13° 40′

1877.86	10°.9	1″.11	8.0...	11.0	1*n*	β
1887.79	8.3	1.31	7.2...	11.0	2*n*	Ho
1891.60	3.6	1.34	7.6...	11.5	3*n*	β
1895.71	354.6	1.27	7 ...	11	1*n*	Ho
1897.83	358.8	1.47	...		1*n*	Br
1899.72	2.2	1.46	7.2...	11.7	2*n*	D

Discovered with the 18½-inch. In an unequal pair of this class, the apparent change in angle needs confirming. In my *Tenth Catalogue* this star was erroneously identified as W[1] XXIII. 363, and given with an error of 1°11′ in the Decl. It was found independently by Hough, and is Ho 301.

[β (X)...β[v]...β[vi] (3114)...β (*Pub. L. O.* II)...Hough (2977,3558)...Brown ( )...Doolittle (*Pub. Flower Obsy.* II)...]

β 386. B.A.C. 8173

R.A. 23h 21m 13s
Decl. + 70° 1′

1876.97	312°.3	20″.08	6.5..	11.9	4*n*	Δ
1888.71	313.1	20.69	7.2..	11.2	3*n*	β
1899.05	313.0	19.94	6.6...	10.8	3*n*	D

Discovered with the 6-inch. The principal star has a proper motion of 0″.026 in the direction of 96°.7 (A.G.C).

[β (VII)...β (2062,2875)...β (*Pub. L. O.* II)...Δ (1)...Doolittle (*Pub. Flower Obsy.* I)...]

β 1148. Groombridge 4070

R.A. $23^h\ 22^m\ 2^s$
Decl. $+64°\ 58'$

1889.60	73.9	2.13	7.1 . . . 13.0	3*n*	β
1898.68	77.3	2.47	6.5 . . . 13.0	1*n*	A

Discovered with the 36-inch. In D.M. 6.5 m.

[β (XVI) . . β (2956) . . β (*Pub. L. O.* II) . . Aitken (. . .]

β 1221. D.M. (41°) 4788

R.A. $23^h\ 22^m\ 12^s$
Decl. $+41°\ 36'$

1890.50	145.2	1.91	9.3 . . . 10.5	3*n*	β
1896.93	145.9	1.73	. .	3*n*	A

Discovered with the 16-inch at the Warner Observatory in 1885.

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . . Aitken (3466) . . .]

β 1222. D.M. (2°) 4669

R.A. $23^h\ 22^m\ 23^s$
Decl. $+2°\ 54'$

1890.82	37.4	1.14	8.9 . . . 9.0	3*n*	β
1896.87	35.2	0.92	. . .	4*n*	A
1898.74	31.8	1.04	. . .	1*n*	Bow

Discovered with the 12-inch.

[β (XVII) . . . β (3047) . . β (*Pub. L. O.* II) . . . Aitken (3466) . . . Bowyer (*Mon. Not.* LIX, 400) . . .]

β 1149. D.M. (57°) 2746

R.A. $23^h\ 24^m\ 11^s$
Decl. $+58°\ 1'$

1889.58	309.1	0.52	9.4 . . . 9.8	3*n*	β
1898.81	308.9	0.56	. . .	2*n*	Hu

Discovered with the 36-inch. In the field with the multiple star, OΣ 496.

OΣ 496 (A) and β 1149 (AB)

1889.58	277.6	231.07	. . .	1*n*	β

[β (XVI) . . . β (2956) . . . β (*Pub. L. O.* II) . . . Hussey ( ) . . .]

β 1266. D.M. (30°) 1963

R.A. $23^h\ 24^m\ 29^s$
Decl. $+30°\ 10'$

A and B

1891.69	74.0	0.24	7.4 . . . 7.4	3*n*	β
1893.54	65.9	0.23	. . .	1*n*	Lv
1893.64	73.3	0.26	8.0 . . . 8.0	2*n*	W
1893.67	60.3	0.22±	. . .	7*n*	Sp
1895.96	55.5	0.20±	. . .	2*n*	Sp
1896.78	52.0	0.28	. . .	2*n*	Lew
1897.94	41.6	0.36	. . .	1*n*	Lew
1898.71	54.0	0.35	. . .	1*n*	Lew
1899.55	45.5	0.24	7.7 . . . 7.8	3*n*	A

AB and C (= Σ 3018)

1830.52	204.0	18.92	7.2 . . . 9.5	2*n*	Σ
1843.74	203.4	19.41	. . .	1*n*	Ma
1864.45	204.0	18.98	7.2 . . . 9.0	3*n*	J
1870.07	203.8	18.83	7.9 . . . 9.8	4*n*	Dun
1879.57	202.9	19.19	7.0 . . . 9.5	1*n*	Cin
1891.69	203.5	18.92	. . 9.0	3*n*	β
1894.44	203.6	18.79	. . .	2*n*	Sp
1897.86	204.0	18.95	. . .	3*n*	Lew
1899.54	203.4	18.77	. . .	1*n*	A

The larger component of Σ 3018 was found to be a close pair with the 36-inch. The measures show rapid motion. It is a binary, and probably of short period. There is no change in C since the observations of STRUVE. All the measures are given.

[β (XVIII) . . . β (3113) . . . β (*Pub. L. O.* II) . . . Lv (*A. J.* 382) . . . Sp (III) . . . Wilson ( ) . . . Lewis (*Mon. Not.* LIX, 400) . . . Madler (*Fixstern Systeme* I) (*Dorpat Obsns.* XI) . . . Herschel (*Mem. R. A. S.* IV) . . . J (II) . . . Duner (*Mesures Microm.* Lund, 1876) . . . Cin5 . . . Aitken ( ) . . .]

β 1150. O. Arg. N. 25672

R.A. $23^h\ 24^m\ 40^s$
Decl. $+64°\ 24'$

1889.60	44.0	0.61	8.7 . . . 9.0	3*n*	β
1898.68	49.7	0.57	8.5 . . . 9.0	1*n*	A

Discovered with the 36-inch.

[β (XVI) . . β (2956) . . . β (*Pub. L. O.* II) . . . Aitken ( ) . . .]

β 1151.

R.A. $23^h\ 25^m\ 6^s$
Decl. $+57°\ 43'$

1889.59	293.7	0.64	9.7 . .	9.7	3*n*	β
1899.59	291.4	0.67	10.5 . . .	11.0	1*n*	A

Discovered with the 36-inch. A difficult pair, and so far without change.

It is too faint to be included in the D.M. In the field with Σ 3022.

Σ 3022 (A) and β 1151 (AB)

1889.58 189.7 116.88 3*n* β

[β (XVI) . . . β (2956) . . . β (*Pub. L. O.* II) . . . Aitken ( ) . . .]

β 774. D.M. (63°) 2006

R.A. $23^h\ 25^m\ 19^s$
Decl. $+63°\ 40'$

1880.58	6.7	0.51	8.4 . . .	8.8	3*n*	β
1890.64	4.1	0.52	8.3 . . .	8.6	3*n*	β
1892.16	1.8	0.45 ±	. . .		5*n*	Sp
1898.68	359.1	0.66	8.2 . . .	8.8	3*n*	A

Discovered with the 6-inch at Mt. Hamilton in 1879. It is a difficult pair with a much larger aperture. Retrograde motion ?

[β (XI) . . . β^2 . . . β^1 . . . β (3048) . . . β (*Pub. L. O.* II) . . . Sp (III) . . . Aitken (3585) . . .]

β 720. 72 *Pegasi*

R.A. $23^h\ 28^m\ 0^s$
Decl. $+30°\ 40'$

1878.74	127.7	0.40	6.0 . . .	6.0	3*n*	β
1878.74	128.7	0.37	5.5 . . .	6.0	1*n*	Δ
1880.01	311.0	0.41	6.0 . . .	6.1	3*n*	β
1882.62	308.9	0.48	6.0 . . .	7.0	1*n*	OΣ
1883.40	147.6	0.25	. . .		7*n*	En
1886.61	141.6	0.45	. . .		5*n*	HΣ
1887.60	141.8	0.3 ±	. . .		3*n*	Sp
1888.93	142.1	0.4 ±	. . .		8*n*	Sp
1889.50	146.0	0.38	6.0 . . .	6.0	3*n*	β
1890.55	148.3	0.37	. . .		3*n*	β
1891.67	149.5	0.33	. . .		3*n*	β
1893.54	151.3	0.30	6.5 . . .	6.0	1*n*	Lv
1893.67	150.9	0.42	6.2 . . .	6.0	3*n*	W
1893.97	160.7	0.35 +	. . .		1*n*	Sp
1894.42	153.8	0.37	. . .		6*n*	Bar
1896.67	157.0	0.39	6.0 . . .	6.5	3*n*	Lv
1896.76	157.7	0.37	. . .		3*n*	Lew
1897.82	164.5	0.43	. . .		1*n*	Dy
1897.83	158.4	0.41	. . .		3*n*	Hu
1897.93	158.6	0.38	. . .		1*n*	A
1897.93	160.2	0.33	. . .		2*n*	Lew
1898.67	161.2	0.50	6.5 . . .	6.5	3*n*	A
1898.78	158.2	0.50	. . .		1*n*	Lew
1898.91	159.2	0.39	. . .		1*n*	Bow
1898.97	151.1	0.34	. . .		1*n*	Bry

Discovered with the 18½-inch. A binary in direct motion. So far the change has been about 1°.5 per year. The system has an annual proper motion of 0".025 in the direction of 101°.5 (AUWERS).

[β (X) . . . β^4 . . . β^3 . . . β (2957,3048,3114) . . . β (*Pub. L. O.* II) . . . Δ (1) . . . OΣ (*Poulkowa Obsn.* X) . . . Engelmann (2678) . . . Sp (III) . . . Lv (*A. J.* 382,407) . . . Wilson ( ) . . . Barnard (*A. J.* 447) . . . Gore (*Mon. Not.* XLVII, 62) . . . Lewis and Dyson (*Mon. Not.* LIX, 400) . . . HΣ ( ) . . . Hussey (*A. J.* 427) . . . Aitken (*A. J.* 429) (3585) . . .]

β 387. Lalande 46162

R.A. $23^h\ 28^m\ 8^s$
Decl. $-10°\ 22'$

1876.67	71.6	5.73	8.7 . . .	10.2	3*n*	Δ
1877.77	69.5	5.94	8.0 . . .	9.0	2*n*	Cin
1891.87	70.8	5.82	8.1 . . .	9.0	2*n*	β
1898.65	70.0	5.91	8.2 . . .	9.2	3*n*	Bd

Discovered with the 6-inch. Without change.

[β (VI) . . . β (2062,3114) . . . β (*Pub. L. O.* II) . . . Δ (1) . . . Cin[4] Boothroyd ( ) . . .]

β 388. W[5] XXIII. 590

R.A. $23^h\ 28^m\ 52^s$
Decl. $+37°\ 22'$

1876.46	334.3	21.77	6.5 . . .	12.0	1*n*	Δ
1897.82	333.5	20.53	. . .		2*n*	β
1898.68	333.5	21.28	6.3 . . .	10.8	4*n*	D

Discovered with the 6-inch. HEIS gives this as a naked-eye star in *Andromeda*, 6–7 m.

[β (VI) . . . β (2062) . . . β (*Pub. L. O.* II) . . . Δ (1) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 81. W[1] XXIII. 562

R.A. 23[h] 28[m] 59[s]
Decl. — 12° 14′

1876.08	10.5	1.53	8.3 . . . 9.8	3*n*	J
1877.86	14.8	1.96	8.2 . . 9.7	2*n*	Cin
1886.40	13.4	1.96	8.2 . . 11.0	3*n*	LM
1897.94	14.6	2.01	. . .	1*n*	Br

Discovered with the 6-inch. Probably fixed.

[β (1) . . β (*Mem. Nat.* XXXIII, 351) . . . J (1) . . . Cin[4] . . LM . . . Brown ( ) . . .]

β 721. W[1] XXIII. 592

R.A. 23[h] 30[m] 7[s]
Decl. — 7° 47′

1878.22	138.2	0.51	9.0 . . . 9.0	1*n*	β
1879.16	145.5	0.44	8.0 . . . 9.0	2*n*	Cin
1886.77	134.6	0.38	8.0 . . . 8.3	2*n*	LM
1898.68	117.1	0.73	8.0 . . . 8.5	1*n*	Bd
1899.68	131.7	0.32	8.6 . . . 8.6	3*n*	A

Discovered with the 18½ inch. The change, if any, is in the distance. There is a faint star in the *n p* quadrant:

1898.68	301.7	21.38	. . . 12.5	1*n*	Bd
1899.63	301.1	22.19	. . . 14.0	1*n*	A

[β (x) . . . β[1] . . . Cin[5] . . . LM . . . Boothroyd ( ) . . . Aitken ( ) . . .]

β 775 = β 1012. Lacaille 9531

R.A. 23[h] 30[m] 45[s]
Decl. — 32° 32′

1881.45	251.0	5.35	7.2 . . . 10.5	4*n*	β
1886.92	248.0	5.60	7.0 . . . 9.5	2*n*	Pol
1898.70	251.2	5.28	7.0 . . . 11.0	3*n*	Cg
1898.74	250.6	5.28	7.0 . . . 10.0	3*n*	A

Discovered with the 6-inch at Mt. Hamilton in 1879, and again independently with the 12-inch in 1881. In Cord. G. C. 6½ m. Without change.

[β (XI, XIII) . . . β[2] . . . β[1] . . . Pollock (*Pub. Sydney Obsy.* 1891) (*Mem. R. A. S.* L) . . . Cogshall ( ) . . . Aitken (3585) . . .]

β 855. D.M. (67°) 1546

R.A. 23[h] 32[m] 23[s]
Decl. + 67° 33′

1881.53	204.2	0.82	8.5 . . . 8.8	4*n*	β
1888.51	199.1	0.79	8.5 . . . 9.3	3*n*	Com
1898.53	201.2	0.94	8.8 . . . 9.2	3*n*	D

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII) . . . β[2] . . . Comstock (*Pub. Washburn Obsy.* VII) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 722. D.M. (41°) 4886

R.A. 23[h] 32[m] 33[s]
Decl. + 41° 51′

1878.53	348.6	7.45	6.8 . . . 12.5	1*n*	β
1885.82	348.5	7.38	. . .	2*n*	HΣ
1897.82	348.9	7.26	. . .	2*n*	β

Discovered with the 18½-inch. Without change.

[β (x) . . . β[1] . . . HΣ ( ) . . .]

β 856. O. Arg. N. 25859

R.A. 23[h] 33[m] 3[s]
Decl. + 69° 58′

1881.55	266.0	0.58	8.1 . . . 9.1	2*n*	β
1886.89	267.8	0.66	8.2 . . . 9.5	3*n*	Com
1898.53	265.3	0.62	8.5 . . . 9.3	3*n*	D

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII) . . . β[2] . . . Comstock (*Pub. Washburn Obsy.* VI) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 723. Lalande 46375

R.A. 23[h] 34[m] 32[s]
Decl. — 0° 15′

1878.25	168.5	3.78	7.0 . . . 11.3	4*n*	β
1888.93	168.2	. . .	7.0 . . . 12.0	1*n*	L.v
1891.77	167.8	3.66	7.1 . . . 11.5	3*n*	β

Discovered with the 18½-inch. Fixed.

[β (x) . . . β[1] . . . β (3114) . . . β (*Pub. L. O.* II) . . . 1 v[1] . . .]

β 724 W^s XXIII. 691

R.A. $23^h\ 34^m\ 46^s$
Decl. $+\ 7°\ 19'$

1878.73	85.7	0.75	9.0 . . . 9.5	1*n*	β
1889.88	88.7	0.5 ±	. . .	1*n*	Sp
1891.77	87.4	0.64	8.7 . . 9.1	3*n*	β
1898.73	89.1	0.78	9.0 . . . 10.0	3*n*	Cg
1898.85	88.7	0.60	8.8 . . . 9.5	3*n*	A

Discovered with the 18½-inch. Unchanged.

[β (X) . . β^a . . . β (3114) . . . β (*Pub. L. O.* II) . . Sp (III) . . . Cogshall ( ) . . . Aitken (3585) . . .]

β 857. D.M. (66°) 1630

R.A. $23^h\ 34^m\ 58^s$
Decl. $+\ 66°\ 53'$

1881.53	296°.9	1".39	8.5 . . . 8.9	4*n*	β
1887.77	296.6	1.66	8.4 . . . 9.3	3*n*	Com
1898.54	297.0	1.43	8.6 . . . 9.5	3*n*	D

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII) . . . β^a . . . Comstock (*Pub. Washburn Obsy.* VII) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

β 858. Lalande 46423

R.A. $23^h\ 35^m\ 18^s$
Decl. $+\ 31°\ 54'$

A and B (= β 858)

1881.57	276°.6	0".48	7.7 . . . 8.2	3*n*	β
1881.72	273.9	0.53	7.0 . . . 7.0	1*n*	Ho
1885.83	267.7	0.67	. . .	2*n*	HΣ
1887.74	272.4	0.71	8.4 . . 9.1	3*n*	Com
1891.64	268.9	0.65	8.0 . . . 8.2	2*n*	β
1893.55	263.7	0.54	. . .	5*n*	Sp
1896.72	268.0	0.61	. . .	1*n*	Lew
1897.79	261.9	0.67	. . .	3*n*	Bow
1897.82	269.6	0.71	. . .	1*n*	Dys
1897.87	262.6	0.70	. .	3*n*	A
1898.72	267.1	0.75	. . .	1*n*	Lew
1898.87	267.4	0.81	. . .	1*n*	Bow

AB and C (= β 389)

1881.62	51°.0	23".66	. . . 12.8	3*n*	β
1881.76	50.5	23.78	. . . 13.0	1*n*	Ho
1885.83	53°.3	23".64	. .	2*n*	HΣ
1888.31	52.4	24.06	. . . 12.0	2*n*	Com
1891.64	52.1	23.24	. . . 12.7	2*n*	β

The distant star was noted with the 6-inch, and the principal star subsequently found to be a close pair with the 15½-inch. The latter is a binary in slow retrograde motion.

[β (VI, XII) . . . β (2062,3114) . . . β^a . . . β (*Pub. L. O.* II) . . . Sp (III) . . . Comstock (*Pub. Washburn Obsy.* VI) . . . Aitken (*A. J.* 429) . . . HΣ ( ) . . . Lewis, Bowyer and Dyson (*Mon. Not.* LIX, 400) . . .]

β 279. ω^2 *Aquarii*

R.A. $23^h\ 36^m\ 30^s$
Decl. $-\ 15°\ 12'$

1875.54	87°.8	5".68	5.0 . . . 11.0	4*n*	J
1877.82	84.5	5.66	5.2 . . . 9.3	3*n*	Cin
1888.71	83.3	5.86	5.2 . . . 11.0	3*n*	β
1888.77	86.0	5.43	5.0 . . . 10.5	4*n*	T
1888.93	85.4	5.11	5.0 . . . 10.8	1*n*	Lv
1898.64	85.6	5.70	. . . 10.2	2*n*	β
1898.65	83.9	5.32	4.5 . . . 10.7	3*n*	Cg

Discovered with the 9.4-inch at the Dartmouth College Observatory. The bright star has a proper motion of 0".091 in the direction of 131°.4 (Auwers). This is sufficiently large to show that the companion is moving with the primary. In twenty-three years there is no material relative change in the components. They appear to have a common proper motion.

[β (V) . . . β (*Mon. Not.* XXXV, 31) . . . β (2875) . . . β (*Pub. L. O.* II) . . J (1) . . . J (2086) . . . Cin^4 . . Tarrant (2991) . . Lv^1 . . . Cogshall ( ) . . .]

β 725. Lalande 46464

R.A. $23^h\ 36^m\ 36^s$
Decl. $-\ 12°\ 0'$

1877.79	243°.8	4".59	8.0 . . . 11.0	1*n*	Cin
1877.82	237.3	4.30	7.0 . . . 11.0	2*n*	β
1891.89	241.1	4.12	7.9 . . . 12.5	3*n*	β
1898.85	238.0	4.24	8.0 . . . 12.0	2*n*	β

Discovered with the 18½-inch. Probably fixed.

[β (X) . . β^a . . . β (3114) . . . β (*Pub. L. O.* II) . . . Cin^4 . . .]

β 993. *Cephei* 301

R.A. $23^h\ 36^m\ 42^s$
Decl. $+63°\ 51'$

1880.75	279°.7	2".67	7.0 . . . 11.4	4*n*	β
1892.73	277.4	2.79	7.0 . . . 12.0	1*n*	W
1898.66	274.0	2.48	7.0 . . . 11.0	3*n*	D

Discovered with the 18½-inch. Magnitude in Argelander 6.0; Harvard 6.9; A.G.C. 6.5. Groombridge 4130.

[β (XIII) . . β³ . . Wilson ( ) . . Doolittle (*Pub. Flower Obsy.* 1). . .]

β 994. Lalande 46490

R.A. $23^h\ 37^m\ 31^s$
Decl. $+24°\ 26'$

1880.63	306°.5	1".38	7.9 . . . 11.0	4*n*	β
1893.77	315.1	1.45	8.0 . . . 10.8	3*n*	W

Discovered with the 18½-inch.

[β (XIII) . . β³ . . . Wilson ( ) . . .]

β 1223. D.M. (4) 5046

R.A. $23^h\ 39^m\ 10^s$
Decl. $+4°\ 27'$

1890.82	298°.6	1".33	8.1 . . 10.8	3*n*	β
1892.46	297.2	1.32	. .	4*n*	Sp
1896.88	291.2	1.16	. .	2*n*	A
1897.96	294.8	1.19	. .	1*n*	Lew

Discovered with the 12-inch. Change in angle?

[β (XVII) . . . β (3047) . . . β (*Pub. L. O.* II) . . Aitken (3466) . . Sp (III) . . . Lewis (*Mon. Not.* LIX, 400) . . .]

β 726. S.D. (13) 6361

R.A. $23^h\ 40^m\ 24^s$
Decl. $-13°\ 25'$

1877.86	324°.2	0".91	8.5 . . . 10.5	1*n*	β
1879.77	326.6	. . .	8.0 . . 10.2	2*n*	Cin
1886.85	324.5	0.68	8.1 . . 10.2	2*n*	LM
1898.76	326.3	0.89	8.5 . . . 10.5	1*n*	Bd
1898.86	320.2	0.67	8.0 . . 10.0	2*n*	A
1898.72	322.5	0.65	8.5 . . . 9.5	3*n*	Hu

Discovered with the 18½-inch.

[β (X) . . . β¹ . . . Cin⁶ . . . LM . . Boothroyd ( ) . . . Aitken (3585) . . . Hussey ( ) . . .]

β 727. W° XXIII, 866

R.A. $23^h\ 41^m\ 26^s$
Decl. $+24°\ 55'$

1878.69	313°.4	17".47	7.0 . . . 12.5	2*n*	β
1885.82	313.6	16.86	. .	2*n*	HΣ
1891.64	315.2	16.83	7.3 . . . 13.5	3*n*	β
1899.72	316.2	17.08	7.0 . . . 11.8	2*n*	D

Discovered with the 18½-inch. The distance printed in β (X) should be doubled.

[β (X) . . β² . . β (3114) . . . β (*Pub. L. O.* II) . . HΣ ( ) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 390. Lalande 46617

R.A. $23^h\ 41^m\ 33^s$
Decl. $+48°\ 38'$

1879.59	233°.9	18".35	8.0 . . . 12.0	1*n*	Cin
1880.74	233.9	18.02	8.3 . . . 11.8	1*n*	β
1892.84	233.3	17.28	8.2 . . . 11.2	2*n*	W
1899.68	232.2	17.58	7.6 . . 11.2	2*n*	D

Discovered with the 6-inch. Change in distance?

[β (VI) . . . β (2062) . . . β³ . . . Cin⁵ . . Wilson ( ) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 995. Groombridge 4139

R.A. $23^h\ 41^m\ 35^s$
Decl. $+46°\ 10'$

1879.61	240°.0	0".73	6.0 . . . 9.0	1*n*	Cin
1880.01	245.4	0.88	6.5 . . . 8.5	2*n*	β
1889.48	243.4	0.93	6.2 . . . 10.2	3*n*	β
1891.75	239.8	0.77	6.7 . . 9.5	3*n*	β
1894.60	238.4	0.73	. .	7*n*	Sp
1898.65	237.5	0.81	6.2 . . . 8.4	4*n*	A

Discovered with the 18½-inch. This is a naked-eye star in *Andromeda*. Change in angle is probable.

[β (XIII) . . . β³ . . . β (2957, 3114) . . . β (*Pub. L. O.* II) . . . Cin⁵ . . . Sp (III) . . . Aitken (3585) . . .]

β 1152. Groombridge 4142

R.A. 23h 42m 18s
Decl. + 63° 0′

B and C

1889.60	102.4	0.64	9.2 . . .	9.2	3*n*	β
1898.78	102.8	0.60	9.0 . . .	11	2*n*	A

A and BC

1889.60	136.3	74.28	7.5 . .		3*n*	β
1898.68	136.1	74.42	7.0 . . .		3*n*	A

Discovered with the 36-inch. Unchanged.

[β (XVI) . . . β (2956) . . . Aitken (3585) . . .]

β 1013. δ *Sculptoris*

R.A. 23h 42m 40s
Decl. − 28° 48′

A and B

1881.80	228.2	3.36	5.0 . . .	13.0	2*n*	β
1891.64	228.9	3.34	4.7 . . .	12.5	2*n*	β
1899.68	229.9	3.32	5.5 . . .	13.5	2*n*	A

A and C (= H 3216)

1830	300.6	80.±	5 . . .	10	1*n*	H
1881.88	296.6	74.31	. . .	8.9	3*n*	β
1891.64	296.7	74.03	. . .	8.8	2*n*	β
1898.74	296.7	74.23	. . .	8.0	2*n*	Bd

The close star was discovered with the 12-inch on Mt. Hamilton in 1881. AUWERS gives the proper motion of δ *Sculptoris* 0″.108 in the direction of 154°.0. The close star is moving with the other, and it is doubtless a physical system. All the measures of the Herschel star are given above. His estimate of the distance in 1830 must be too large. The three sets of measures seem to indicate common proper motion, as otherwise the distance should have increased about 1″.3 from 1881 to 1898.

[β (XIII) . . . β² . . . β (3114) . . . β (*Pub. L. O.* II) . . . Boothroyd ( ) . . . Aitken ( ) . . .]

β 728. Lalande 46752

R.A. 23h 46m 7s
Decl. + 42° 50′

1878.23	352.6	1.14	8.3 . . .	8.3	2*n*	β
1883.34	351.9	1.20	8.2 . . .	8.3	7*n*	En
1892.73	353.7	1.37	9.0 . .	9.5	1*n*	W
1898.54	354.0	1.26	8.1 . . .	8.1	4*n*	D

Discovered with the 18½-inch. In A.G.C. 7.1 m.

[β (8) . . . β² . . . Engelmann (2678) . . . Wilson ( ) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 996. Piazzi XXIII. 218

R.A. 23h 46m 34s
Decl. + 74° 53′

1880.64	64.7	5.52	6.8 . . .	11.7	4*n*	β
1888.74	67.1	5.43	7.2 . . .	12.0	3*n*	β
1889.51	68.0	5.77	6.4 . . .	12.5	3*n*	β
1898.62	70.9	5.72	6.5 . . .	11.4	2*n*	β

Discovered with the 18½-inch. The large star has a considerable proper motion, 0″.288 in the direction of 81°.8 (PORTER). This is evidently a binary in slow direct angular motion, with a large movement in space common to both components.

ENGELHARDT (*Obsns. Astron.* III) measures a distant star, D.M. (74°) 1049, 130°.6 : 165″.74 (1894.11) 2*n*.

[β (XIII) . . . β² . . . β (2875,2957) . . . β (*Pub. L. O.* II) . . .]

β 859. W* XXIII. 961

R.A. 23h 46m 35s
Decl. + 22° 18′

1881.67	217.3	0.63	8.5 . .	8.5	3*n*	β
1887.81	214.8	0.64	9.0 .	9.0	3*n*	Com
1898.74	215.5	0.72	9.0 . .	9.0	2*n*	D

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII) . . . β² . . . Comstock (*Pub. Washburn Obsy.* VI) . . . Doolittle (*Pub. Flower Obsy.* 1) . . .]

β 1153.

R.A. 23h 46m 45s
Decl. + 60° 2′

A and B

1889.68	318.5	0.43	9.7 . . .	9.9	4*n*	β
1899.58	318.6	0.43	9.7 . . .	10.2	2*n*	A

AB and C

1889.68	339.5	13.72	. . .	10.1	3*n*	β
1899.58	339.6	13.84	. . .	10.0	2*n*	A

AB and OΣ 511 (A)

1889.69	66°.0	176".51	... 6.8	2*n*	*β*

A very difficult pair of small stars, discovered with the 36-inch. Too faint to be given in the D.M. I have connected it with another pair in the field, OΣ 511.

[*β* (XVI)...*β* (2050). *β* (*Pub. L. O.* II). .Aitken ( )...]

β 729. O. Arg. S. 23124

R.A. 23h 49m 14s
Decl. − 18° 30′

1877.70	346°.4	11".42	8.0...12.0	1*n*	*β*
1891.89	344.9	11.22	8.0...12.7	2*n*	*β*
1898.85	344.9	11.47	8.0...11.2	2*n*	*β*

Discovered with the 18½-inch. Without change. The magnitude in O. Arg. is 7.0

[*β* (X).. *β*¹...*β* (3114)...*β* (*Pub. L. O.* II)...]

β 1224. Lalande 46942

R.A. 23h 50m 53s
Decl. + 55° 10′

1890.74	203°.3	3".94	6.6...13.3	3*n*	*β*
1899.63	201.4	4.10	6.5...13.8	3*n*	A

Discovered with the 36-inch. In D.M. 7.5 m. Piazzi XXIII. 236.

[*β* (XVII)...*β* (30471. ..*β* (*Pub. L. O.* II)...Aitken ( )...]

β 280. D.M. (56°) 3120

R.A. 23h 51m 50s
Decl. + 56° 43′

A and C

1880.74	185°.9	8".08	...12.5	1*n*	*β*
1886.90	193.2	8.27	...	2*n*	Hl
1891.80	189.8	7.90	...12.2	2*n*	*β*
1898.61	186.2	8.24	...13.0	2*n*	D

A and B (= Σ 3047)

1832.20	65°.6	1".18	8.7... 8.7	3*n*	Σ
1869.68	67.5	1.02	8.7... 9.1	4*n*	J
1880.74	70°.3	0".89	...	1*n*	*β*
1891.80	73.1	0.92	8.1... 8.4	2*n*	*β*
1898.61	71.0	1.14	8.2.. 8.2	2*n*	D

The small star was discovered with the 9.4-inch of the Dartmouth College Observatory. The close pair is probably a binary, but the motion is very slow. The relation of the third star to the system is still uncertain.

[*β* (V)...*β* (*Mon. Not.* XXXV, 31)...*β*¹...*β* (3114)...*β* (*Pub. L. O.* II)...Hall (II)...Doolittle (*Pub. Flower Obsy.* I)...]

The measures given of AB, and others, will be found in the following additional references:

[Madler (*Fixstern-Systeme* II) (*Dorpat Obsns.* XI, XIII, XV) ...Herschel (*Mem. R. A. S.* IV)...Secchi (*Catalogo di 1321 Stelle Doppie*)...OΣ (*Poulkowa Obsns.* IX)...Gledhill, Wilson and Seabroke (*Mem. R. A. S.* XLII)...Δ (II)...Glasenapp (III)...]

β 730. *27 Piscium*

R.A. 23h 52m 32s
Decl. − 4° 13′

1878.39	265°.8	1".42	5.5...10.8	3*n*	*β*
1879.03	264.0	1.40	4.9... 9.5	3*n*	Cin
1879.84	264.4	1.60	5.5...11.2	2*n*	*β*
1886.88	269.1	1.78	5.0... 9.6	2*n*	LM
1889.57	267.4	1.50	5.0...11.3	3*n*	*β*
1898.66	272.8	1.66	6.0...11.7	3*n*	Cg

Discovered with the 18½-inch. Certainly a physical system, since the components have a common proper motion of 0".094 in the direction of 232°.7 (AUWERS). There is very little relative change.

[*β* (X)...*β*¹...*β*²...*β* (2057)...*β* (*Pub. L. O.* II)...Cin³... LM...Cogshall ( )...]

β 1154. D.M. (73°) 1068

R.A. 23h 53m 12s
Decl. + 74° 10′

1889.51	310°.1	0".98	8.0... 8.2	3*n*	*β*
1892.87	129.7	0.91	8.0... 8.2	2*n*	J
1895.90	308.0	0.77	8+... 8+	3*n*	A
1896.93	309.4	0.88	...	3*n*	A

Discovered with the 12-inch. Unchanged.

[β (XVI)...β (2036)...β (*Pub. L. O.* II)...Jones (*Proc. Hereford Coll. Obsy.* 1892)...Aitken (3396.3406)...]

β 731 Lalande 47033

R.A. $23^h\ 53^m\ 27^s$
Decl. $-\ 8°\ 28'$

1878.28	257.8	1.57	8.7...10.0	2*n*	β
1886.80	262.0	1.67	8.5 . 9.3	4*n*	LM
1888.84	262.1	1.36	8.2... 9.1	2*n*	Lv
1898.70	264.6	1.59	8.8... 9.7	3*n*	A
1898.72	265.8	1.60	8.5... 9.2	3*n*	Cg

Discovered with the 18½-inch. Some motion in angle seems probable.

[β (X) ..β¹ ... LM ... Lv¹ ... Aitken (3585) ... Cogshall ( )...]

β 860. *Andromedae* 6

R.A. $23^h\ 53^m\ 53^s$
Decl. $+\ 38°\ 12'$

1881.72	107.2	6.70	6.8...11.6	4*n*	β
1881.83	105.4	6.32	6.5...11.0	2*n*	Ho
1885.82	107.9	6.66	...	2*n*	HΣ
1888.47	106.4	6.85	6.3...11.9	4*n*	Com
1898.61	106.7	6.91	6.3...11.0	3*n*	D

Discovered with the 15½-inch at the Washburn Observatory. Lalande 47049.

[β (XII)...β¹ ... Hough (2978)... Comstock (*Pub. Washburn Obsy.* VI)... HΣ ( )... Doolittle (*Pub. Flower Obsy.* I)...]

β 732. W¹ XXIII. 1086

R.A. $23^h\ 54^m\ 18^s$
Decl. $+\ 7°\ 50'$

1878.35	152.4	6.10	8.5...10.7	3*n*	β
1891.87	152.9	5.95	8.5... 9.5	2*n*	β
1898.57	151.8	5.84	8.8...10.3	3*n*	D
1898.84	151.7	5.95	8.5...10.7	1*n*	β

Discovered with the 18½-inch. Without change. The *n* star of a wide pair.

[β (X)...β¹...β (3114)...β (*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

β 482. D.M. (62°) 2350

R.A. $23^h\ 55^m\ 45^s$
Decl. $+\ 62°\ 30'$

A and B

1877.23	342.6	4.07	9.7...11.0	2*n*	J
1880.74	341.6	4.28	9.5... 9.8	1*n*	β
1888.71	343.8	4.60	9.0...10.0	3*n*	β
1898.56	343.0	4.75	9.0... 9.5	2*n*	D

A and C

1880.74	125.9	9.46	...11.8	1*n*	β
1888.71	123.9	9.79	...11.2	3*n*	β
1898.56	122.9	9.96	...10.8	2*n*	D

Discovered with the 6-inch. No material change. In D.M. 8.9 m.

[β (IX)...β (*Mem. Nat.* XXXVIII, 78)...β¹...β (2875)...β (*Pub. L. O.* II)...J (II)...Doolittle (*Pub. Flower Obsy.* I)...]

β 733. 85 *Pegasi*

R.A. $23^h\ 55^m\ 54^s$
Decl. $+\ 26°\ 27'$

A and B

1878.73	274.0	0.67	6.0...12.5	3*n*	β
1879.46	284.6	0.75	...11.3	5*n*	β
1880.59	298.3	0.65	...10.5	5*n*	β
1880.79	297.2	0.66	...	3*n*	HJ
1881.54	311.5	0.58	...11.0	1*n*	β
1882.62	89.4	0.64	.. 9.0	1*n*	OΣ
1883.75	333±	...	...	1*n*	β
1885.93	107.0	0.5±	..	1*n*	HΣ
1886.81	115.0	0.68	..	2*n*	HΣ
1886.90	109.7	0.79	...	3*n*	HJ
1886.98	111.0	0.58	...	1*n*	Sp
1887.91	119.3	0.66	...	1*n*	Sp
1888.69	126.7	0.95	..	5*n*	β
1888.95	124.1	0.83	...	3*n*	HJ
1888.96	128.3	0.70	...	7*n*	Sp
1889.59	134.7	0.94	...11.2	5*n*	β
1889.81	132.2	0.82	...	1*n*	HΣ
1889.90	137.0	0.70	...	5*n*	Sp
1890.55	139.0	0.78	...	4*n*	β
1890.96	146.4	0.71	...	6*n*	Sp
1891.56	151.8	0.79	...11.0	3*n*	β
1891.94	152.8	0.83	...	2*n*	Sp

1892.88	165.4	0.73			1*n*	Bar
1892.97	167.3	0.73			4*n*	Sp
1893.64	168.3	0.90			2*n*	Schaeb
1893.92	174.0	0.88			3*n*	Bar
1893.96	176.1	0.69			6*n*	Sp
1894.53	178.6	0.84			5*n*	Bar
1894.59	181.3	0.89			4*n*	Schaeb
1894.93	188.6	0.65			2*n*	Sp
1894.98	177.6	0.65	6.0	11.0	2*n*	Lew
1895.53	191.2	1.02			4*n*	Schaeb
1895.64	190.5	0.83			10*n*	Bar
1895.71	185.8	0.86	5.5	11.5	6*n*	A
1895.73	198.4	0.73			2*n*	See
1895.74	204.8	0.7±			1*n*	Moul-ton
1895.86	196.3	0.47			2*n*	Lew
1896.04	201.6	0.73			6*n*	Sp
1896.75	200.8	0.54			3*n*	A
1896.81	205.5	0.76			3*n*	Schaeb
1896.86	208.6	0.60			2*n*	Hussey
1897.59	212.5	0.79			8*n*	Schaeb
1897.70	207.5	0.89			1*n*	Dob
1897.72	209.9	0.70			3*n*	A
1897.74	226.3	0.83			1*n*	Doo
1897.75	209.9	0.74			4*n*	Hussey
1897.96	218.0	0.61			3*n*	Sp
1897.97	216.1	0.76			1*n*	Lew
1898.44	217.5	0.79			3*n*	A
1898.80	225.5	0.59			2*n*	Lew
1898.89	224.8	0.5±			1*n*	Doo
1898.94	225.8	0.67			3*n*	Sp
1899.51	225.6	0.78	6.0	11.1	4*n*	A

A and C

1851.96	114.1	33.03	6.0	8.5	1*n*	OΣ
1852.67	113.9	32.60			1*n*	OΣ
1865.91	92.1	18.89			1*n*	OΣ
1868.77	82.4	17.03			1*n*	OΣ
1869.98	77.8	16.13			20*n*	Bru
1870.65	74.4	15.47			25*n*	Bru
1874.66	54.4	13.92			1*n*	OΣ
1876.77	40.3	14.02			1*n*	OΣ
1877.94	39.8	14.0			1*n*	Flm
1878.54	33.6	14.40		9.0	4*n*	β
1878.74	32.8	14.76		9.0	1*n*	J
1879.27	30.4	14.96		9.0	8*n*	β
1880.57	25.0	15.41			4*n*	β
1881.54	20.8	16.29			4*n*	β
1882.85	19.8	16.54			1*n*	Big
1882.62	15.2	16.98			1*n*	OΣ
1882.77	17.1	17.34			3*n*	β
1883.54	11.3	17.34			1*n*	Seag
1886.24	7.6	19.84			3*n*	HΣ
1886.99	6.1	21.15			3*n*	Eng
1888.67	0.9	21.71			5*n*	β
1889.50	358.7	22.66		9.0	4*n*	β
1889.82	358.4	22.70			2*n*	Lv
1890.52	356.7	23.59			3*n*	β
1891.56	354.7	24.58			3*n*	β
1891.94	354.3	25.02			8*n*	β
1895.06	350.0	28.86			1*n*	Lew
1895.68	348.7	29.27		8.8	3*n*	A
1896.75	347.8	30.48			2*n*	A
1897.56	346.1	31.49			2*n*	A
1897.82	345.7	31.74			2*n*	β
1898.49	344.4	32.53			3*n*	β
1898.69	344.5	32.90			2*n*	A

A and D

1878.96	277.1	61.73		13	1*n*	β
1880.56	278.0	64.25		12.5	1*n*	β
1888.69	283.8	72.02		12	1*n*	β
1891.90	285.4	75.09		13.2	4*n*	β
1897.56	288.0	81.89			2*n*	A
1897.82	288.0	82.54			2*n*	β
1898.47	288.4	83.29			2*n*	β
1898.69	288.5	83.86		13.0	2*n*	A

One of the most important and most interesting of the known binary systems. The shortness of its period, the rapid movement in space of both components, the relative nearness of this system to our own, and the extreme inequality in magnitude and closeness of the stars, all combine to give this a leading place among the binary stars. It is at all times an object of considerable difficulty, and the reliable observations will necessarily be confined to the larger refractors. It is an excellent test for the definition of any object glass, however large, and no instrument, whatever its aperture, can deal with a pair of this class unless the figure of the objective will compare favorably with the Alvan Clark standard.

The close companion was discovered with the 18½-inch of the Dearborn Observatory while measuring the 9m optical companion. The distant companion had been measured on two nights before the close star was detected. The third night was perhaps of unusual steadiness, as, in addition to 85 *Pegasi*, four other first-class stars were discovered

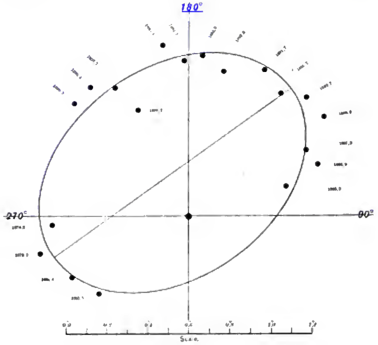
on the same night — 64 *Pegasi*, 72 *Pegasi*, η *Piscium*, and B.A.C. 1101 (β 533).

Four orbits have been computed of this pair. The dates of the last measures made use of, and the periods are:

1888	Schaeberle	22.3	years	*A. J.* 185
1892	Glasenapp	17.49	"	*A. N.* 3145
1895	See	24.0	"	*Evolution of the Binary Systems*
1899	Burnham	25.7	"	

The principal results, including some from meridian observations, are:

Argelander	1″.390	in	135°.1
Mädler	1.376	"	133.3
Brunnow	1.259	"	133.6
Schaeberle	1.305	"	140.3
Gore	1.221	"	141.2
O. Struve	1.289	"	139.2
Burnham	1.286	"	139.5
Auwers	1.288	"	139.5
Porter	1.287	"	138.9



85 Pegasi. β 733.

The elements of the several orbits are:

	P	*T*	*e*	*a*	Ω	*i*	λ
Schaeberle	22.3	1884.0	0.35	0.90	306.1	68.6	70.3
Glasenapp	17.5	1884.2	0.16	0.80	307.3	66.7	60.7
See	24.0	1883.8	0.39	0.84	110.3	55.6	265.4
Burnham	25.7	1883.7	0.43	0.78	123.5	49.0	261.5

The last orbit is shown in the accompanying diagram.

The system has a very large proper motion, and its value is known with extreme accuracy from micrometrical measures of the distant companion.

A comparison of the measures of D of 1878–80 with those of 1897–8 gives 1″.30 in 136°.8 for the movement of A. This is a very faint star, and the close agreement with the other results is sufficient to show that C has no proper motion of its own. A similar comparison of the two measures of C by OΣ in 1851–2 with the two sets of measures in 1898 gives 1″.281 in 139°.2. It is worthy of note that the distances of C at these points, separated by an interval of forty-six years, differ by only one tenth of a second of arc.

[β (x) . . β[1] . . β[2] . . β[4] . . β (2319, 2334, 2875, 2957, 3048, 3114) . . β (*Pub. L. O.* II) . . . β *A. J.* 246) . . . Hall (II) . . OΣ (*Poulkova Obs.* X, pp. 110, 146) . . . Sp (III) . . . Barnard

(*A. J.* 447)...Schaeberle (*A. J.* 185,246,323,391,420)... Doberck (3466)... Lewis (*Greenwich Obsns.* 1894, 1895) (*Mon. Not.* LVI, 359; LIX, 400)...Aitken (3466,3585) (*Ast. Soc. Pac.* VII, 305) (*A. J.* 429)... Hussey (*A. J.* 307, 427)...Doolittle (*A. J.* 4161...Aitken ( ). . .]

The following relate to the distant star C.

[Brunnow (*Dunsink Obsns.* Part 2) (*Viert. der Astron. Gesell.* IX, 38)...Argelander (*Beob. Sternwarte zu Bonn* VI) ...Flammarion (*Etoiles Doubles et Multiples*) (*Std. Mess.* III, 2131 (*L'Astronomie* III, 176)...Engelhardt (*Obsns. Astron.* II) ...Bigourdan (*Paris Obsns.* 1883)...Seagrave (*Std. Mess.* II, 258)...A (1)...Gore (*Mon. Not.* XLIX, 301)...Lv (*A. J.* 382) (*Proc. Haverford Coll. Obsy.* 1891) Comstock (*Pub. Washburn Obsy.* X)...Glasenapp (3145)...HΣ ( ). . .Everett (*Mon. Not* LVI, 404)...See (3339) (*A. J.* 350,378) (*Evolution of Binary System*)...]

β 281. Lalande 47148

R.A. 23h 56m 38s
Decl. + 1° 28′

A and B

	°	″				
1877.82	217.0	1.12	7.5	11.0	2*n*	β
1881.73	212.6	1.25	7.5	9.2	2*m*	β
1885.97	203.7	1.20	...		1*n*	HΣ
1888.89	209.0	1.35	8.0	9.3	1*n*	Lv
1891.61	208.8	1.25	7.9	10.2	3*n*	β
1893.46	207.9	1.06	.		6*n*	Sp
1897.96	203.3	1.53	...		1*n*	Lew
1898.73	203.2	1.53	7.2	10.0	3*n*	A
1898.85	199.8	1.38	7.3	9.8	4*n*	β

A and C (= H 998)

	°	″				
1825	330±	25±	8	13	1*n*	H
1877.82	335.8	30.44		11.0	2*m*	β
1881.73	336.7	30.85		11.2	2*m*	β
1885.97	334.3	31.20	...		1*n*	HΣ
1891.61	334.6	31.82		11.9	3*n*	β
1898.70	334.4	32.24		12.0	2*n*	A
1898.86	334.4	32.63		10.8	3*n*	β

Discovered with the 9.4-inch at the Dartmouth College Observatory. The binary character of the close pair is established by the measures. The motion is retrograde, with perhaps a slow increase in the distance. The system has a proper motion of 0″.079 in the direction of 154°.1 (Boss). This movement is in a direction opposite the HERSCHEL companion, and the distance of that star is therefore increasing annually by the proper motion of AB. At one time these stars must have formed a close pair.

[β (V)...β (*Mon. Not.* XXXV, 31)...β^1...β^2...β (3114)...β (*Pub. L. O.* III)...Sp (III)...Lewis (*Mon. Not.* LIX, 400) ...Aitken (3585)...HΣ ( )...]

β 861. D.M. (68°) 1422

R.A. 23h 56m 55s
Decl. + 69° 2′

	°	″				
1881.53	177.4	1.30	9.4	9.7	4*n*	β
1887.80	177.8	1.78	9.3	9.5	2*n*	Com

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^2...Comstock (*Pub. Washburn Obsy.* VI)...]

β 862. W° XXIII. 1245

R.A. 23h 58m 36s
Decl. + 37° 30′

	°	″				
1881.74	104.9	0.54	8.5	8.8	2*n*	β
1888.32	107.5	0.55	8.5	9.0	2*n*	Com
1899.57	115.5	0.50	8.7	9.1	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory. Apparently slow motion in angle.

[β (XII)...β^2...Comstock (*Pub. Washburn Obsy.* VI)...Aitken ( )...]

β 997. Lalande 47215

R.A. 23h 58m 47s
Decl. + 45° 1′

	°	″				
1879.80	340.2	4.25	9	10	2*n*	Hl
1880.73	339.7	4.02	7.9	8.9	4*n*	β
1885.76	340.8	4.08			3*n*	Hl
1891.72	340.7	4.29	8	8	2*n*	Hl
1895.69	339.8	4.12	7.9	9.1	3*n*	A
1895.84	338.0	4.09	...		1*n*	Com
1898.75	338.9	4.22	...		3*n*	Hu

Discovered with the 18½-inch. Probably no motion. The last measures of HALL are erroneously credited to OΣ 547, which is in the field 8′ *n* and 26s *f*.

[β (XIII)...β^2...Hall (I, 31)...Aitken (*Ast. Soc. Pac.* VII, 305) ...Comstock (*Pub. Washburn Obsy.* X)...Hussey ( )...]

β 863. D.M. (72°) 1139

R.A. 23h 59m 42s
Decl. + 72° 55′

	°	″				
1881.57	123.7	1.60	9.2	11.0	3*n*	β
1888.02	121.6	1.98	8.8	10.2	4*n*	Com
1898.68	119.3	2.03	9.0	10.0	3*n*	A

Discovered with the 15½-inch at the Washburn Observatory.

[β (XII)...β^2...Comstock (*Pub. Washburn Obsy.* VI)... Aitken (3585)...]

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910	9 27 10	107
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913	10 36 26	110
914	10 39 46	111
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1018	6 10 7	77
1019	6 11 26	77
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1031	4 29 2	19
1032	5 32 43	68
1033	18 46 56	184
1034	20 50 25	219
1035	21 17 16	228
1036	21 40 59	237
1037	22 41 56	251
CATALOGUE XV		
1039	3 11 0	38
1040	3 28 19	40
1041	3 37 19	41
1042	3 52 36	44
1043	4 30 28	51
1044	4 33 1	52
1045	4 50 32	56
1046	4h 57m 17s	57
1047	5 2 13	58
1048	5 26 37	65
1049	5 27 3	65
1050	5 30 55	66
1051	5 32 1	67
1052	5 35 39	70
1053	5 45 18	72
1054	5 45 47	72
1055	5 51 32	73
1056	5 55 42	74
1058	6 3 13	75
1059	6 15 42	78
1060	6 52 38	84
1061	7 33 54	91
1062	7 41 23	92
1063	7 44 15	92
1064	8 5 39	97
1065	8 10 0	98
1066	8 18 31	99
1067	8 20 17	99
1068	8 43 2	102
1069	8 43 41	102
1070	9 18 8	105
1071	9 24 49	106
1072	9 58 29	107
1073	10 26 26	110
1074	10 28 20	110
1075	10 30 25	110
1076	10 40 32	112
1077	10 56 49	112
1078	11h 33m 47s	115
1079	11 54 34	117
1080	12 22 55	120
1081	12 54 32	121
1082	12 55 35	122
1083	13 0 27	123
1084	13 15 59	125
1085	14 52 37	139
1086	15 1 27	140
1087	16 4 35	148
1088	17 2 51	155
1089	17 23 22	165
1090	17 27 43	165
1091	18 8 35	174
1092	22 33 3	249
CATALOGUE XVI		
1093	0 14 44	4
1094	0 23 29	5
1095	0 23 47	5
1096	0 29 46	8
1097	0 30 30	8
1098	0 47 53	13
1099	0 49 31	14
1100	1 7 9	18
1101	1 17 27	19
1102	1 19 39	20
1103	1 35 13	23
1104	1 36 2	23
1105	3 11 26	43
1106	3 42 58	43
1107	13 20 37	126

β	R.A.	Page
1200	17h 11m 5s	162
1201	17 26 37	165
1202	17 55 33	169
1203	18 19 57	178
1204	19 6 1	188
1205	20 5 47	203
1206	20 13 36	206
1207	20 16 25	206
1208	20 28 38	211
1209	20 31 9	214
1210	20 56 6	220
1211	20 57 15	221
1212	21 33 20	232
1213	21 48 26	238
1214	21 51 23	239
1215	22 6 47	242
1216	22 14 42	243
1217	22 15 33	243
1218	22 22 33	245
1219	22 42 27	251
1220	23 9 36	257
1221	23 22 12	261
1222	23 22 23	261
1223	23 39 10	265
1224	23 50 53	267
CATALOGUE XVIII		
1225	0 20 55	5
1226	0 24 58	7
1227	0 25 41	7
1228	0 59 30	15
1229	1 13 46	19
1230	1h 24m 43s	21
1231	3 32 45	40
1232	4 1 26	46
1233	4 6 6	46
1234	4 11 56	47
1235	4 17 20	48
1236	4 31 27	52
1237	4 46 28	56
1238	4 53 53	57
1239	5 23 28	65
1240	5 30 56	66
1241	6 2 27	74
1242	6 3 42	75
1243	8 7 19	97
1244	8 7 31	97
1245	12 14 21	119
1246	14 12 12	132
1247	17 7 3	159
1248	17 16 31	164
1249	17 19 30	164
1250	17 20 19	165
1251	17 36 35	167
1252	18 15 55	177
1253	18 28 15	180
1254	18 38 52	181
1255	18 51 37	185
1256	19 12 36	189
1257	19 30 27	194
1258	19 55 26	200
1259	20 16 27	207
1260	20 16 33	207
1261	21h 10m 29s	226
1262	21 15 40	228
1263	21 38 40	234
1264	22 24 1	246
1265	22 35 18	249
1266	23 23 29	261
CATALOGUE XIX		
1267	5 27 22	66
1268	7 9 11	86
1269	10 28 18	110
1270	13 57 46	131
1271	14 13 4	133
1272	14 13 22	133
1273	14 14 2	133
1274	18 12 35	177
1275	2 6 21	29
1276	3 47 4	43
1277	3 58 15	45
1278	4 7 0	46
1279	7 4 26	85
1280	10 19 55	109
1281	10 21 18	110
1282	11 7 43	113
1283	11 8 7	114
1284	17 17 38	164
1285	18 59 31	187
1286	19 21 39	191
1287	19 34 5	195
1288	19 35 39	196
1289	19 56 38	201
1290	20 56 50	220

APPENDIX

APPENDIX

CORRECTIONS

β 1096 (page 8). *For* B and C *read* AB and C.

β 309 (page 46). *For* 3-inch *read* 6 inch.

β 555 (page 59). In the measures of B and C *for* 1880.82 *read* 1880–82. The close pair was examined a number of times in those years.

β 1281 (page 110). The identity of this pair with OΣ 218 was overlooked when it was placed in the catalogue. A comparison of the recent measures with those of Madler and OΣ show clearly direct motion in angle.

β 120 (page 149). In the last measure of AB and C *for* 326°.4 *read* 336°.4.

β 815 (page 151). The direction of the proper motion, given as 141°.6, is that of the principal star. If the companion is moving, as seems most probable, the direction of its motion would be 321°.6.

β 1204 (page 188). Insert the word "than" in the third line, making it read, "four other stars nearer than the Struve companion."

β 1092 (page 249). In the measure of AB of 1899.71 *for* 229°.5 *read* 209°.5.

β 1025 (page 255). In the Right Ascension *for* 22^h *read* 23^h.

ADDITIONAL MEASURES

β 1026 (Page 2)

1899.89	343°.4	0".29	1*n*	Aitken

There appears to be a very decided change in the angle since my measures in 1888.

β 1156 (Page 5)

1899.57	31°.0	0".54	2*n*	Aitken

There seems to be no sensible change.

β 107 (Page 5)

AB	1899.82	354°.8	5".78	2*n*	
AC	1899.82	336.7	46.83	2*n*	
AD	1899.82	146.6	50.30	2*n*	Barnard
AE	1899.82	171.0	113.48	2*n*	
AF	1899.82	113.8	150.32	2*n*	

The interval is too short to show change in the distant stars. This will be cleared up by later measures. Change in AB is certain, but it may be due to the proper motion of one of the components.

β 1226 (Page 7)

1899.55	187°.3	0".34	3*n*	Aitken
1899.85	191.3	0.33	2*n*	Barnard

Probably no material change since the measures of 1891.

β 1096 (Page 8)

1899.57	266°.7	0".19	3*n*	Aitken	A and B
1899.76	61.6	33.78	2*n*	Barnard	AB and C

β 1097 (Page 8)

1899.85	251°.4	0".40	3*n*	Barnard

β 395 (Page 9)

1899.72	286°.7	0".48	3*n*	Aitken

In two of the measures the components were rated as equal in magnitude.

β 1159 (Page 9)

Examined by AITKEN (1899.89) and elongation suspected in 52° ±, with distance of 0".2 or less, but conditions not good enough for accurate measurement.

β 301 (Page 11)

1899.68	319°.2	0".86	2*n*	Aitken

No relative motion since 1891.

β 1099 (Page 14)

1899.56	312°.6	0".23	3*n*	Aitken

This mean result includes the single measure previously given of 1899.46.

β 1162 (Page 17)

1899.56	139.2	0".33	3*n*	Aitken
1899.83	141.6	0.35	2*n*	Barnard

The recent measures show no change since 1890.

β 1163 (Page 20)

1899.70	214.7	0".31	3*n*	Aitken
1899.79	214.3	0.25	2*n*	Barnard

A very decided change since my measures in 1890. In nine years the angle has increased more than 20°.

β 513. 48 *Cassiopeiae* (Page 27)

1893.72	11.6	0".42	3–2*n*	Aitken

β 1170 (Page 29)

1899.65	297.4	0".32	1*n*	Aitken

In 1890 I made the angle 313.3, but it is a very difficult pair, and the apparent change requires confirming.

β 1172 (Page 31)

1899.65	232.8	1".60	1*n*	Aitken
1899.79	238.2	1.68	2*n*	Barnard

β 524. 20 *Persei* (Page 34)

1899.55	49.7	0".13	2*n*	Aitken

β 1173 (Page 35)

1899.73	338.2	0".20	2*n*	Aitken	A and B
1899.70	283.8	4.83	2*n*	Aitken	AB and C

Some change in the close pair is probable.

β 1176. 48 *Cephei* (II) (Page 37)

1899.65	268.1	1".22	1*n*	Aitken	AB
1899.82	275.7	1.25	2*n*	Barnard	
1899.65	232.7	10.89	1*n*	Aitken	AC
1899.81	232.4	11.06	3*n*	Barnard	

A and B appear to have the same proper motion; and probably form a physical system. The change in C corresponds to the proper motion of A, and the distant companion is therefore not a member of the system.

β 1178 (Page 38)

1899.84	348.4	0".51	1*n*	Barnard

No evidence of change sine 1890.

B 1177 (Page 38)

1899.78	12.0	0".35	3*n*	Aitken

A difficult pair, but some change is probable.

β 536 (Page 42)

1899.70	301.6	0".15	3*n*	Aitken	AB
1899.65	8.6	18.38	2*n*	Barnard	CD
1899.65	329.8	7.76	3*n*	Barnard	CE

The 16 m star, E, has not been observed before. It is important that the close pair should be watched and measured in the near future.

β 538 (Page 42)

1899.69	130.2	1".78	1*n*	Aitken

β 1105 (Page 43)

1899.70	46.4	0".32	2*n*	Aitken

β 1106 (Page 43)

1899.69	19.6	0".35	1*n*	Aitken

This measure is noted as "uncertain," and the apparent change of more than 30° in the past ten years may not be real. It is very difficult object with the largest aperture.

β 1185 (Page 48)

1899.92	352.0	0".14	2*n*	Aitken

Very decided change in the angle.

β 550. α *Tauri* (Page 49)

1899.64	275.1	1.95	2*n*	Barnard	CD

β 883 (Page 53)

1899.75	54.4	0.25	7*n*	Aitken
1899.75	58.7	0.38	1*n*	See
1899.78	54.0	0.22	4*n*	Barnard

A recent examination of all the measures of this star leads to the conclusion that the most probable period is about seventeen years. It is certain that the measures of 1891.97 to 1899.78 are properly adjusted as to quadrants, and that the angular motion in 7.8 years is only 110°. These measures are fairly consistent. A different and somewhat smaller value for the period may be found by rejecting the original position of 1879. This is a single observation, but it is substantially correct, unless an error was made in reading the position-circle, and this is very improbable.

β 552 (Page 54)

1899.75	202.3	0.60	1*n*	See
1899.79	202.8	0.45	4*n*	Aitken

β 1238 (Page 57)

1899.92	15.8	1.48	1*n*	Aitken

Probably unchanged.

β 555. β *Orionis* (Page 59)

1899.71	192 ±	0.2 ±	1*n*	Aitken
1899.72	184	0.13	1*n*	"
1899.82	172.7	0.1 ±	1*n*	Barnard
1899.92	210.6	0.16	1*n*	Aitken

This pair may have a period less than that of any known binary. It is difficult to adjust all the observations, positive and negative. The measures can be represented by a period of about five years, but upon any assumption the elongation should have been seen at some of the times when it was noted as single by apertures large enough to show it. If it is carefully watched with the largest telescopes, as it doubtless will be, the approximate period will be determined within a few years.

β 557 (Page 64)

1899.73	146.0	0.29	1*n*	Aitken

β 1239 (Page 65)

1899.92	320.1	2.36	2*n*	Aitken	BD
1899.92	232.1	7.75	1*n*	Aitken	AB
1899.92	310.8	10.41	1*n*	Aitken	AC

β 1240. 26 *Aurigæ* (Page 66)

1899.92	330.8	0.20	2*n*	Aitken

β 1032. σ *Orionis* (Page 68)

1899.79	329.0	0.20	3*n*	Aitken

The retrograde motion continues, with little or no change in the distance.

β 1007. 126 *Tauri* (Page 69)

1899.54	243.5	0.21	3*n*	Aitken

This mean includes the single measure of 1899.17 given on page 69.

β 1055 (Page 73)

1899.80	333.6	2.15	4*n*	Barnard	AB
1899.77	327.8	33.38	3*n*	Barnard	AC

If the proper motion given from KUSTNER is substantially correct, the components of the close pair are moving together, as otherwise, the position angle of B at the date of the above measures would be 20°.5 more than it was in 1888.

β 1241. 4 *Geminorum* (Page 74)

1899.92	334.0	0.50	2*n*	Aitken

Change is probable in the close pair.

β 1058. 4 *Geminorum* (Page 75)

1899.92	275.8	0.28	2*n*	Aitken

Slow motion in angle is probable.

β 1192. *ν Geminorum* (Page 79)

1899.92	342°.2	0".21	1*n*	Aitken

β 101. 9 *Argus* (Page 92)

1899.62	295°.4	0".54	5*n*	Aitken

This mean includes the two measures of 1899.19 given on page 62. The distance is now about maximum, and the motion in angle is correspondingly slow.

β 1064. 19 *Argus* (Page 97)

1899.91	252°.9	2".24	2*n*	Aitken

β 208 (Page 101)

1899.91	94°.4	0".25	2*n*	Aitken

This binary appears to be rapidly closing.

β 1069 (Page 102)

1899.92	60°.0	2".08	1*n*	Aitken

β 608 (Page 124)

1898.43	297°.2	285".57	2*n*	Glasenapp	AC

β 800 (Page 125)

1899.43	111°.5	2".52	1*n*	Brown

β 237 (Page 126)

1899.43	203°.9	2".87	1*n*	Brown

β 113 (Page 126)

1899.43	206°.0	1".30	1*n*	Brown

β 953 (Page 153)

1899.71	223°.2	0".10	1*n*	Aitken

The rapid angular motion continues. It is probably a short-period binary.

β 1089 (Page 165)

1899.58	352°.2	0".78	3*n*	Aitken

These measures confirm the retrograde motion in angle.

β 962. 26 *Draconis* (Page 166)

1899.71	44°.1	0".59	1*n*	Aitken

The angular motion is now rapid, and it has become a very difficult pair to measure.

β 131 (Page 174)

1899.62	278°.5	2".85	4*n*	Hussey

β 1128 (Page 179)

1897.73	197°.9	3".70	2*n*	See

See (*A. J.* 431) notes the principal star as a close equal pair, 265°± : 0".18± (1897.74).

β 971 (Page 183)

1899.71	19°.8	0".36	1*n*	Aitken

This will be an interesting system, but further measures are necessary to show the apparent orbit.

β 651 (Page 192)

1899.70	287°.0	6".69	6*n*	Doolittle

β 145 (Page 196)

1899.70	266°.2	0".83	3*n*	Doolittle	AB
1899.70	28.8	9 03	3*n*	"	AC
1899.70	156.2	27.08	3*n*	"	AB

β 827 (Page 196)

1899.60	262°.1	0".74	1*n*	Hussey

Slow retrograde motion is probable.

β 361 (Page 198)

1899.71	358°.9	3".86	3*n*	Doolittle

β 979 (Page 198)

1899.70	335°.9	2".05	4*n*	Doolittle

β 980. η *Cygni* (Page 199)

1899.71	208°.2	7".50	3*n*	Doolittle	AB
1899.71	326.8	46.29	3*n*	"	AC
1899.71	169.2	50.08	3*n*	"	AD

β 429 (Page 202)

1899.73	60°.2	6".56	4*n*	Doolittle	AB
1899.73	25.3	8.89	4*n*	"	AC
1899.73	300.7	11.34	4*n*	"	AD
1899.73	107.1	28.28	4*n*	"	AE
1899.73	28.1	36.36	4*n*	"	AF
1899.73	109.1	9.68	4*n*	"	FG
1899.73	56.6	30.08	4*n*	"	AH

The faint star, H, has not been measured before.

β 1260 (Page 207)

1899.71	164°.1	0".48	3–2*n*	Aitken

A difficult object, but without material change.

β 1136 (Page 211)

1899.76	215°.5	0".19	1*n*	Barnard
1899.82	200.9	0.39	1*n*	Aitken

In the last measure the distance is noted as uncertain.

β 68 (Page 220)

1899.76	150°.3	1".90	3*n*	Barnard

β 151. β *Delphini* (Page 211)

1899.76	7°.9	0".68	2*n*	See
1899.76	5.5	0.58	3*n*	Brown
1899.68	3.8	0.60	2*n*	Aitken

β 271 (Page 226)

1899.75	237°.4	3".21	2*n*	Barnard	AB
1899.75	72.9	75.45	4*n*	Barnard	AC

The change in the distance of C corresponds to the proper motion of A.

β 686 (Page 232)

1899.71	300°.9	0".80	1*n*	Aitken

β 1263 (Page 234)

1899.71	243°.4	0".49	1*n*	Aitken

The measures indicate rapid motion in angle.

β 989. κ *Pegasi* (Page 234)

1899.81	281°.4	0".20	2*n*	See
1899.81	282.2	0.24	2*n*	Brown

β 689 (Page 234)

1899.74	239°.0	1".91	2*n*	Aitken

The components appear to be fixed.

β 691 (Page 237)

1899.76	316°.1	0".76	1*n*	Barnard

Change in angle is probable.

β 1213 (Page 238)

1899.78	306°.0	0".84	2*n*	Aitken

There may be some change in the angle.

β 1265 (Page 249)

1899.73	250°.0	0".55	1*n*	Aitken

β 848 (Page 253)

1899.73	2".1	2".34	1*n*	Aitken

β 78 (Page 255)

1898.51	54.7	18.29	2*n*	Doolittle	AB
1898.51	61.9	48.36	2*n*	Doolittle	AC

β 180 (Page 256)

1898.49	172.8	0.82	2*n*	Doolittle
1898.49	106.6	34.84	2*n*	Doolittle

No material change.

β 853 (Page 258)

1899.73	223.4	0.75	1*n*	Aitken	AB
1899.73	69.8	7.03	1*n*	Aitken	AC

No material change.

β 718. 64 *Pegasi* (Page 260)

1899.92	88.1	0.46	1*n*	Aitken

Noted as "difficult and uncertain." The relative motion is obviously slow.

β 720. 72 *Pegasi* (Page 262)

1899.81	167.8	0.35	1*n*	See

β 721 (Page 263)

1899.81	127.0	0.30	1*n*	See

β 733. 85 *Pegasi* (Page 268)

1899.80	234.6	0.83	2*n*	Brown
1899.81	237.5	0.82	1*n*	See
1899.92	234.8	0.81	1*n*	Aitken

NEW NEBULAE

In looking over my old observing books used at the Lick Observatory, I find a good many nebulae noted from time to time which were not found in DREYER'S *General Catalogue*. These were accidentally picked up in the course of the double star work, and seen because they were in the field with some bright star. A few of these were measured from the star, and the places given in *Publications of the Lick Observatory*, Vol. II, pp. 155, 181. Many others were never reëxamined at that time. Three of these I have looked up with the 40-inch, and measured their places from the adjacent stars. In each case the position given below is that of the star (1880).

Lalande 26702 and nebula

R.A. $14^h\ 33^m\ 29^s$ }
Decl. $-15°\ 41'$ }

1899.285	236.7	284.46	Single distance

This star is the preceding of two, about 7 m.

D.M. (31°) 2815 and nebula

R.A. $16^h\ 56^m\ 57^s$ }
Decl. $+33°\ 42'$ }

1899.285	314.0	153.88	Single distance

The comparison star is 13".6 preceding and 5'.2 south of 59 *Herculis*.

Piazzi XVIII, 203 and nebula

R.A. $18^h\ 43^m\ 39^s$ }
Decl. $+19°\ 11'\ 43''$ }

1899.249	86.8	112.99	Single distance

The comparison star is 6 m. Lalande 35032.