

ANNALS OF THE ROYAL OBSERVATORY,
CAPE OF GOOD HOPE. —

VOL. II. PART II.

REFERENCE CATALOGUE OF SOUTHERN
DOUBLE STARS.

COMPILED BY

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WITH A PREFACE BY

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PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY,
IN OBEDIENCE TO HER MAJESTY'S COMMAND.

EDINBURGH:

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE
By NEILL & Co., LIMITED, OLD FISHMARKET CLOSE.

And to be purchased, either directly or through any Bookseller, from
JOHN MENZIES & CO., 12 HANOVER STREET, EDINBURGH, and
90 WEST NILE STREET, GLASGOW; or
EYRE & SPOTTISWOODE, EAST HARDING STREET, FLEET STREET, E.C.; and
32 ABINGDON STREET, WESTMINSTER, S.W.; or
HODGES, FIGGIS, & CO., LIMITED, 104 GRAFTON STREET, DUBLIN.

1899.

Price Fourteen Shillings.

ERRATA.

PAGE

- 2A No. 10, for "W. B. 1 h." read "W. B. 0 h."
- 4A ,, 27, line 25, for "Star" read "Stars."
- 15A Footnote, for "M'Clean" read "McClean."
- 49A No. 13, for "1".81" read "4".81."
- 55A ,, 62, for "6^h 45^m" read "6^h 44^m."
- 62A ,, 28, for "+" (twice) read "*."
- 96A ,, 75, for "H. II. 7.4" read "H. II. 74."
- 99A ,, 5, for "Engelman" read "Engelmann."
- 111A ,, 41, for "La Feuillée" read "Père Jean de Fontenay."
- 148A ,, 55, last line, insert a full stop after "See."
- 160A ,, 39, the correct synonym for *h* 4850 is H. N. 39. For Mag. "5.7" read "5.4."
- 243A *h* 4975 should be struck out; it will be found on page 178A, to which it has been removed on the authority of the observation by Cruls.

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N.—400—11/99. Wt. 4529/934.

P R E F A C E.

UP to the present time no general catalogue of the double stars of the Southern Hemisphere has been published. The observer who desired to work in this field of research has, therefore, been compelled either to expend much time in searching for suitable objects in the sky, or to consult and compare many different publications, in order to find the objects most likely to repay labour, with such means as may be at his disposal.

Greater activity may, in future, be confidently looked for in double star work, owing to the increased number of suitable instruments recently erected in the Southern Hemisphere. A strong additional stimulus will undoubtedly be given by the example of Dr See's labours in this comparatively unexplored field, and by the publication of his *Researches on the Evolution of the Stellar Systems*.

The time is therefore opportune for the appearance of a Reference Catalogue of these objects.

Mr R. T. A. Innes, the author of the present work, joined the staff of the Cape Observatory in 1896 as Secretary, Librarian, and Accountant. It formed no part of his official duties either to engage in astronomical observing or to contribute in any way to the publications of the Cape Observatory. But previous to his arrival at the Cape, he had devoted himself to practical astronomy, and, with comparatively feeble means, had discovered about forty new double stars, and published their estimated distances and position angles. He had also made some progress in the preparation of a card catalogue of reference to the known double stars of the Southern Hemisphere. This catalogue he has not only completed within the past two years in the intervals of his leisure time, but he has discovered upwards of 280 new double stars with the 7-inch equatorial, and contributed a large amount of valuable work to the revision of the *Cape Photographic Durchmusterung*.

DAVID GILL.

INTRODUCTION.

THE object of this compilation is to furnish a reference catalogue of all known double stars having southern declination at the equinox of 1900. But:—What is a double star? Should the wide pairs of the earlier astronomers be indiscriminately included? It is easier to say ‘No’ to the latter suggestion than to give a definition of what should constitute a double star that will meet all views. A compromise has been adopted: in addition to many rather wide pairs, worthy of inclusion from some point of view, every known southern double star finds a place here, which falls within the limits of distance given in the following table:—

Magnitude of Primary.	Limiting Distance of Components.
1	30"
2	25
3	20
4	15
5	10
6	7
7	5
8	3
9	1

These limits do not exclude any binary pair in either hemisphere. Some systems, much exceeding the above distances and showing no certain signs of orbital motion, have been included on account of the large proper motion common to both components.

In the course of an examination of the southern sky for double stars, the necessity for the construction of a reference catalogue has become more and more evident. In addition, such a catalogue will be found useful when measuring astrographic plates.

The programme adopted by the *Comité International de la Carte du Ciel* requires the selection of ten stars on each plate for meridian observation as points of reference for the remainder. It is obvious that these standard stars should not be double; if the components are not shown separately on the plates, it is inadmissible to assume that the photographic light-centre of gravity, so to speak, agrees with that resulting from eye observation. This objection applies even to optical or fixed pairs. In the case of binary systems, even if both stars are shown on the plates, it is clearly advisable to

avoid the complications that arise through their introduction. It will be evident that the scheme of this catalogue excludes no double star that would appear single on a good plate; hence it may be found useful when selecting reference stars by showing what stars to avoid.

As a justification for the exclusion of double stars more widely separated than the limits adopted, it may be urged that even if binary, their orbital motion will be extremely slow; unless, indeed, the mass of the system is exceptionally great, or the stars are relatively near to us. All these wide pairs, however, will be found on the catalogue plates of the *Carte du Ciel*, and their positions will in due course be recorded. Repetition of these photographs in future centuries will therefore serve all purposes, or, at least, will indicate those pairs worthy of micrometrical measurement.

The selection having been made on the above principles, the stars were identified in various catalogues, and their positions brought up to 1900·0 to the nearest second of time and tenth of a minute of arc.

The *Cape Photographic Durchmusterung* (1875), from which the places for 1900·0 may be taken out by inspection, has been most useful in affording a ready check on the places of all stars common to the two catalogues.

Nomenclature.

Great care has been taken to name each star after its discoverer, all observations being classified in order of publication. This seems consistent and fair, and it is trusted that the nomenclature adopted will be found satisfactory to astronomers. It has seemed to me that any other method would lead to confusion.* Stars discovered by Herschel, and also measured by Struve, are therefore here referred to by Herschel's designation, and all other cases have been similarly dealt with. In many cases a note has been added to the measures, giving the better known synonyms, and some other synonyms have been included in the indexes on pp. 249A-262A.

In addition to the name adopted by the double star observer, a reference is given to the earliest catalogue in which the star appears. This, however, was not considered an essential point, and exceptions will be found. The order in which the star names were selected was substantially as follows:—

Constellation-named stars.	Gilliss's Catalogue.
Auwers's Bradley.	Yarnall (3rd edition).
„ Mayer.	Cape Catalogue, 1880.
Piazzi.	Cordoba Zone Catalogue.
Lacaille.	Argentine General Catalogue.
Brisbane.	Gilliss's Catalogue of Polar Zones.
Lalande.	Bonn Durchmusterung.
Weisse's Bessel.	Cape Photographic Durchmusterung.
Oeltzen's Argelander.	Cordoba Durchmusterung.

* I consider this nomenclature as only tentative: when the whole heavens have been well explored, and our knowledge of double stars is sufficiently complete to admit of classification, a more satisfactory and impersonal system will doubtless be substituted.

The full titles and other particulars relating to these works will be found elsewhere.*

It is hoped that by giving the earliest catalogue-name, investigations of proper motion will be facilitated.

Magnitudes.

Much consideration was given to the question of magnitude, the range between different observers being in some cases excessive. It seemed, therefore, desirable to leave the question of magnitude to the uranometries and photometries.† As, however, the photometric observers almost invariably observed the stars as single, it was necessary to make use of the differences of magnitude given by the double star observers. At one time the idea of giving a separate column for the observed differences of magnitude suggested itself. The poorness of the material available led to its omission. It would be an advantage in future observations, while leaving the absolute magnitude of the pair considered as one star to those who devote themselves to this study, to record on each occasion the *difference* of magnitude between the components, provided this difference does not exceed three magnitudes, as beyond this range any approach to a rigorous comparison is out of the question. For very unequal wide pairs, Dawes's method of limiting apertures offers a ready means of determining the magnitude of the companion.

The combined magnitude has therefore been taken from the following authorities in the order in which they are named :—

Southern Meridian Photometry.	Argentine General Catalogue.
Harvard Photometries.	Cordoba Zone Catalogue.
Bonn Durchmusterung (Schönfeld).	Gilliss's Polar Zones Catalogue (reduced to the
„ „ (Argelander).	Cordoba scale as given in the introduction
Cordoba Durchmusterung.	to the catalogue).

For the very few stars which are not contained in any of the above works, the magnitude necessarily depends on the double star observer's estimate. It has been assumed that no star brighter than $9^m.0$ can have been omitted from the Bonn or Cordoba Durchmusterung. If, therefore, a star, not contained in either of these works, is recorded as brighter than $9^m.0$, it has been assumed that this estimate is erroneous, and the magnitude amended accordingly. In one or two cases where the Durchmusterung or other authority is palpably in error, attention is drawn thereto.

For the separate magnitude of a companion star, the following formulæ have been applied :—

* See introduction to the *Radcliffe Catalogue* for 1890, or the *Cape Photographic Durchmusterung*, vol. i. pp. (64)–(65).

† It would be as logical for the double star observer to prefer, in place of meridian observations, the readings of the circles of his equatorial, as it is for him to adopt his own estimate of magnitude rather than that of recognised authorities. It seems to be a pretty general rule with all double star observers to over-estimate the brightness of the pairs they discover. This has led to the omission of some pairs, which, on their discoverer's estimate of magnitude, fall within the limits given on page viiA.

xA

INTRODUCTION.

Let

A = Magnitude of the brighter component

B = " " fainter "

C = Combined magnitude

D = Difference of magnitudes

then

$$A = C + x$$

$$B = A + D$$

where

$$x = \frac{\text{Log}\left(1 + \frac{1}{2.512^D}\right)}{0.4}$$

assuming a light-ratio of 2.512.

From the last formula, the following table was constructed:—

D	x	D	x
m	m	m	m
0.0	0.8	0.8	0.4
0.1	.7	1.0	.4
0.2	.7	1.5	.2
0.3	.6	2.0	.2
0.4	.6	2.5	.1
0.5	.5	3.0	.1
0.6	.5	4.0	.0
0.7	.5		

Thus, in α Centauri we have

$$C = 0.2$$

$$D = 1.5$$

$$\therefore x = 0.2$$

$$C + x = 0.4 = A$$

$$A + D = 1.9 = B$$

The inverse case is illustrated by two stars, each of the 6^m.8.

$$A = 6.8$$

$$B = 6.8$$

$$\therefore D = 0.0$$

$$x = 0.8$$

$$A - x = 6.0 = C$$

Although the above table, which depends upon the accepted light-ratio to which the Durchmusterung-magnitudes are supposed to conform, holds good for most pairs, I am convinced that it does not apply to those pairs both components of which are faint. Thus two stars of the 10th magnitude in the Durchmusterung are only equal to one of the 9.7 or 9.8 magnitude instead of 9.2 magnitude as given by the table. It seemed, however, unwise to discuss this question at present, as it did not enter essentially into the construction of this catalogue; for which any system will do, provided that it is uniformly applied, and is one to which all astronomers can easily conform. The value of the light-ratio between the different magnitudes is of such importance in astronomical photography and

in the study of variables, that it must be left to astronomers dealing with these subjects. When the question is entered into, and a scale of magnitude agreeing with theory has been constructed, it will be a very simple matter to bring the *Durchmusterung*-magnitudes into agreement therewith. If each double star observer continues to adopt a system of his own, as has been too much the case in the past, it will complicate matters, besides making comparisons between different catalogues more uncertain.

If the stars are so wide as to have been observed separately in any one of the authorities on magnitude, the resulting combined magnitude has first been computed, and then, using the mean of the differences of magnitude given by the various double star observers, the magnitude of each component has been found. If the stars are fairly equal in magnitude and close together, so as to have been observed as one star, reliance has of course to be placed on the estimates of the double star observer for the difference of magnitude between the components. When the companion is small and distant, it is assumed to have had no effect on the estimate of brightness of the chief star; should, therefore, an observer make the magnitudes of such a pair 5.0 and 8.5, and the chief star in the selected photometry be 5.8 mag. the companion will here on some occasions be altered to 9.3 mag., thus retaining the observed difference.

The cases above considered merge into one another and it would have been difficult to adopt a fixed rule, which indeed has not been attempted.

I have specially examined the magnitudes of many of the stars, and have either adopted my own results, or used them in combination with those of Sir John Herschel and some other observers.

I have not given prominence to the question of the variability of components of double stars—attention has been directed to a few of the more striking cases only. It is highly probable that the variation of light so often recorded is in some cases real. If observers will regularly record the difference of magnitude between the components of pairs as *suggested above*, material will soon accumulate for a satisfactory investigation of the subject. I have found that if a pair is observable, but really too close to be separated with the telescope employed, the smaller component will be estimated considerably under its real magnitude as seen with greater optical power.

When the magnitude of a double star system, as given in the *Cape Photographic Durchmusterung*, differs from the visual, by more than a unit, its photographic magnitude is quoted in the notes appended to the measures. The photographic magnitudes are often fainter than the visual, and this in nearly all cases is due to the yellow or reddish light of the stars, which is well known to have less actinic effect than white light.

Measures.

In a few cases only have all the available observations been quoted. It has been considered sufficient to give such a selection that it can be seen at a glance whether the pair is stationary or in motion—in other words, whether a pair is likely to require or repay further observation. For many of the more southerly pairs showing signs of

change, the lists of measures will in most cases be found fairly complete. To many well-measured pairs the words "Other measures" have been added.

The measures given are in some cases the means of several observations, and where the original observer has himself given means, others have sometimes been formed in their stead, when it seemed advantageous to do so. Although every care has been taken to insure accuracy in copying, any astronomer pursuing an investigation into the motion of a star would do well to refer to the original authorities. This has been found necessary when consulting lists quoted as complete by their compilers.

Many astronomers have adopted corrections to their observed angles and distances, among them, Otto Struve and the Cincinnati observers; the younger Herschel gave a table to reduce his position angles measured with the reflector to those measured with the refractor. Some, at least, of these corrections are of doubtful utility, but in transcribing the results, they have sometimes been used and sometimes omitted.

When an orbit has been computed for a binary pair, the elements taken from the latest authority, together with some idea of the nature of the apparent orbit, have generally been given. This seems sufficient for the purposes of a working reference catalogue. With great kindness, Professor T. J. J. See offered to lend, for reproduction here, the plates which appeared in vol. i. of his *Evolution of the Stellar Systems*, showing the apparent orbits of several interesting southern binaries. Although their inclusion would have added greatly to the interest of the catalogue, it was decided that they were not essential to its purpose.

Some hitherto unpublished measures will be found herein; for these my thanks are due to Mr Baracchi, the director of the Melbourne Observatory, to my present chief Dr David Gill, and lastly to Professor See, who kindly sent complete lists of all his measures, in advance of publication. Most of the Melbourne measures were made by the former director, Mr Ellery; and the older Cape measures by Sir Thomas Maclear, who used the same instrument with which the double stars contained in the recent lists issued from the Cape Observatory were discovered. Two or three sets of measures (hitherto unpublished) made by myself with the same telescope are also included, as well as many estimates showing in some cases interesting instances of change.*

It is noticeable that the duplicity of many of the stars included, rests on the authority of one observer, and often on observations of one night only. This is a shortcoming that the publication of this catalogue should help to remove. At the end of the catalogue a chronological bibliography of works and observations on southern double stars will be found, which it is hoped will facilitate researches into measures of southern pairs, and form a guide for those who desire to devote their time to measuring wider pairs than are here included.

Notes of a miscellaneous character follow the measures of the more important pairs;

* The clock of the 6.9-inch refractor is faulty, and measures of distance can only be made with great difficulty. Moreover, it seemed advisable, pending the completion of the McClean telescope, to endeavour to find as many new pairs as possible on the few occasions available for such work, instead of making measures of a few pairs under difficulties.

in particular, they contain, when available, the value of the proper motion reduced to a great circle taken from various authorities, among whom may be mentioned Auwers, Stone, Argelander, Bossert, and Porter. Many proper motions have been computed specially for this catalogue. Owing to lack of material, these are not so complete as could be wished.

Many references to neighbouring stars will also be found, in order to make the identification of the fainter pairs more certain.

Very little attention has been given to colours. Where, however, they seemed generally agreed on, they are quoted. The minute differences of shade recorded by some observers have been omitted as useless if not misleading.

Very few abbreviations have been used; a list will be found on page xviA.

Of the 2140 stars contained in this catalogue, 21% are under 1" in distance, 24% are between 1" and 2", the remaining 55% exceed 2". The following inference may be drawn from this:—that the pairs under 2" apart probably exceed in number those between 2" and 7", remembering that the latter class can be easily seen, and that with few exceptions all pairs under 2" distance require special care on the part of the observer to see that they are double.

During the past quarter of a century the only observatory in the southern hemisphere which has systematically devoted a part of its time to double star astronomy is that of Sydney, New South Wales, where, under the direction of Mr H. C. Russell, several valuable series of measures have been made.

The study of double stars will always be interesting from the Newtonian point of view, and in the case of the brighter pairs, the spectroscopic determination of motion in the line of sight will lead to a knowledge of the true position in space as well as of the absolute dimensions of their orbits, and hence their parallaxes. The irregularities of their orbital motions (already ascertained in a few cases, which will multiply as observations grow more precise) indicate the presence of disturbing bodies. For these reasons even the binaries with the best determined orbits deserve careful and regular observation. From the astro-physical point of view, it is hoped that much may be learned from their study. A contracting and rotating mass of gas may eventually reach an epoch when it will become unstable and separate into two or more portions forming a binary system. It is evident that this critical period will depend on the constitution of the body, its speed of rotation, mass, and temperature. Systematic observations, micrometric and spectroscopic, should in time enlighten us on these, at present, obscure subjects. When we are able to arrange the elements of the orbits of say one thousand binary pairs in tabular form, with their spectroscopic history, both of constitution and of radial speed, including for each the proper motion and its solar component, we shall be in a position to attack questions relating to the constitution of the sidereal heavens, which are to-day beyond the realms of reasonable speculation. In this respect the stars of the southern hemisphere offer at least as attractive a field of investigation as those north of the equator. In spite of neglect, the southern systems already exceed in importance those of the north. Among them may be quoted:—

Sirius.	γ Sextantis.	ξ Scorpii.
α Centauri.	ζ Aquarii.	π Lupi.
γ Virginis.	σ_2 Eridani.	β Phœnicis.
γ Lupi.	α Crucis.	ζ Sagittarii.
γ Centauri.	β Muscæ.	etc. etc.
γ Circini.	4 Aquarii.	

It is true that of these α Crucis is not a binary. It is perhaps all the more remarkable for that reason, being one of the brightest stars in the sky, and shown by photography to be surrounded by a cluster or rather by rings of very faint stars, in the centre of which the two large stars are, as far as can be ascertained, absolutely stationary. Are these gloriously brilliant stars devoid of mass, or, if they shine with an intrinsic brilliancy of surface equal to that of Sirius, at what distance must they be apart that gravitational motion becomes too small to be detected even in a century? * Speculation and analogy alike fail us, and a systematic study of all double stars is alone likely to solve these and many other allied questions.

The high eccentricity of the orbits of some double stars, including α Centauri, subjects the internal constitution of the components to different pressures at the times of periastron and apastron. Does this affect their spectra in a measurable degree?

Tidal evolution must have very sensible effects on the orbits of double stars. Will it be possible to measure its effect in increasing the axis major of a pair? For this purpose very accurate measurements of distance are necessary. A favourable example is exhibited in the case of α Centauri, the components of which attain their maximum distance a few years hence. Every expedient to determine this distance with the utmost exactitude should be employed. It is a debt to posterity that we should strive to discharge. If this be done, a repetition of the measures after the lapse of eighty years would be of the highest interest.

The study of double star astronomy in its many aspects thus promises one of the most hopeful aids to a better knowledge of the history of cosmical development. The present work has been undertaken with the desire to facilitate investigation in this field.

My thanks are due to many friends for their encouragement—especially to Dr Gill, without whose help and advice, in many ways, this work would not have been published.

As this work was printed in Edinburgh, Dr Gill kindly wrote to Dr Ralph Copeland, Astronomer Royal for Scotland, asking if he would be good enough to revise the second proofs and pass the work through the press. For undertaking this, and for many valuable suggestions, I cannot sufficiently express my great indebtedness to him.

* The only determination of the parallax of α Crucis is that made by Dr Gill with the Heliometer in 1888–1889. It is still unpublished. The result is

$$\pi = 0''.050 \pm 0''.018,$$

but this is the parallax with reference to neighbouring stars, which may be at about the same distance as α Crucis.

R. T. A. INNES.

ROYAL OBSERVATORY, CAPE OF GOOD HOPE,
29th August 1899.

FORMULÆ, ETC.

The annual precession can be approximately computed by the following formulæ:—

$$\text{In R.A.} = +3\cdot07 + 1\cdot34 \sin \text{R.A.} \tan \text{Dec.}$$

$$\text{In Dec.} = +0\cdot334 \cos \text{R.A.}$$

The change in position angle, due to precession, for one century is equal to:—

$$+0\cdot557 \sin \text{R.A.} \sec \text{Dec.}$$

In this catalogue all position angles are given for the epoch of observation.

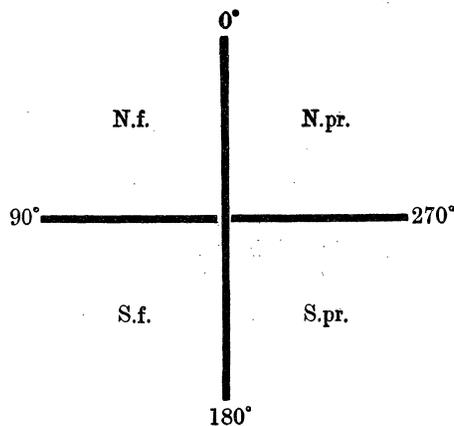
In many of the old double stars, both components will be found in meridian catalogues. If the difference in seconds of R.A. (companion—chief star) be Δ R.A., and the difference of Declination = Δ Dec., the position angle and distance can be found as follows:—

$$\text{Tan (Position angle)} = \frac{15\Delta \text{ R.A.} \cos \text{Dec.}}{\Delta \text{ Dec.}}$$

$$\text{Distance} = \frac{15\Delta \text{ R.A.} \cos \text{Dec.}}{\sin (\text{pos. angle})} = \frac{\Delta \text{ Dec.}}{\cos (\text{pos. angle})}$$

These formulæ will also serve to convert proper motion in R.A., and Dec. into proper motion along a great circle.

QUADRANTS.



ABBREVIATIONS.

N.,	.	.	.	North.
S.,	.	.	.	South.
pr.,	.	.	.	preceding.
f.,	.	.	.	following.
p.m.,	.	.	.	proper motion (annual).
H,	.	.	.	Sir Wm. Herschel.
h.,	.	.	.	Sir John F. W. Herschel.
Σ,	.	.	.	F. G. W. Struve.
OΣ,	.	.	.	Otto Struve.
β,	.	.	.	S. W. Burnham.
Cinc.,	.	.	.	The observers at the Cincinnati Observatory.
Goodsell,	.	.	„	Goodsell „
λ,	.	.	„	Lowell „
L. McC.,	.	.	„	Leander McCormick Observatory.
Washburn,	.	.	„	Washburn Observatory.
M.O.,	.	.	.	Meridian Observations.
* (to position angles),	.	.	.	That the position angle has been altered by $\pm 180^\circ$.
U.A.,	.	.	.	Uranometria Argentina.
±,	.	.	.	Estimation.

STAR CATALOGUES.

B.D.,	.	.	.	Bonner Durchmusterung.
Bris.,	.	.	.	Brisbane's Catalogue.
C.G.A.,	.	.	.	Catálogo General Argentino.
C.Z.,	.	.	.	Cordoba Zones.
C.P.D.,	.	.	.	Cape Photographic Durchmusterung.
Cor. D.M.,	.	.	.	Cordoba Durchmusterung.
Gilliss P.Z.,	.	.	.	Gilliss's Polar Zones.
Lac.,	.	.	.	Lacaille's B.A. Catalogue.
Lal.,	.	.	„ „	Lalande's „ „
1st Mun.,	.	.	.	First Munich Catalogue.
Ö.A.,	.	.	.	Oeltzen's Argelander (Weisse's edition used, but the old numbers retained).
Pos. Med.,	.	.	.	Struve's Positiones Mediæ.
Schj.,	.	.	.	Schjellerup's Catalogue.
W.B.,	.	.	.	Weisse's Bessel (+ 15° to -15°).

REFERENCE CATALOGUE

OF

SOUTHERN DOUBLE STARS.

O hrs.				MAG.			MAG.
No. 1.	λ 1. C. Z. 23 h. 1630. 0 ^h 0 ^m 51 ^s — 30° 53'.1.			8.8	No. 4.	λ 2. Lac. 9732. 0 ^h 2 ^m 40 ^s — 23° 3'.9.	6.0
	<i>Comes</i> = 11.4					<i>Comes</i> = 12.3	
	1896.8 323.1 " 4.73 Lowell 3 n				1897.7 174.3 " 2.15 See 1 n		
	Ö.A. 23232, mag. 7.5, is 2 ^s .5 pr. and 2' S.						
No. 2.	Harvard. Lac. 9721. 0 ^h 1 ^m 9 ^s — 49° 37'.8.			5.6	No. 5.	β 391. κ_1 Sculptoris. 0 ^h 4 ^m 15 ^s — 28° 32'.5.	6.0
	1891 Double within 30". Arequipa. The p.m. of Lac. 9721 is 0".485 towards 91°.2.					6.7 and 6.8	
					1877.5 277.1 " 0.84 Cinc. 4-3 n		
					1888.9 272.5 0.94 Haverford 4-3		
					1894.5 271.6 0.86 Sellors 5		
					1895.8 271.0 0.93 Aitken 3		
					1897.1 273.2 1.24 See 3		
No. 3.	Σ 3063. Lal. 47294. 0 ^h 2 ^m 29 ^s — 5° 6'.0.			8.7	No. 6.	λ 3. C. Z. 0 h. 99. 0 ^h 4 ^m 46 ^s — 34° 20'.5.	8.5
	8.9 yellowish, and 10.6					8.8 and 10.4	
	1831.5 232.9 " 1.79 Σ 3 n				1896.7 187.8 " 1.15 See 2 n		
	1865.6 224.4 1.84 Dembowski 4-1						
	1877.9 223.3 1.82 β 2						
	1886.7 219.8 1.95 L. McC. 4						
	Some change.						
	Wt. 4529/934.—N.—12/1/99.						A

<p>No. 7. Innes 43. Lac. 9755. MAG. 6.9 $0^h 5^m 44^s$ — $73^\circ 47'.0$ 7.3 and 8.3 1896.7 $34.0 \pm 0.8 \pm$ Innes 1 n The p.m. of this star is about $0''.13$ towards 99°. A physical system.</p>	<p>No. 12. β 256. Anon. MAG. 9.0 $0^h 14^m 2^s$ — $14^\circ 23'$ 9.6 and 9.9 1877.9 249.5 2.45 Cinc. 1 n 1886.8 248.4 2.70 L. McC. 2 Not in Schönfeld's <i>Durchmusterung</i>. It is therefore assumed that the combined magnitude is not brighter than 9.0. Other measures.</p>
<p>No. 8. β 486. Lal. 158. 5.8 $0^h 9^m 21^s$ — $8^\circ 20'.2$ Comes = 10.5 1877.9 4.3 " Cinc. 1 n 1878.2 5.0 3.07 β 2 1879.8 6.3 3.05 Cinc. 2 1888.9 5.3 3.09 β 1</p>	<p>No. 13. h. 1957. Piazzì 0 h. 51. 7.2 $0^h 16^m 49^s$ — $23^\circ 33'.6$ 7.6 and 8.6, both yellow 1846.7 19.2 6.29 Jacob 1 n 1851.0 20.9 6.13 " 2 1869.9 19.5 6.12 Harvard 1 1882.7 22.4 6.34 Cinc. 2-1 1892.9 21.5 5.73 Glasenapp 2 1896.9 22.6 6.11 Scott 2 1897.6 22.6 6.24 See 1 Separately observed on the meridian at Cordoba.</p>
<p>No. 9. Σ 15. Lal. 204. 7.6 $0^h 10^m 45^s$ — $6^\circ 9'.4$ 7.7 very yellow, and 10.2 1831.2 197.9 4.70 Σ 3 n 1896.9 198.1 4.74 Hussey 1 Fixed. Other measures.</p>	<p>No. 14. h. 3362. Lal. 446. 7.5 $0^h 18^m 22^s$ — $19^\circ 26'.5$ Comes = 11.0 1836.8 73.3 $4. \pm$ h 1 n Identification uncertain, the nearest star to h's position. 1897.9 Not seen. Innes.</p>
<p>No. 10. Σ 23. W.B. 1 h. 164. 7.7 $0^h 12^m 21^s$ — $0^\circ 14'.3$ 7.8 and 10.1, both yellow 1828.5 361.2 13.67 Σ 3 n 1854.3 357.4 11.00 $O \Sigma$ 2 1877.8 350.3 7.92 Cinc. 3 1893.7 340.5 6.05 Glasenapp 1 Many other measures. Rectilinear motion in the larger star. The minimum distance, about $3''$, will occur about 1940.</p>	<p>No. 15. β 488. Lal. 465. 7.6 $0^h 18^m 53^s$ — $4^\circ 1'.8$ 7.7 and 10.6 1877.7 347.7 3.30 β 1 n 1878.6 348.0 3.33 " 3 1886.7 347.2 3.40 L. McC. 4</p>
<p>No. 11. β 393. Lal. 291. 6.7 $0^h 13^m 13^s$ — $21^\circ 41'.6$ 7.0 and 8.3 1878.8 11.6 0.69 Cinc. 2-1 n 1886.8 12.6 " L. McC. 1 1890.9 16.0 0.71 β 3 1893.9 12.9 0.59 Sellors 2 No certain change.</p>	<p>No. 16. Cordoba [1]. C.Z. 0 h. 489. 8.7 $0^h 19^m 42^s$ — $33^\circ 53'.5$ 9.2 and 9.7 1896.8 $118.$ 2.53 See 2 n</p>

No. 17. h. 1964. Ö. A. 177. MAG. 8.7
 0^h 20^m 32^s — 19° 22'.1

Comes = 10.0

1831.±	125.8	7.±	h	1 n
1855.8	122.5	6.18	Secchi	1
1876.8	115.6	6.41	Cinc.	1
1895.9	115.7	6.60	Aitken	3

Secchi measures this pair for h 3362. See No. 14.

No. 18. λ 5. C. Z. O h. 517. MAG. 9.3
 0^h 20^m 42^s — 35° 22'.9

9.4 and 12.1

1896.7	73.5	3.84	See	2 n
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Between two stars, C. Z. o h. 510, mag. 8.7, and C. Z. o h. 526, mag. 9.1.

No. 19. λ —. κ . Phœnicis. MAG. 3.9
 0^h 21^m 17^s — 44° 14'.1

Comes = 13.0

1897	1261.0	8.23	See	— n
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No. 20. λ 6. α . Phœnicis. MAG. 2.4
 0^h 21^m 20^s — 42° 50'.9

Comes = 13.0

1897.0	272.7	9.73	See	6 n
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The p.m. of the chief star is 0".449 towards 155°.4.

No. 21. h. 1968. Lal. 593. MAG. 7.3
 0^h 22^m 36^s — 16° 57'.8

7.4 and 10.0

1830	61.3	20.±	h	1 n
1877.2	73.1	8.50	Dembowski	4
1895.9	106.7	2.81	Aitken	3

Many other measures.

According to β this is probably a case of rectilinear motion in both stars, and the minimum distance 1".8 will be reached about 1901. (Glasenapp, 2".3 in 1904.)

Meridian observations of the chief star yield a p.m. of 0".276 towards 85°.2.

An 11.7 mag. star 93" distant is noted by β .

See papers by H. Sadler, *Sidereal Messenger*, vol. v. p. 189, 1886; S. W. Burnham, *M. N. R. A. S.*, January 1891; and S. Glasenapp, *Proc. Russian Astr. Society*, April 1897.

No. 22. Innes 44. Lac. 95. MAG. 8.2
 0^h 23^m 27^s — 55° 10'.6

8.5 and 9.7

1896.8	250.±	0".75±	Innes	2 n
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Lac. 102, mag. 8.0, is about 14' N.f.

No determination of the place of Lac. 95 was made between 1751 (Lacaille) and 1875 (Cordoba and Cape), and it was then found that Lacaille's position was erroneous or that there was a large p.m. Dr Gould suggests that perhaps Lacaille's observation got confused with that of Lac. 102. If so, the position agrees with the later determinations to 0".4 and 26", giving a very doubtful p.m. of 0".2.

No. 23. Russell 3. C. Z. O h. 605. MAG. 8.0
 0^h 23^m 42^s — 66° 27'.9

8.4 and 9.4

1873.9	120.±	1.±	Russell	1 n
1887.9	238.8	1.47	Pollock	3-1
1889.9	240.9	1.±	"	1
1891.9	240.0	1.20	Sellors	2

These are all the measures published.

This is the principal star of the old pair h 3370, composed of the two stars C. Z. o h. 605, mag. 8.0, and C. Z. o h. 608, mag. 9.4, which have been measured as follows:—

1834.8	54.1	25.±	h	1 n
1873.9	61.9	38.0	Russell	1
1879.9	62.4	38.6	Hargrave	2
1889.8	62.9	39.6	Pollock	2

The change arises probably from p.m.

No. 24. Innes 177. Lac. 113. MAG. 8.1
 0^h 23^m 48^s — 83° 41'.6

8.5 and 9.5

1896.8	10.±	1.±	Innes	1 n
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No. 25. h. 322. 12 Ceti. MAG. 6.2

Yellow

0^h 24^m 56^s — 4° 30'.6

Comes = 10.9 blue

1866.8	185.2	8.66	Dembowski	3 n
1880.2	187.0	8.63	β	3

A 10th mag. comes 212" f.

The p.m. is about 0".01.

No sign of change.

4A

O hrs.

REFERENCE CATALOGUE OF

No. 26. β 1158. Lal. 722. ^{MAG.} 8.6
 $0^h 26^m 1^s$ — $10^\circ 38'.1$

Both = 9.4

1890.91 138.1 0.26 β 3 n

Piazzì o h. 96, mag. 7.2, is $79''$ S.pr., it has been thought variable.

No. 27. β Toucani. 3.6
 $0^h 26^m 58^s$ — $63^\circ 31'.0$

 β_2 Toucani = 4.33 S.M.P. β_1 " = 4.50 "Lacaille = $\beta_2 + \beta_1$

1835.8	350.5	.....	h (mirror)	2 n
1835.8	352.3	27.76	h (o. g.)	4
1846.9	351.4	26.81	Jacob	2
1851.0	351.2	27.32	"	2
1870.8	350.0	27.51	Russell	1
1878.2	350.6	26.69	Melbourne	5
1880.6	350.7	23.85	Cruls	1
1882.2	350.4	27.32	Tebbutt	1

No change.

The double star observers have generally considered the two components equal in magnitude, or if there is any difference, that β_1 is slightly the brighter star, therein agreeing with the Cordoba estimates. Nevertheless, on the authority of the Southern Photometry of the Harvard Observatory, 180° has been added to all the angles given by the double star observers.

Common p.m. of $0''.103$ towards $132^\circ.8$.

Also registered as Dunlop 1, and in the first Sydney Catalogue of Double Star measured as " h 3373 after β Toucani."

In the *Harvard Circular*, No. 18, β_1 Toucani is registered as T (triple or multiple) within $30''$, but on examination with the 7-in. no nearer star than β_2 was seen. The latter star is, however, a close double, viz.:—

Innes $260 = \beta_2$ Toucani

4.7 and 5.7

1897.9 $300. \pm$ $0.7 \pm$ Innes 1 n

Lastly, it may be noted that β_2 is a yellow star, and β_1 white or bluish, like stars of the Sirius or Milky Way type.

No. 28. Innes 45. Lac. 130. ^{MAG.} 7.0
 $0^h 28^m 49^s$ — $55^\circ 52'.8$

7.2 and 8.6

1896.8 $280. \pm$ $0.8 \pm$ Innes 1 n

This is the chief star of the pair h 3376, comes 10.6, mag. measured as follows:—

1837.3	247.6	7.60	h	2 n
1857.9	247.0	6.26	Jacob	2
1887.9	246.4	6.50	Pollock	2

Probably also seen at Arequipa. See *Harvard Circular*, No. 18, 29th July 1897.

No. 29. h 3375. Piazzì O h. 111. 6.5
 $0^h 28^m 50^s$ — $35^\circ 32'.4$

6.7 and 9.2

1835.2	164.2	6.45	h	3 n
1851.9	165.2	6.40	Jacob	4
1856.0	167.0	5.46	Secchi	1
1877.5	164.5	5.81	Melbourne	2
1877.8	165.8	6.12	Cinc.	2
1879.7	166.7	6.90	β	2
1879.9	166.0	5.16	Hargrave	1
1892.9	168.7	5.60	Glaserapp	2
1893.2	162.5	6.09	Scott	3
1896.8	165.4	6.03	See	2

Change is very doubtful.

Large common proper motion of $0''.511$ towards $184^\circ.1$ proving a physical connection.

No. 30. Secchi 1. Piazzì O h. 113. 7.0
 $0^h 29^m 23^s$ — $5^\circ 5'.9$

7.4 and 8.2

1858.0	237.0	$0.4 \pm$	Secchi	1 n
1867.6	243.1	obl.	Dembowski	2
1871.5	237.6	$0.7 \pm$	"	3
1877.8	241.8	0.89	β	1
1886.7	242.8	0.78	L. McC.	6

This pair and C. G. A. 494, mag. 9.3, $20''$ distant, compose the pair H. iv. $76 = \Sigma$ 39. All evidently fixed.

Other measures.

SOUTHERN DOUBLE STARS.

O hrs.

5A

No. 31.	β 490.	13 Ceti.	MAG.	
	0 ^h 30 ^m 6 ^s	— 4° 8'.6.	5.3	
	Comes = 13.0			
1877.8	65.3	37.1	β	1 n
1891.6	58.9	33.7	"	3

The change is accounted for by the p.m. of the chief star, viz., α " 397 towards 93°.0. The minimum distance, 19", will be attained about 1960.

Prof. Hough thought that 13 Ceti was a close pair, but on examination this was not confirmed by β .

No. 32.	Russell 4.	Lac. 141.	MAG.	
	0 ^h 30 ^m 32 ^s	— 54° 6'.0.	7.6	
	8.0 and 8.8			
1873.9	91.3	3.09	Russell	1 n
1887.9	93.3	2.46	Pollock	2

Separately observed on the meridian at Cordoba.

No. 33.	β 395.	Piazzi O h. 130.	MAG.	
	0 ^h 32 ^m 12 ^s	— 25° 19'.0.	5.6	
	6.3 and 6.4			
1875.8	135.±	0.5±	β	1 n
1886.8	104.7	0.65	L. McC.	2
1888.0	109.4	.....	Pollock	1
1889.9	109.6	0.67	Haverford	3-2
1890.0	111.4	0.88	Hall	2
1890.8	112.6	0.74	β	3
1891.8	115.2	0.69	Haverford	1
1891.9	118.2	0.75	β	3
1897.7	276.4	0.23	Lowell	3
1897.9	273.7	0.27	Aitken	3
1897.9	275.1	0.31	Hussey	3

Common p.m. = 1".359 towards 90°.1

An important binary system, the period being 16.3 years.

See:—Prof. See, "Researches on the Orbit of the New Binary β 395," *Astr. Nachr.*, No. 3455. 1897.

Earlier references to this system are:—

1885. Sadler, H., *English Mechanic*, 29th May.
 1886. Burnham, S. W., *Sidereal Messenger*, vol. v. p. 87.

No. 34.	Innes 46.	Lac. 165.	MAG.	
	0 ^h 35 ^m 13 ^s	— 39° 29'.7	8.1	
	8.2 and 10.7			
1897.0	310.±	2.±	Innes	1 n

No. 35.	Σ 49.	Lal. 1073.	MAG.	
	0 ^h 35 ^m 43 ^s	— 7° 46'.7.	7.0	
	7.1 yellowish, and 9.5			
1830.9	321.5	4.49	Σ	3 n
1865.2	319.6	5.24	Dembowski	3
1881.8	321.3	6.10	β	3
1892.9	317.9	5.85	Glaspapp	2

Some increase in distance.

No. 36.	h. 3385.	Cord. D. M.—41°, 178.	MAG.	
	0 ^h 36 ^m 2 ^s	— 41° 45'.3.	8.7	
	9.2 and 9.7			
1835.8	242.9	4.±	h	1 n
1896.9	260.±	4.±	Innes	1

Originally selected as a reference star for one of the Cape Catalogue plates, but rejected when found to be double at the Transit-Circle.

No. 37.	h. 3387.	ξ Phœnicis.	MAG.	
	0 ^h 37 ^m 14 ^s	— 57° 3'.1.	5.8	
	Comes = 10.2			
1834.8	252.1	15.±	h	1 n
1887.4	253.1	12.6	Pollock	3-2

No change.

No. 38.	Melbourne 1.	Lac. 182.	MAG.	
	0 ^h 37 ^m 27 ^s	— 56° 19'.7.	7.5	
	8.5 and 9.0			
1877.0	159.3	7.06	Melbourne	1 n
1886.9	163.4	7.22	Pollock	1
1887.8	164.0	5.79	"	2

No. 39.	h. 3391.	η Phœnicis.	MAG.	
	0 ^h 38 ^m 52 ^s	— 58° 0'.7.	4.5	
	Comes = 11.3			
1834.8	213.0	22.±	h	3 n
1887.9	217.7	20.1	Pollock	1

The change may arise from the small p.m. of the chief star = α " 0.02 towards 240°.2.

- No. 40. Cordoba [2]. U.A. 64 Toucani. 6.4** MAG.
 $0^h 40^m 10^s$ — $63^\circ 2' 7$.
 6.6 and 8.5
 1894.9 $90. \pm 3. \pm$ Innes 1 n.
 Discovered in 1873.
 Registered as a new pair in error, Innes 1 = Bris. 118.
 Also in the Arequipa list of new double stars published in *Harvard Circular*, No. 18, July 1897.
- No. 41. F. Muller. Piazzì O h. 174. 6.5**
 $0^h 40^m 42^s$ — $16^\circ 58' 3$.
 6.6 and 9.6
 1887.0 193.0 2.48 L. McC. 1 n
 1890.0 191.0 2.00 Hough 1
 Thought to be new when the latter measure was made and registered as Hough 215.
- No. 42. Harvard. Lac. 207. 5.7**
 $0^h 41^m 4^s$ — $48^\circ 6' 1$.
 Noted as double within $30''$ at Arequipa in 1891.
 From *Harvard Circular*, No. 18.
- No. 43. h. 3396. C. Z. O h. 1057. 9.4**
 $0^h 41^m 18^s$ — $33^\circ 50' 2$.
Comes = 10.7
 1835.3 217.0 2. \pm h 2 n
 Seen 1898, not much change, if any; h 's distance is too small.
- No. 44. β 494. Lal. 1266. 8.5**
 $0^h 41^m 54^s$ — $1^\circ 47' 9$.
 9.2 and 9.3
 1877.7 163.3 1.42 β 1 n
 1878.7 170.6 1.35 " 1
 1886.8 171.2* 1.36 L. McC. 3
 1888.8 170.5 1.27 Haverford 4
 1892.9 171.8 1.37 Glasenapp 2-1
- No. 45. Innes 261. Lac. 219. 7.2**
 $0^h 43^m 4^s$ — $29^\circ 53' 4$.
 7.8 and 8.1
 1897.9 $60. \pm 0.5 \pm$ Innes 1 n
- No. 46. β 301. Lal. 1350. 8.2**
 $0^h 44^m 20^s$ — $21^\circ 56' 5$.
Comes = 14.0
 1891.79 318.8 0.90 β 3 n
 This is really a new pair discovered by β with the 36-inch Lick refractor. The chief star of the new pair and a 9.4 mag. star, 11" N.pr., compose the pair originally called β 301.
 β remarks that the close pair is very difficult, the telescope used being the 36-inch Lick refractor.
- No. 47. β 1160. Piazzì O h. 198. 5.8**
 $0^h 44^m 24^s$ — $14^\circ 6' 2$.
Comes = 12.0
 1890.69 113.1 1.19 β 3 n
- No. 48. Innes 47. Lac. 236. 6.6**
 $0^h 47^m 12^s$ — $44^\circ 15' 1$.
 7.0 and 7.8
 1896.7 355. \pm 1.8 \pm Innes 2 n
 Also noted at Arequipa. See *Harvard Circular*, No. 18, 29th July 1897.
- No. 49. Ormond Stone. Lal. 1458. 7.0**
 $0^h 47^m 18^s$ — $23^\circ 9' 3$.
 7.4 and 8.2
 1877.8 271.9 2.38 Cinc. 5 n
 1882.8 274.5 2.42 " 2-1
 1886.8 272.0 2.35 L. McC. 3
 1891.8 270.5 2.24 Haverford 2
 1897.7 267.6 2.25 See 1
 This neat pair has a common p.m. of $0''.27$ towards $194^\circ 8$.
 Distance decreasing?
 Prof. See also measures an 11th mag. star, $36''$ S.pr.
- No. 50. β 734. Lac. 238. 5.5**
 $0^h 47^m 46^s$ — $24^\circ 33' 0$.
 5.6 and 8.8
 1879.7 348.9 10.7 β 3 n
 1888.8 346.9 10.8 " 2
 1897.6 345.7 11.2 See 1
 Mag. in C. P. D. = 6.6.
 Noted as a double star at Cordoba in 1873, but β 's by priority of publication.

SOUTHERN DOUBLE STARS.

hrs.

7A

No. 51. Washington 1. Lac. 241. ^{MAG.} 6.6
 $0^h 48^m 18^s$ — $25^\circ 19' 3''$

6.8 and 8.6

1876.8	11.8	5.61	Cinc.	1 n
1877.8	12.6	5.27	"	3
1892.9	10.3	5.57	Glasnapp	2
1896.9	12.6	5.66	Scott	2

Also separately observed on the meridian at Cordoba.

No. 52. Dunlop 2. λ_1 Toucani. ^{MAG.} 6.6
 $0^h 48^m 36^s$ — $70^\circ 2' 7''$

6.9 and 8.1 bluish.

1836.3	79.3	20.5	λ	3 n
1852.4	79.3	21.2	Maclear	3-2
1879.9	80.2	20.7	Hargrave	1
1880.2	79.1	20.5	Tebbutt	1

Dunlop gave $71^\circ 6'$ in 1826 which would seem to be in error.

Erroneously called λ 3407 in the Sydney list.

λ 's estimates of the chief star vary from 6.0 to 8.2, and at Cordoba we have:—

$$1873 = 8.0$$

$$1874 = 6.5$$

No. 53. Gilliss 4. Lac. 247. ^{MAG.} 7.3
 $0^h 48^m 46^s$ — $61^\circ 37' 2''$

7.7 and 8.5

1877.0	69.8	7.36	Melbourne	1 n
1887.9	71.4	5.51	Pollock	2

Both stars have been observed on the meridian at the Cape and Cordoba.

No. 54. β 233. Ö.A. 505. ^{MAG.} 8.4
 $0^h 50^m 9^s$ — $17^\circ 59' 1''$

8.8 and 9.8

1876.8	88.6*	1.42	Dembowski	4-3 n
1877.8	87.5	1.29	Cinc.	2
1884.9	91.3	1.53	"	1
1886.6	88.1	1.51	L. McC.	4
1891.8	92.0	1.36	Haverford	2
1892.0	90.5	1.14	β	1
1895.9	96.1	.....	Doberck	3
1897.8	90.0	1.46	See	1

Angle increasing?

A faint pair in the neighbourhood has been measured at Cincinnati.

No. 55. Howe 1. Ö.A. 509. ^{MAG.} 8.9
 $0^h 50^m 52^s$ — $16^\circ 54' 5''$

9.6 and 9.8

1878.7	106.3	1.82	Cinc.	1 n
1879.8	105.1	1.72	"	2
1886.4	111.9	1.86	L. McC.	4

No. 56. h. 2004. Lal. 1645. ^{MAG.} 7.2
 $0^h 52^m 41^s$ — $19^\circ 32' 4''$

7.3 and 9.9

1851.0	239.5	3.20	Jacob	2 n
1869.4	237.7	2.58	Harvard	2
1876.8	240.0	3.33	Cinc.	1
1877.8	242.2	3.11	"	3
1897.8	239.2	3.88	See	1

Fixed.

No. 57. Lalande 4. Lal. 1661-2. ^{MAG.} 7.3
 $0^h 53^m 11^s$ — $16^\circ 13' 4''$

8.0 and 8.2

1851.0	215.0*	6.37	Jacob	2 n
1877.8	214.9	6.33	Cinc.	3
1881.9	211.7	6.58	Pritchett	3
1885.8	215.2	6.34	Cinc.	4
1892.9	214.0	6.16	Haverford	2

Three nights' observations by Secchi yielding a discordant angle made this pair seem in motion.

Called λ 1138 by Secchi, but erroneously so.

Separately observed on the meridian at several observatories.

A 7.8 mag. star = Lal. 1648 is S.pr.

No. 58. Innes 48. Lac. 272. ^{MAG.} 7.2
 $0^h 54^m 0^s$ — $67^\circ 6' 0''$

7.5 and 8.8

1896.8	342. ±	0.75 ±	Innes	2 n
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The p.m. is insensible.

No. 59. β 234. Ö.A. 563. ^{MAG.} 8.4
 $0^h 55^m 38^s$ — $17^\circ 37' 6''$

Both = 9.2

1875.9	154.4*	Cinc.	3 n
1877.8	150.9	4.73	"	3-2
1888.0	152.2	4.70	Haverford	2

Ö.A. 565, mag. 9.0, is $40''$ distant.

Other measures.

8A

O hrs.

REFERENCE CATALOGUE OF

No. 60.	Innes 49.	Lac. 278.		MAG.	1877.9	129.1*	4.98	Melbourne	4
	O ^h 56 ^m 17 ^s	— 53° 7.3.		7.0	1880.2	126.2	4.74	Sydney	2
	7.4 and 8.4, both yellow.				Observed separately on the meridian at the Cape and Cordoba.				
1896.8	40.±	0.8±	Innes	1 n					
1897.8	45.±	0.8±	„	1					
No. 61.	Washburn 62.	B.D. —9°, 205.	9.0						
	O ^h 57 ^m 2 ^s	— 9° 23'.7.							
	Both = 9.8								
1888.8	291.0	1.25	Washburn 4-3 n						
No. 62.	λ 10.	Lal. 1823.	8.0						
	O ^h 57 ^m 32 ^s	— 22° 8'.6.							
	Comes = 10.3								
1897.6	323.0	4.94	See	1 n					
No. 63.	h. 3416.	Lac. 297.	6.8						
	O ^h 59 ^m 15 ^s	— 60° 37'.9.							
	7.4 and 7.7								
1836.1	126.8	5.33	h	3 n					
1851.0	129.1	4.74	Jacob	2					
1857.9	129.0	4.81	„	1					
No. 64.	h. 3415.	Lac. 294.		MAG.					
	O ^h 59 ^m 19 ^s	— 41° 11'.1.		7.0					
	7.3 and 8.6								
1834.7	157.0	0.8±	h	2 n					
1858.0	152.4	1.28	Jacob	2					
1870	Divided 140° to			Russell	4				
1877	157°.0".5 to 1".±								
1882.0	141.9	0.91	Hargrave	1					
1895.9	150.3	1.23	Sellers	2					
	Change doubtful.								
No. 65.	Ormond Stone.	Lac. 296.	6.5						
	O ^h 59 ^m 50 ^s	— 34° 4'.2							
	Comes = 10.0								
1877.8	219.1	8.45	Cinc.	1 n					
1879.7	218.4	8.64	β	2					
1891.8	220.3	8.68	„	3					
1896.9	220.0	8.43	Hussey	1					
1896.8	219.4	8.37	See	2					
	Also registered as β 735.								

SOUTHERN DOUBLE STARS.

1 hr.

9A

No. 1.	Sellors 1.	β Phoenicis.	MAG.	
	1 ^h 1 ^m 37 ^s	— 47° 15'.3.	3.4	
	Both = 4.2			
1892.0	26.3	0.93	Sellors	1 n
1892.9	24.4	0.92	"	3
1893.9	23.1	0.96	"	5
1894.8	23.1	1.64	Tebbutt	4
1894.9	22.0	1.02	Sellors	3-2
This fine binary system has a p.m. of 0".062 towards 256°.9.				
<i>h</i> noted an 11 th mag. companion 30" N.f. (17°.6). Of the chief star he remarks, "A mere blot," which may refer to bad definition or to his inability to see a neat disc, which should be the case if the two principal stars were then over 1".5 apart.				
This star is included in the Arequipa list of New Double Stars (<i>Harvard Circular</i> , No. 18).				
No. 2.	<i>h</i> 3418.	C.P.D.—58°, 73.	9.0	
	1 ^h 1 ^m 38 ^s	— 58° 25'.8.		
	9.5 and 10.2			
1835.8	252.6	1.9 ±	<i>h</i>	2 n
Seen in 1898. Not much change if any.				
C. Z. 1 h. 1, mag. 8.3, is about 8' N.pr.				
No. 3.	β 501.	Lal. 1958.	8.0	
	1 ^h 1 ^m 41 ^s	— 5° 11'.0.		
	<i>Comes</i> = 11.7			
1878.5	29.9	2.55	β	2 n
1891.9	31.3	2.73	"	3
No. 4.	Σ 91.	Lal. 1965.	6.8	
	1 ^h 2 ^m 4 ^s	— 2° 16'.0.		
	7.2 and 8.2, both yellow			
1821.9	328.3	4.01	Σ	1 n
1831.9	328.8	3.86	"	3
1854.8	323.2	4.03	Dembowski	3
1877.8	321.3	3.92	Cinc.	4
1886.8	321.1	4.12	L. McC.	1
1892.8	321.7	4.05	Haverford	5
Many other measures and meridian observations of both components.				

No. 5.	Gale.	Lac. 342.	MAG.	
	1 ^h 3 ^m 24 ^s	— 83° 47'.4.	8.2	
	8.6 and 9.6			
1894.9	0. ±	0.8 ±	Gale	— n
No. 6.	Innes 262.	Ö.A. 655.	7.7	
	1 ^h 4 ^m 6 ^s	— 30° 9'.2.		
	8.1 and 9.1			
1897.9	170. ±	0.8 ±	Innes	1 n
No. 7.	Sellors 2.	Lac. 317.	7.0	
	1 ^h 4 ^m 7 ^s	— 47° 12'.2.		
	7.1 and 9.6			
1892.9	200.0	1.09	Sellors	3 n
1893.9	201.4	0.84	"	1
This fine pair follows β Phoenicis, and is more difficult.				
No. 8.	Rumker 2.	ζ Phoenicis.	4.1	
			Yellow	
	1 ^h 4 ^m 11 ^s	— 55° 46'.8.		
	C.G.A. 1067 = 8.4 reddish			
1835.9	244.0	6.27	<i>h</i>	2 n
1845.9	241.7	5.88	Jacob	3-1
1851.0	242.3	6.39	"	2
1852.8	244.1	6.00	"	2
1878.0	245.1	6.43	Melbourne	3
1894.9	243.2	6.52	Tebbutt	1
No. 9.	Cape 1.	C. Z. 1 h. 98.	8.3	
	1 ^h 5 ^m 0 ^s	— 40° 40'.5.		
	8.8 and 9.3			
1896.9	80. ±	2.5 ±	Innes	1 n
Found by Mr W. H. Cox at the Transit-Circle.				
No. 10.	Gilliss 9.	Lac. 332.	6.7	
	1 ^h 7 ^m 4 ^s	— 73° 29'.4.		
	<i>Comes</i> = 10.7			
1887.9	354.8	3.98	Pollock	2 n

B

10A

1hr.

REFERENCE CATALOGUE OF

No. 11. Cordoba [3]. C.Z. 1 h. 152. 8.3
 1^h 7^m 9^s — 45° 59'.8.

9.0 and 9.2

1880.8 71.5 2.52 C. G. A. 3 n

No. 12. H. V. 24. 37 Ceti. 5.0
 1^h 9^m 22^s — 8° 27'.6.

Piazzi I h. 22 = 8.2

1782.7 332.6 45.9 H 1-2 n

1836.0 331.4 50.1 Σ 4

1884.0 331.4 49.7 Pulkowa 2

Relatively fixed.

Common p.m. of 0".291 towards 16°.3.

No. 13. Innes 27. Lac. 353. 7.3
 1^h 11^m 34^s — 69° 21'.0.

7.7 and 8.7.

1896.4 183.± 1.2± Innes 2 n

This pair shares in the p.m. of the next star κ Toucani which is about 5' 20" S.f., and with it forms a quadruple stellar system.

(See *Monthly Notices R. A. S.*, vol. lvii. pp. 456-7, 1897).†

Also noted as double at Arequipa. See *Harvard Circular*, No. 18, 29th July 1897.

No. 14. h. 3423. κ Toucani. 4.9
 1^h 12^m 23^s — 69° 24'.5.

5.0 and 7.7 purple

1834.9 11.7 2.7± h 2 n

1836.8 16.0 5.01 ,, 2

1871.9 0.0 5.19 Russell 2

1878.0 0.1 4.73 Melbourne 3

1880.6 4.2 4.97 Cruls 1

1887.9 355.7 4.93 Pollock 3

1891.9 356.3 5.41 Sellors 3

1894.9 354.8 5.52 Tebbutt 3

Common p.m. of 0".407 towards 86°.2.

See also the preceding star.†

No. 15. Innes 50. C.Z. 1 h. 293. 9.0
 1^h 12^m 42^s — 37° 48'.4.

9.4 and 10.4

1896.8 140.± 1.± Innes 1 n

Lac. 352, mag. 7.5, is 6 sec. f. and 1½' N.

No. 16. h. 3426. Lac. 361. 6.2
 1^h 13^m 35^s — 66° 55'.5.

6.3 and 9.3

1834.9 341.7 2.± h 1 n

1837.7 348.2 2.52 ,, 1

1877.7 340.7 2.52 Melbourne 2-1

1887.9 339.0 1.90 Pollock 2

Some change shown.

No. 17. λ 11. Lal. 2390. 8.2
 1^h 13^m 58^s — 27° 2'.1.

8.7 and 9.4

1896.8 315.8 1.88 See 2 n

1897.7 313.8 2.07 ,, 1

No. 18. Σ 113. 42 Ceti. 6.2
 1^h 14^m 41^s — 1° 2'.0.

6.8 and 7.2

1829.9 330.8 1.24 Σ 2 n

1833.9 333.9 1.22 ,, 7

1836.9 334.3 1.18 ,, 3

1863.0 343.0 1.27 Dembowski 6

1881.8 350.2 1.58 β 3

1887.0 349.9 1.28 Hall 3

1893.0 352.9 1.48 Maw 3

Many other measures.

The p.m. is inconsiderable.

Evidently a binary system, but the motion is very slow, the increase in angle being about 1° in three years.

† Nos. 13 and 14. Connecting the chief star of κ Toucani and the optical centre of gravity of Lac. 353 we have:—

1874.8	129 31'	319.65	Cape M.O.	3 n
1898.2	129 21	319.17	De Sitter	1

the latter measure being made with the Cape Heliumeter.

SOUTHERN DOUBLE STARS.

1^{hr}.

R.A.

No.	β	C. Z.	h.	MAG.
No. 19.	β 1229.	C. Z.	1 h. 351.	7.8
	1 ^h 14 ^m 42 ^s	—	35° 1' 1.	
	8.5 and 8.6			
1891.8	292.4	1.04	β	3 n
1893.9	293.0	1.02	Sellors	2
1896.8	291.4	1.01	Lowell	3
1898.0	292.6	1.14	Aitken	3

No.	λ	Lal.	MAG.	
No. 20.	λ 12.	Lal. 2406.	7.0	
	1 ^h 14 ^m 43 ^s	—	25° 28' 4.	
	Both = 7.8			
1897.7	205. ±	0.15 ±	See	1 n

No.	h.	Lal.	MAG.	
No. 21.	h. 2036.	Lal. 2416.	6.3	
	1 ^h 15 ^m 3 ^s	—	16° 20' 1.	
	7.0 and 7.2, both white			
1830.8	53.0	2. ±	h	1 n
1836.3	41.5	1.53	"	2
1851.9	40.7	1.89	Jacob	2
1854.9	40.2	1.65	Cape	1
1858.0	36.1*	1.57	Jacob	3
1875.1	26.5	1.54	Dembowski	2
1877.2	23.3	1.47	"	3
1877.5	26.7	1.47	Cinc.	6
1882.8	26.0	1.87	"	1
1886.5	20.6	1.65	L. McC.	5
1888.7	19.7*	1.70	Haverford	3
1892.9	17.8	1.16	"	2
1895.9	14.1	.....	Doberck	5
1897.9	17.0	1.44	Hussey	2

Also registered as β 110.

Variability suspected.

A binary system.

A few other measures.

No.	h.	Lac.	MAG.	
No. 22.	h. 3430.	Lac. 369.	6.8	
	1 ^h 16 ^m 29 ^s	—	57° 52' 0.	
	6.9 and 10.2			
1834.8	251.7	1.5 ±	h	1 n
1858.0	246.3	2.0 ±	Jacob	3
1889.8	238.6	1.86	Pollock	1
1894.9	230. ±	2. ±	Innes	1

Some change.

No.	λ	Lal.	MAG.
No. 23.	λ 13.	Lal. 2474.	8.0
	1 ^h 16 ^m 59 ^s	—	24° 39' 2.
	8.5 and 9.0		

1897.6	306.0	0.24	See	1 n
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No.	h.	Lal.	MAG.
No. 24.	h. 2043.	Lal. 2498.	6.9
	1 ^h 17 ^m 40 ^s	—	19° 36' 1.
	7.0 and 9.4		

1846.8	76.4	4.89	Jacob	2 n
1879.8	73.0	5.26	Cinc.	2
1892.9	73.8	4.98	Glazenapp	3
1897.8	74.9	5.59	See	1

Separately observed on the meridian at Cordoba.

No.	Secchi	Piazzi	h.	MAG.
No. 25.	Secchi 2.	Piazzi 1	h. 68.	6.8
	1 ^h 18 ^m 49 ^s	—	24° 52' 5.	
	7.0 and 8.9			

1856.0	83.5	2.93	Secchi	1 n
1878.8	79.7	2.50	Cinc.	2
1886.8	80.8	2.69	L. McC.	3
1889.0	81.1	2.98	Haverford	2-1
1897.7	82.5	2.84	See	2

Separately observed on the meridian at Cordoba in 1877.

Although not likely, this may be the pair h 3429 with errors of -2^m and $+2^o$ in R.A. and Dec. h gives:—1834, $15^\circ \pm$, $5'' \pm$, mags. 7 and 9.5. It is as h 3429 that Secchi measured the above pair.

No.	Innes	Lac.	MAG.
No. 26.	Innes 263.	Lac. 399.	7.2
	1 ^h 18 ^m 58 ^s	—	70° 14' 5
	7.7 and 8.2		

1897.9	52. ±	0.65 ±	Innes	2 n
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No.	β	W.B.	h.	MAG.
No. 27.	β 1163.	W.B. 1	h. 271.	6.0
	1 ^h 19 ^m 19 ^s	—	7° 26' 2.	
	6.7 and 6.9			

1890.68	192.3	0.19	β	3 n
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The p.m. is very small.

No. 28.	Σ 120.	Lal. 2582.		MAG.
	1 ^h 19 ^m 58 ^s	— 6° 28'.1.		7.0
	Comes = 10.4			
1831.6	280.7	7.06	Σ	3 n
1867.1	279.7	7.14	Dembowski	3
1877.9	278.6	7.47	Cinc.	1

No. 29.	β 399.	Lal. 2675.		MAG.
	1 ^h 22 ^m 47 ^s	— 11° 25'.2.		6.2
	Comes = 9.7			
1876.5	302.8	7.39	Dembowski	2 n
1877.7	301.2	1.89	"	1
No other measures found.				
First seen by β in Dec. 1873.				

No. 30.	β 1230.	Piazzi 1 h. 99.		MAG.
	1 ^h 25 ^m 40 ^s	— 26° 43'.4.		6.1
	Comes = 11.6			
1891.84	224.5	2.62	β	4 n
Mag. in C. P. D. = 7.4.				

No. 31.	Innes 264.	Lac. 446.		MAG.
	1 ^h 27 ^m 36 ^s	— 53° 53'.1.		8.0
	Both = 8.8			
1898.0	310. ±	0.5 ±	Innes	3 n
An 11 th mag. star 20" ± N!				

No. 32.	Howe.	W.B. 1 h., 457.		MAG.
	1 ^h 28 ^m 37 ^s	— 12° 43'.5.		8.5
	9.1 and 9.5			
1877.8	330.1	0.88	Cinc.	2-1 n
1885.8	329.6	0.87	"	1
1886.7	327.6	0.85	L. McC.	1

No. 33.	Innes 51.	Lac. 460.		MAG.
	1 ^h 30 ^m 6 ^s	— 46° 12'.4.		7.0
	7.1 and 9.9			
1896.8	15. ±	1.4 ±	Innes	2 n

No. 34.	β 1000.	Lac. 458.		MAG.
	1 ^h 30 ^m 23 ^s	— 30° 25'.6.		7.4
	Comes = 11.0			
1881.8	336.4	1.80	β	2 n
1891.8	356.4	1.44	"	3
1897.9	350. ±	1.5 ±	Innes	1
There is an 8.7 mag. star 142" distant.				

No. 35.	h. 3447.	τ Sculptoris.		MAG.
	1 ^h 31 ^m 31 ^s	— 30° 25'.2.		5.7
	6.1 and 7.1			
1837.2	75.4	3.35	h	2 n
1846.3	82.4	2.90	Jacob	2
1851.0	82.5	2.62	"	2
1852.9	82.5	2.50	"	3
1877.8	90.1	2.20	Cinc.	3
1878.0	90.1	2.43	Melbourne	2
1881.8	87.3	2.19	β	3
1889.0	93.2	2.16	Hall	2
1894.9	91.3	2.09	Tebbutt	4
1896.8	92.6	2.01	See	2

In 1882 this star was looked for at Sydney and "not divided" on one night by Hargrave. It is almost certain that some other star was examined. Some decrease in distance with the increase in angle.

No. 36.	Pollock [1].	Lac. 483.		MAG.
	1 ^h 34 ^m 29 ^s	— 45° 6'.3.		8.0
	8.7 and 8.8			
1887.9	37.8	1.02	Pollock	2 n
1889.9	38.3	1.25	"	1
1893.9	39.3	1.12	Sellers	1

No. 37.	Dunlop 5.	p Eridani.		MAG.
	1 ^h 35 ^m 59 ^s	— 56° 42'.2.		5.3
	6.0 and 6.1			
1834.8	302.3	3.65	h	5-2 n
1849.8	269.4	4.38	Cape	1
1854.9	262.6	4.44	"	2
1861.0	253.4	4.86	Powell	6-4
1870.9	242.1	5.46	Russell	1
1877.9	236.0	6.36	Ellery	2
1886.9	230.3	6.76	Pollock	2
1890.9	226.7	6.84	Sellers	
1896.9	223.4	7.40	"	
Many other measures.				

The first observation of this star by James Dunlop is to be found in vol. iii. of the *Mem. R. A. S.*, p. 259, and is here quoted in full:—

“Double, both of the small 6th magnitude. December 1825.

Position.	
rev.	div.
3	2,0 n.f.
3	2,5
3	4,0
<hr/>	
Mean = 3	2,8
Position	73° 6'

“A beautiful double star, both stars white; the preceding a little dusky. I cannot say which of the stars is the larger; perhaps the following if there be any difference. The distance is about equal to one diameter of the following star, which I estimate at 2½ seconds.”

Dunlop's position circle seems to have been rotated by means of a divided head, of which one revolution was equal to 24° and one division equal to 24'.

The angle 73°.1 n.f. corresponds to 16°.9 in the ordinary way of reckoning, but it is suggested that n.p. was really meant, and that the angle should be 343°.1. With this angle Mr J. E. Gore finds the following orbit, using modern observations to 1886.

$$\begin{aligned} T &= 1823.55 \\ P &= 302.37 \text{ years.} \\ a &= 6''.96 \\ e &= 0.674 \\ i &= 38°.5 \\ \Omega &= 135°.0 \text{ (1870)} \\ \lambda &= 240°.0 \end{aligned}$$

The representation of observations to 1897 with these elements is practically perfect.

It has, however, been considered that one star is passing another by proper motion. This is equivalent to rejecting not only Dunlop's observation but also all made by *h* (eight extending over three years).

A careful discussion of all the meridian observations, which unfortunately end in 1881, yields the following proper motions:—

	R.A.	Dec.
Preceding star,	+ 0".035	+ 0".09
Following „	+ 0".031	- 0".07

or the mean point has a p.m. along a great circle of

$$0''.27 \text{ towards } 87.9$$

Considering all the circumstances, it seems, very probably, that this is a binary system, interesting on account of its p.m. and large semi-axis major.

Assuming that the mass of this system is equal to that of the Sun, the parallax would be 0".16.

The distance will increase slowly for the greater part of a century.

The following papers may be consulted:—

1877. Doberck, W., “Orbit.” *Astr. Nach., Nrs.* 2148 and 2168.
 1881. Russell, H.C., “Motion,” *M. N. R. A. S.*, vol. xli. pp. 166–7.
 1883. Downing, A. M. W., “Orbit,” *M. N. R. A. S.*, vol. xliii. pp. 263–266.
 1887. Gore, J. E., “Orbit,” *M. N. R. A. S.*, vol. xlvi. pp. 26–27.
 1893. Burnham, S. W., “Motion,” *Astronomy and Astrophysics*, vol. xii. pp. 587–8.

No. 38. λ 15. **Piazzi 1 h. 153.** ^{MAG.} 7.8.
 $1^h 36^m 25^s$ — $22^\circ 13'.5$
 8.1 and 9.7

1897.7 311.1 2.74 See 1 n

No. 39. **h. 2072. Lal. 3138.** 8.6
 $1^h 36^m 43^s$ — $18^\circ 29'.6$
 9.0 and 10.0

1831 278.2 $3. \pm$ *h* 1 n
 1868.9 283.7 4.04 Harvard 3-2
 1877.8 282.8 3.05 Cinc. 3
 1886.7 283.6 3.39 L. McC. 1-2

An uninteresting pair, *h* 2067, will be found, 2^m 13^s pr. 12' N.

No. 40. **Lalande 8. Lal. 3137.** 5.9
 $1^h 36^m 49^s$ — $11^\circ 49'.1$
 6.2 and 7.5

1831.9 88.2 4.01 Σ 5 n
 1851.9 88.1 4.30 W. Struve 1
 1857.0 89.6 3.78 Morton 2
 1867.1 87.7 3.50 Dembowski 4
 1877.9 86.5 4.00 Cinc. 3
 1884.9 88.0 3.52 Seabroke 1
 1886.7 87.4 3.69 L. McC. 7
 1892.9 90.4 3.29 Glasenapp 2
 1895.9 88.5 3.46 Doberck 4-3

Fixed in angle.

Common p.m. of 0".424 towards $172^\circ.0$.
 Also registered as Σ 147.

No. 41. **Russell 11. Lac. 521.** 8.2
 $1^h 38^m 0^s$ — $76^\circ 31'.6$
 Both = 9.0

1873.9 126.9 1.94 Russell 1 n

No. 42. Sellors 3. C. Z. 1 h. 997. ^{MAG.} 9.2 $1^{\text{h}} 39^{\text{m}} 16^{\text{s}}$ — $55^{\circ} 21' 6''$.	No. 47. β 871. Lal. 3289. ^{MAG.} 8.0 $1^{\text{h}} 42^{\text{m}} 50^{\text{s}}$ — $1^{\circ} 27' 3''$.
Both = 10.0	8.4 and 9.1
1893.0 179.3 1.± Sellors 1 n	1879.9 352.6 1.88 β 4 n 1886.6 351.3 2.28 L. McC. 3 1888.3 352.0 1.97 Haverford 3-2
No. 43. Gilliss 14. Lac. 561. 7.2 $1^{\text{h}} 39^{\text{m}} 18^{\text{s}}$ — $82^{\circ} 47' 2''$.	No. 48. Innes 52. C. Z. 1 h. 1092. 8.5 $1^{\text{h}} 43^{\text{m}} 31^{\text{s}}$ — $44^{\circ} 28' 2''$.
7.7 and 8.2	9.0 and 9.5
1887.9 53.0 6.02 Pollock 2 n Separately observed on the meridian at Cordoba.	1896.8 180.± 1.± Innes 1 n The pr. of 3 stars in a curve.
No. 44. β 6. Lal. 3205. 7.0 $1^{\text{h}} 39^{\text{m}} 43^{\text{s}}$ — $7^{\circ} 16' 1''$.	No. 49. Triple. Pos. Med. 157. 8.1 $1^{\text{h}} 43^{\text{m}} 41^{\text{s}}$ — $1^{\circ} 55' 3''$.
7.1 and 9.9	A and B = Σ 171
1875.5 167.1 2.59 Dembowski 4 n 1886.9 166.1 2.62 L. McC. 2 1888.7 167.6 2.65 Haverford 3-2 An 8.3 mag. star is $6' 3''$ due N.	8.9 and 9.0 1829.9 157.6 27.9 Σ 2 n 1865.1 159.0 29.1 Dembowski 4 1879.9 159.5 29.7 β 4 1891.9 159.9 30.2 " 3
No. 45. h. 3464. Lac. 534. 7.8 $1^{\text{h}} 39^{\text{m}} 48^{\text{s}}$ — $76^{\circ} 44' 9''$.	Angle and distance increasing. B and C = β 511
8.0 and 9.7	9.0 and 12.5
1836.9 156.3 2.2 ± h 1 n 1873.9 160.3 3.73 Russell 1 Separately observed on the meridian at Cordoba.	1878.2 316.0 3.69 β 3 n 1891.9 317.4 3.91 " 3
No. 46. h. 3461. ϵ Sculptoris. 5.2 $1^{\text{h}} 40^{\text{m}} 58^{\text{s}}$ — $25^{\circ} 33' 1''$.	No. 50. β 1001. Lal. 3339. 8.0 $1^{\text{h}} 44^{\text{m}} 3^{\text{s}}$ — $18^{\circ} 52' 6''$.
Comes = 9.2	Comes = 11.5
1836.5 69.6 5.53 h 2 n 1877.6 60.2 4.80 Cinc. 4-3 1879.0 61.1 4.28 β 1 1887.1 61.0 4.55 Hall 4 1897.6 51.6 4.91 See 1	1881.8 2.7 1.32 β 3 n Lal. 3363, mag. 7.9, is $7' \text{ S.f.}$
Angle and distance perhaps decreasing. It is a physical system on account of the common p.m. of $0''.137$ towards $121^{\circ}.1$.	No. 51. β 1168. Schj. 534. 8.1 $1^{\text{h}} 44^{\text{m}} 47^{\text{s}}$ — $10^{\circ} 52' 1''$.
In the C. P. D. the combined mag. is 6.4 indicating colour.	8.7 and 9.0 1890.71 203.0 0.32 β 4 n This close pair is $1^{\text{m}} 44^{\text{s}}$ pr. 2.4 S. of ζ Ceti, mag. 3.8; and $19' \text{ N.f.}$ χ Ceti, mag. 4.8.

SOUTHERN DOUBLE STARS.

1 hr.

15A

No. 52. h. 3469. Piazz 1 h. 188. ^{MAG.} 6.4
 1^h 45^m 30^s — 38° 54'.4

Comes = 10.2

1837.8 70.9 2.2 ± h 1 n

The only observation found.

The p.m. of the larger star is 0".26 towards 360°.
h remarks, "Must be verified."

No companion seen here 1897.9.

No. 53. β 259. W.B. 1 h. 805. 8.0
 1^h 47^m 29^s — 10° 13'.6

8.2 and 9.7

1875.8 236.0 4.51 Dembowski 3 n

1877.9 237.5 4.29 Cinc. 3

1889.0 239.7 4.52 Haverford 2-1

No. 54. β 183. Lal. 3487. 8.2
 1^h 48^m 20^s — 17° 13'.5

8.4 and 10.2

1874.7 226.4 2.79 Dembowski 1 n

1875.9 226.4 1.6 ± Cinc. 1

1879.8 226.7 2.42 " 1

1885.9 227.5 2.40 L. McC. 1

Other measures.

No. 55. h. 3473. χ Eridani. 3.6
 1^h 52^m 4^s — 52° 6'.4

Comes = 12.0

1834.8 193.9 12. ± h 1 n

The companion was not seen in 1896 with the
 6.9 - in. Merz refractor.*

The p.m. of the chief star is 0".667 towards 67°.4
 or more than 40" since *h*'s measure.

No. 56. h. 3475. Lac. 584. 6.4
 1^h 52^m 6^s — 60° 48'.0

7.0 and 7.4

1837.4 37.6 3.36 h 2 n

1851.0 43.5 2.5 ± Jacob 2

1858.0 39.4 2.43 " 2

1870.9 42.3 3.04 Russell 2

1879.0 45.3 2.45 Melbourne 1

1882.0 35.9 2.04 Russell 1

1890.9 47.9 1.97 Sellors 2

Registered as Russell 12 in 1880.

Separately observed on the meridian at Cordoba.

* 1898.8 - Seen in the Cape 18-in. M'Clean refractor. Apparently unchanged.

No. 57. Cape 2. C.P.D. — 42° 184. ^{MAG.} 9.0
 1^h 52^m 30^s — 42° 51'.5

9.6 and 10.0

1897.8 250. ± 3. ± Innes 1 n

Found by Mr A. Cochrane when observing the star
 in the Transit-Circle.

No. 58. β 7. 58 Ceti. 6.7
 1^h 52^m 54^s — 2° 32'.8

Comes = 11.4

1875.5 12.1 2.86 Dembowski 3 n

1877.8 12.9 2.79 Cinc. 3

1880.9 12.8 2.73 β 2

1886.9 10.9 3.10 L. McC. 3

"Very delicate and difficult":—β.

Considered a test for a 6-inch refractor.

The p.m. is about 0".02.

No. 59. Cordoba [4]. C.Z. 1 h. 1386. 8.1
 1^h 53^m 44^s — 52° 41'.1

8.3 and 9.9

1887.9 40.7 3.96 Pollock 2 n

Separately observed on the meridian at Cordoba
 in 1880.

No. 60. β 514. Lal. 3698. 8.4
 1^h 54^m 55^s — 13° 48'.2

Comes = 11.3

1877.7 135.3 6.20 β 1 n

1891.9 134.2 6.36 " 3

Lal. 3692, mag. 7.0, is 33' S. pr.

No. 61. Innes 265. Lac. 604. 8.0
 1^h 56^m 50^s — 44° 18'.8

8.4 and 9.4

1897.9 20. ± 0.6 ± Innes 1 n

16A

2 hrs.

REFERENCE CATALOGUE OF

No. 1.	β 516.	Lal. 3851.	MAG.
	2 ^h 0 ^m 7 ^s	— 1° 26'.8.	8.3
	8.9 and 9.2		
1877.9	285.0*	1.07 β	2 n
1886.8	287.4	0.84 L. McC.	3
1888.9	282.6	0.69 Haverford	3

Distance decreasing?

No. 2.	λ 16.	Ö.A. 1300.	MAG.
	2 ^h 1 ^m 20 ^s	— 22° 37'.8.	8.0
	8.4 and 9.4		
1897.7	36.1	0.54 See	2 n

No. 3.	Lalande 12.	Lal. 3952.	MAG.
	2 ^h 3 ^m 36 ^s	— 0° 54'.6.	7.8
	8.1 and 9.3, both white		
1832.4	250.0	4.78 Σ	4 n
1867.6	248.8	4.69 Dembowski	4
1877.8	247.6	4.98 Cinc.	3
1892.9	249.1	4.68 Haverford	2

Also known as Σ 218.
An 8.3 mag. star is 17 secs. pr.

No. 4.	H.IV. 25.	66 Ceti.	MAG.
	2 ^h 7 ^m 41 ^s	— 2° 51'.7.	5.6
	Companion = 8.7		
1821.0	225.8	16.34 Σ	2 n
1834.2	229.2	15.47 "	8
1852.2	229.9	15.55 O Σ	6
1864.9	229.1	15.60 Dembowski	5
1882.7	231.7	15.99 Cinc.	1
1884.9	231.5	15.99 "	2

Common p.m. of σ " 359 towards 98°.2.
Also known as Σ 231.

No. 5.	h. 3485.	Lac. 668.	MAG.
	2 ^h 7 ^m 45 ^s	— 49° 48'.2.	8.1
	8.6 and 9.3		
1836.9	143.0	3.± h	1 n
1853.0	139.3	4.51 Jacob	3
1878.0	S.f.	5.± Cordoba	3

No. 6.	h. 3488.	C. Z. 2 h. 237.	MAG.
	2 ^h 9 ^m 32 ^s	— 62° 7'.4.	8.2
	8.7 and 9.2		
1835.8	134.8	5.83 h	2 n
1875.4	137.5	4.86 Sydney	2
1878.0	136.0	4.86 Melbourne	2

No. 7.	Innes 266.	Lac. 691.	MAG.
	2 ^h 10 ^m 21 ^s	— 66° 37'.4. Yellow	7.6
	Comes = 11°0		
1897.9	160.±	3.± Innes	1 n

No. 8.	Hastings 1.	Lal. 4219.	MAG.
	2 ^h 11 ^m 4 ^s	— 18° 42'.0.	7.5
	8.1 yellowish, and 8.4 greenish		
1879.9	311.8	2.22 Hall	2 n
1885.0	333.4	2.29 "	3
1886.9	337.0	2.15 L. McC.	3
1887.1	338.9	2.18 Hall	4
1888.7	339.6	2.18 Haverford	9-8
1891.0	341.4	2.21 β	3
1891.0	343.6	2.06 Hall	3
1891.5	341.0	2.22 Haverford	6-4
1897.0	346.0	1.94 Aitken	2

Common p.m. of σ " 229 towards 180°.

No. 9.	Cordoba [5].	C. Z. 2 h. 314.	MAG.
	2 ^h 12 ^m 38 ^s	— 33° 27'.5.	8.5
	9.2 and 9.3		
1897.7	270.1	2.25 See	1 n

No. 10.	Ormond Stone.	C. Z. 2 h. 322.	MAG.
	2 ^h 13 ^m 4 ^s	— 31° 11'.0.	7.4
	7.8 and 8.8		
1877.9	202.6	3.02 Cinc.	2 n
1879.7	204.5	3.09 β	4-3
1885.8	202.3	2.73 Cinc.	2

Noted as a double star at Cordoba about 1874.
Also registered as β 737.
The estimated magnitude of A ranges from 6.5 to 8.5, and for B from 7.5 to 9.5.

SOUTHERN DOUBLE STARS.

2 hrs.

17A

No. 11. h. 3494. Lac. 702. MAG. 8.0
 2^h 15^m 36^s — 35° 54'.3.

8.7 and 8.8

1837.9	122.6	1.5 ±	h	3 n
1852.8	110.0	1.96	Jacob	2-1
1877.8	88.2	1.54	Cinc.	1
1887.9	75.6	1.42	Pollock	1
1893.0	67.6	0.98	Sellers	2
1897.7	62.1	1.28	See	1

Separately observed on the meridian at Cordoba in 1875, and noted as "elongated" at the Sydney Observatory in 1880.

A binary system, the motion at present being about 1° per annum.

Registered as a new pair by Prof. See, who identifies it with a star (C. Z. 2 h. 402) some way N.f.

No. 12. Harvard. Lac. 717. 5.4
 2^h 16^m 40^s — 56° 24'.3.

Recorded as double at Arequipa.

See *Harvard Circular*, No. 18.

The nearest star seen with the Cape 7-inch is a 10th mag. 30" at about 90°, and measured sixty years ago as h 3497.

Mag. in C.P.D. = 7.2.

No. 13. Innes 147. Cape 1880. 943. 7.7
 2^h 17^m 53^s — 48° 46'.1.

7.8 and 10.0

1897.1	340. ±	0.8 ±	Innes	1 n
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No. 14. Hough 313. W.B. 2 h. 249. 8.3
 2^h 18^m 21^s — 8° 16'.3.

8.9 and 9.3

1890.0	75.7	1.42	Hough	2 n
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A 13th mag. star 15" distant.

Hough 314, is 43 secs. f. 3' S.

No. 15. β 738. Lac. 720. 7.5
 2^h 18^m 53^s — 30° 19'.2.

8.0 and 8.5

1879.7	182.6	0.64	β	2 n
1891.8	174.3	0.55	"	3

"A close and difficult pair": —β.

No. 16. Hough 314. W.B. 2 h. 264. MAG. 8.9
 2^h 19^m 5^s — 8° 19'.0.

9.1 and 10.9

1890.0	198.4	3.95	Hough	2 n
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See also No. 14 = Hough 313.

No. 17. β 739. O.A. 1542. 7.8
 2^h 20^m 26^s — 30° 18'.7.

8.4 and 8.7

1879.7	264.5	2.13	β	3 n
1891.8	266.0	1.45	"	3
1897.0	261.4	1.69	Aitken	2

First noticed as a double star at Cordoba in 1878.

See also No. 15 = β 738.

No. 18. β 519. Lal. 4628. 8.3
 2^h 24^m 39^s — 2° 42'.7.

8.8 and 9.5

1877.9	57.7*	0.97	β	1 n
1878.4	58.8	0.80	"	2
1886.6	55.2	1.17	L. McC.	4-3
1891.9	59.4	0.69	β	2

No. 19. Howe 3. B.D.—8°, 470. 9.1
 2^h 26^m 40^s — 8° 2'.3.

9.8 and 9.9

1877.3	205.1	2.21	Dembowski	2 n
1877.8	207.2	2.16	Cinc.	3
1885.8	208.3	2.27	"	2
1886.7	206.4	2.53	L. McC.	4
1889.0	210.5	.....	Haverford	1

Change doubtful.

No. 20. Σ 280. Lal. 4773. 7.0
 2^h 29^m 8^s — 6° 4'.5.

7.7 and 7.9

1831.2	349.8	3.77	Σ	3 n
1856.7	345.9	3.90	Dembowski	1
1879.7	346.7	3.52	Cinc.	2
1886.7	346.3	3.73	L. McC.	4-3
1892.8	345.8	3.30	Haverford	2

c

18A

2 hrs.

REFERENCE CATALOGUE OF

No. 21.	h. 3506.	ω Fornacis.	MAG. 4.8						
	2 ^h 29 ^m 28 ^s	— 28° 40' 3.							
	4.9 white, and 7.9 blue								
1835.9	241.1	5" \pm	<i>h</i>	1 n					
1858.0	242.8	10.7	Jacob	2					
1876.0	241.8	11.7	Cinc.	3					
1884.8	244.4	10.8	"	1					
1897.7	243.2	11.1	See	1					
No. 22.	β 520.	Lal. 4858.	MAG. 8.3						
	2 ^h 31 ^m 49 ^s	— 4° 0' 0.							
	8.5 and 10.0								
1879.99	214.7	0.78	β	1 n					
1886.93	199.8	0.89	L. McC.	1					
An 8.3 mag. star is 22' S.f.									
No. 23.	Hough 315.	W.B. 2 h. 537.	MAG. 8.7						
	2 ^h 33 ^m 53 ^s	— 2° 1' 1.							
	9.4 and 9.6								
1891.9	359.2	1.04	Hough	2 n					
An 8.0 mag. star is 32 secs. pr. 10½' N.									
No. 24.	Innes 53.	Cor. D.M.—40° 686.	MAG. 9.6						
	2 ^h 35 ^m 40 ^s	— 40° 23' 6.							
	10.1 and 10.8								
1896.9	325. \pm	2. \pm	Innes	2 n					
Closely N.pr. C. Z. 2 h. 953, mag. 8.3; and ϵ Eridani, mag. 4.2, is N.f.									
This pair can be clearly distinguished on a Cape Photo. Plate.									
No. 25.	λ 19.	Lal. 5005.	MAG. 7.7						
	2 ^h 36 ^m 3 ^s	— 24° 33' 9.							
	8.2 and 8.7								
1897.7	323.8	0.57	See	1 n					
No. 26.	Σ 295.	84 Ceti.	MAG. 6.2						
	2 ^h 36 ^m 6 ^s	— 1° 7' 3.							
	6.3 and 8.8								
1829.8	335.1	4.60	Σ	2 n					
1834.0	334.2	5.10	"	2					
1856.5	326.5	4.82	Pulkowa	3					
1864.0	324.7	4.63	Dembowski	3					
1881.8	324.5	4.70	β	2					
1888.7	323.0	4.27	Haverford	2					
Common p.m. of 0".135 towards 152°.									
No. 27.	β 261.	Lac. 846.	MAG. 7.0						
	2 ^h 39 ^m 24 ^s	— 28° 19' 4.							
	7.1 and 9.8								
1876.8	100.5	2.98	Cinc.	5-3 n					
1884.8	99.8	2.90	"	2					
1891.7	100.1	2.77	Haverford	1					
Separately observed on the meridian at Cordoba. There is another pair S.f. See No. 29.									
No. 28.	h. 3527.	Piazzi 2 h. 173.	MAG. 6.2						
	2 ^h 39 ^m 27 ^s	— 40° 57' 2.							
	6.9 and 7.1, both white								
1836.6	43.2	1.47	<i>h</i>	3 n					
1845.8	46.0	1.3 \pm	Jacob	1					
1851.0	45.0	1.5 \pm	"	2					
1880.0	43.6	1.41	Hargrave	1					
1895.9	44.5	.....	Doberck	5					
This fine pair shows no sign of change.									
No. 29.	Howe.	Ö.A. 1780.	MAG. 8.6						
	2 ^h 39 ^m 37 ^s	— 28° 51' 7.							
	9.1 and 9.6								
1878.4	352.4	3.70	Cinc.	2 n					
Separately observed on the meridian at Cordoba.									

SOUTHERN DOUBLE STARS.

2 hrs.

19A

No. 30.	β 83.	Lal. 5140.	MAG.
	$2^h 41^m 0^s$	$- 5^\circ 22'.7$	7.7
	8.0 and 9.3		
1872.±	$123.^\circ \pm$	$1.3 \pm$	β 1 n
1876.0	121.3	1.40	Dembowski 4
1877.9	122.2	1.01	Cinc. 2
1888.9	109.4	1.01	Haverford 2-1
1891.8	111.7	0.90	β 3
1892.2	115.6	0.97	Haverford 3

The angles seem irreconcilable.

No. 31.	Innes 267.	C.Z. 2h. 1123.	8.0
	$2^h 41^m 48^s$	$- 41^\circ 39'.2$	
	8.4 and 9.4		

1898.0	$[4.^\circ \pm]$	$1. \pm$	Innes 1 n
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The N.f. of a finder pair.

No. 32.	Innes 28.	Bris. 410.	8.5
	$2^h 42^m 4^s$	$- 67^\circ 42'.4$	
	Comes = 11.1		

1895.8	$3. \pm$	Innes 1 n
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No. 33.	β 1002.	Lal. 5198.	8.0
	$2^h 42^m 26^s$	$- 15^\circ 47'.8$	
	8.1 and 11.3		

1881.8	333.7	1.78	β 3 n
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No. 34.	Leavenworth.	Ö.A. 1817.	8.8
	$2^h 43^m 0^s$	$- 18^\circ 44'.2$	
	Comes = 12.2		

1886.8	24.6	3.08	L. McC. 2 n
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The brightest of a group of three stars.

No. 35.	Triple.	C.Z. 2h. 1201.	9.0
	$2^h 44^m 20^s$	$- 60^\circ 34'.0$	
	A=9.5	B=10.0	C=9.7
	A and B, both yellow = Innes 268		

1897.9	$250.^\circ \pm$	$0.8 \pm$	Innes 1 n
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A + B and C = h 3534

1836.8	213.1	$25. \pm$	h 1 n
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1897.9	$220. \pm$	$15. \pm$	Innes 1
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 h 's dec. is 10' in error.

No. 36.	Σ 315.	Lal. 5253.	MAG.
	$2^h 44^m 29^s$	$- 10^\circ 57'.9$	8.0
	8.3 and 9.5		

1832.0	160.2	2.52	Σ 3 n
1865.9	156.7	2.30	Dembowski 3
1878.9	157.0	2.50	Cinc. 2
1892.8	156.8	2.46	Haverford 2

No. 37.	h. 3532.	Piazzi 2 h. 194.	6.7
	$2^h 44^m 38^s$	$- 37^\circ 49'.1$	
	6.9 and 8.4		

1837.9	149.7	$8. \pm$	h 2 n
1877.7	145.6	5.36	Cinc. 1
1880.0	146.2	5.22	Hargrave 1
1893.3	144.8	5.29	Scott 5
1895.9	148.0	.....	Doberck 2

Formerly called ν Fornacis.

Separately observed on the meridian at Cordoba.

No. 38.	β 10.	Lal. 5276.	7.2
	$2^h 45^m 22^s$	$- 5^\circ 24'.0$	
	7.3 and 10.6		

1874.8	99.2	2.66	Dembowski 4 n
1877.8	101.2	2.83	Cinc. 2-1
1879.7	100.1	2.56	" 1

The f. and brightest of three stars forming a triangle in the finder.

No. 39.	β 877.	γ_1 Fornacis.	6.4
	$2^h 45^m 25^s$	$- 24^\circ 58'.2$	
	Comes = 13.0		

1880.9	144.4	11.5	β 4 n
1892.0	145.5	12.0	" 2

The C. P. D. mag. of this star is 7.4.

 h noted a 10.5 mag. star about 47" distant.

No. 40.	h. 3535.	γ_2 Fornacis.	5.6
	$2^h 45^m 34^s$	$- 28^\circ 21'.4$	
	6.1 and 6.6		

1835.9	Double?	h	1 n
1877.41	316.8	2.03	Melbourne 1
1883-4	Elongated	Cinc.	2
1891	Single	β	1

The Melbourne measure was communicated. It leaves little doubt but that this is a binary system.

20A

2hrs.

REFERENCE CATALOGUE OF

No. 41.	h. 3536.	η_2 Fornacis.	MAG. 5.7
	2 ^h 46 ^m 12 ^s	— 36° 15'.5.	
	Comes = 10.5		
1835.8	6.0	4. ±	<i>h</i> 1 n
1879.7	9.8	6. ±	β 2
1880.0	12.6	6. ±	Pollock 1
1897.7	12.6	4.86	See 1
η_3 Fornacis is about 11' N.f.			
No. 42.	λ 21.	Ö.A. 1861.	8.3
	2 ^h 47 ^m 14 ^s	— 21° 42'.1.	
	Both = 9.1		
1897.6	98.1	0.36	See 1 n
No. 43.	Cordoba [6].	C.Z. 2h. 1269.	8.5
	2 ^h 47 ^m 15 ^s	— 45° 39'.0.	
	Both = 9.3		
1896.8	0. ±	3. ±	Innes 1 n
A neat pair.			
No. 44.	Harvard 59.	Ö.A. 1882.	8.6
	2 ^h 49 ^m 14 ^s	— 28° 15'.8.	
	8.8 and 10.8		
1869.9	101.4	3.29	Harvard 1 n
A wider and fainter pair, Harvard 60 is S.f.			
No. 45.	h. 3541.	C.Z. 2h. 1358.	8.5
	2 ^h 49 ^m 57 ^s	— 60° 20'.2.	
	8.7 and 10.4		
1836.8	150.4	1.5 ±	<i>h</i> 1 n
1883.0	157.0	2.19	Hargrave 1
No. 46.	Innes 148.	Cape 1880, 1214.	7.6
	2 ^h 52 ^m 17 ^s	— 63° 24'.6.	
	7.8 and 9.3		
1897.1	5. ±	4. ±	Innes 1 n
No. 47.	Cordoba [7].	C.Z. 2h. 1413.	MAG. 8.0
	2 ^h 52 ^m 41 ^s	— 39° 50'.7.	
	8.5 and 9.0		
1896.8	175. ±	4. ±	Innes 1 n
No. 48.	Innes 149.	Cor. D.M.—23°,	
		1138.	9.4
	2 ^h 52 ^m 48 ^s	— 23° 47'.1.	
	9.9 and 10.4		
1897.0	260. ±	3. ±	Innes 1 n
Cor. D.M. - 23°, 1136, mag. 8.9, is 13 secs. pr.			
No. 49.	β 741.	Lac. 932.	8.2
	2 ^h 52 ^m 50 ^s	— 25° 22'.3.	
	8.9 and 9.1		
1879.7	158.4	0.57	β 4 n
1891.8	165.6	1.26	" 3
Another star, 8.3 mag., 28" S.pr., makes, with the above pair, the old pair South 423 or Dunlop 8, which shows no signs of change.			
No. 50.	Piazzi 2.	θ Eridani.	3.1
	2 ^h 54 ^m 28 ^s	— 40° 42'.3.	
	3.3 and 4.8		
1835.9	81.5	8.71	<i>h</i> 2 n
1845.9	81.3	8.66	Jacob 1
1851.8	82.4	8.11	" 7
1852.9	83.0	7.93	" 6
1857.9	83.1	8.03	" 2
1874.0	82.3	8.19	Russell 1
1877.8	84.4	8.54	Cinc. 1
1882.2	85.0	8.44	Tebbutt 1
1890.0	84.3	8.34	Pollock 3
1893.3	85.6	8.44	Scott 4
1897.1	84.5	8.51	See 2
A fine double star with a common p.m. of 0."085 towards 290°.6.			
A slow increase in the angle.			
The temporary diminution of the distance during			

SOUTHERN DOUBLE STARS.

2 hrs

21A

1911AnCap...2A...11

1851-1874 is remarkable, and suggests the inevitable disturbing body.

It will be interesting if the phenomenon is repeated.

This pair is erroneously called *h* 3545 by Mr Russell.

Also registered as Dunlop 9.

No. 51. β 11. ρ_2 Eridani. ^{MAG.} 5.4
 $2^h 57^m 48^s - 8^\circ 4'.7$

Comes = 9.6 (variable ?)

1875.6	87.2	2.72	Dembowski	5 n
1877.8	85.9	2.45	Cinc.	3-2
1879.9	85.1	2.47	β	3
1886.8	81.8	2.72	L. McC.	2
1891.8	84.8	2.64	Haverford	2

The p.m. is about $0''.01$.

The middle of three bright stars.

No. 52. β 1174. Lal. 5683. ^{MAG.} 7.5
 $2^h 58^m 44^s - 11^\circ 21'.9$

Comes = 11.2

1890.82 305.9 1.22 β 3 n
 P.m. of $0''.178$ towards 180° .

No. 53. *h* 3549 Cor.D.M.— $38^\circ, 1007. 9.4$
 $2^h 59^m 10^s - 38^\circ 27'.3$

Comes = 11.2

1836.9	275.9	4.5 ±	<i>h</i>	2 n
1879.0	222.5	1.94	Hargrave	1
1898.0	280. ±	6. ±	Innes	1

Hargrave's angle is given = $225^\circ.5$ in the *Mem. R. A. S.* As explained elsewhere, the official publication is followed; but there seems to be some error in the observation, the pair is almost certainly fixed.

No.				MAG.
No. 1.	β 527.	Lal. 5765.		8.3
	$3^h 1^m 32^s$	$- 13^\circ 38'.5$		
	8.9 and 9.2			
1877.8	60.4	0.85	β	1 n
1878.0	57.6*	0.76	Cinc.	1
1892.0	66.0	0.83	β	3
Closely N.pr., Σ 356, a 16" pair.				
No. 2.	β 528.	W.B. 2 h. 1086.		8.3
	$3^h 3^m 25^s$	$- 3^\circ 58'.4$		
	Both = 9.1			
1878.0	197.5	1.01	β	2 n
1886.8	192.5*	0.91	L. McC.	1
1891.7	195.4	1.00	Haverford	1
In the field with Σ 358, a 15" pair.				
No. 3.	Σ 357.	B.D.—13°, 596.		8.4
	$3^h 3^m 30^s$	$- 12^\circ 59'.1$		
	8.8 and 9.6			
1833.0	294.7	7.88	Σ	3 n
1866.8	295.1	8.04	Dembowski	3
1896.2	295.2	7.96	Aitken	4
No. 4.	Cape 3.	C. Z. 3 h. 108.		9.2
	$3^h 4^m 30^s$	$- 42^\circ 53'.8$		
	9.8 and 10.1			
1897.0	$250 \pm$	$2 \pm$	Innes	1 n
The duplicity of this star was discovered by Mr W. H. Cox at the Transit-Circle.				
No. 5.	Innes 54.	C. Z. 3 h. 123.		8.7
	$3^h 5^m 0^s$	$- 41^\circ 44'.7$		
	9.4 and 9.6			
1896.8	$320 \pm$	$0.7 \pm$	Innes	1 n
Closely S.f. Bris. 484, mag. 8.3.				
No. 6.	Ormond Stone.	Cor. D.M.		9.1
		$- 23^\circ 1246.$		
	$3^h 5^m 50^s$	$- 23^\circ 6'.7$		
	9.7 and 10.0			
1875.9	178.0	3.77	Cinc.	2-1 n
1886.6	178.5	4.72	L. McC.	2

No.				MAG.
No. 7.	h. 663.	94 Ceti.		5.0
	$3^h 7^m 40^s$	$- 1^\circ 34'.2$		
	Comes = 11.5			
1830. \pm	$255. \pm$	$6. \pm$	h	1 n
1871.0	253.1	5.09	Dembowski	2
1878.7	251.9	5.73	β	2-1
1896.2	249.8	4.60	Aitken	2
Common p.m. of $0''.194$ towards 112° .				
"Not easy." (β with a 6-inch refractor.)				
No. 8.	h. 3555.	α Fornacis.		3.8
	$3^h 7^m 49^s$	$- 29^\circ 22'.9$		
	3.9 and 6.9			
1835.9	306.1	$3. \pm$	h	1 n
1847.0	309.8	4.09	Jacob	1
1851.1	308.3	3.39	"	2
1853.0	309.8	3.29	"	4-3
1856.2	310.0	3.31	"	4
1877.0	310.9	2.45	Schiaparelli	1
1877.8	316.9	2.56	Cinc.	3
1884.8	321.7	2.33	"	2
1888.0	320.0	1.53	Sydney	2
1889.0	326.6	1.97	Hall	2
1895.9	320.4	.....	Doberck	5
1897.7	330.2	1.58	See	1
Also known as 12 Eridani.				
Common p.m. of $0''.712$ towards $25^\circ.2$.				
A binary and evidently approaching periastron.				
No. 9.	λ 22.	Ö.A. 2118.		7.7
	$3^h 8^m 26^s$	$- 30^\circ 31'.5$		
	8.0 and 9.7			
1897.7	338.7	0.95	See	1 n
Identification somewhat doubtful.				
No. 10.	Triple.	Piazzi 3 h. 19.		5.9
	$3^h 8^m 55^s$	$- 44^\circ 47'.7$		
	A = 6.5 B = 7.0 C = 10.1			
	Innes 55 = A and B			
1896.8	$185. \pm$	$0.8 \pm$	Innes	2 n
1897.0	$190. \pm^*$	$1.0 \pm$	Sellers	1

h 3556 = A + B and C

Year	RA	Dec	Star	MAG.	Notes
1835.8	235.5	1.5 ±	h	1 n	
1848.1	237.6	1.8 ±	Jacob	1	
1851.1	230.5	2.44	"	3-2	
1856.2	228.4	2.83	"	3	
1872.	230. ±	1.5 ±	Russell	1	
1879.0	204.1	2.12	Hargrave	1	
1897.0	214.7	2.94	Sellors	3	
1897.1	220.3	2.46	See	2	

The close pair was found at the Cape in October 1896, and independently detected at Sydney early in 1897. Also seen at Arequipa (see *Harvard Circular*, No. 18, 29th July 1897). In 1856, Jacob remarks:—"A suspicion that A is a close double in a direction nearly South."

Hence it may be assumed that the close pair is stationary, or that the period is about forty years. A very few years will suffice to show which is the case.

Some change shown in the more distant star.

No. 11. β 529. Lal. 6006. **8.2**
3^h 9^m 8^s — 8° 56'.7.

Comes = 12.3

Year	RA	Dec	Star	MAG.	Notes
1877.9	220.0	2.40	β	2 n	
1891.9	222.4	3.11	"	2	

No. 12. Sellors 4. C. Z. 3 h 292. **8.5**
3^h 10^m 15^s — 47° 34'.1.

9.2 and 9.4

Year	RA	Dec	Star	MAG.	Notes
1892.0	248.7	0.95	Sellors	2 n	

Lac. 1024, mag. 7.5, is 40 secs. pr.

No. 13. β 84. W.B. 3 h. 147. **6.0**
3^h 11^m 4^s — 6° 17'.3.

6.4 and 7.2

Year	RA	Dec	Star	MAG.	Notes
1875.8	10.3	0.51	Dembowski	5-1 n	
1877.8	28.1	.....	Cinc.	2	
1879.0	32.7	0.68	β	4	
1879.8	30.6	0.74	Cinc.	1	
1886.7	27.1	0.76	L. McC.	3	
1888.9	21.5	0.65	Haverford	2-1	
1890.9	27.3	0.73	β	4	
1897.1	21.4	0.87	Aitken	1	

The measures are too discordant to allow of any safe inference.

W.B. 3 h. 152, mag. 6.3, is N.f.

No. 14. Alvan Clark 2. 95 Ceti. **5.7**
3^h 13^m 15^s — 1° 17'.7.

5.8 and 8.3

Year	RA	Dec	Star	MAG.	Notes
1853.97	.....	0.8 ±	A. Clark	1 n	
1854.75	66.9	0.8 ±	Dawes	1	
1854.82	73.5	0.7 ±	"	1	
1854.83	75.4	0.7 ±	"	1	
1866.88	350.9	.....	Winlock	1	
1866.88	12.9	.....	Searle	1	
1866.90	[26.7]	.....	Winlock	1	
1867.09	82.6	.....	"	1	
1878.86	Single		β	2	
1886.74	"		L. McC.	2	
1888.72	104.4	0.53	β	1	
1888.77	121.2	0.37	"	1	
1890.88	Single		"	2	
1891.73	"		"	1	
1897.83	147.9	0.46	Lowell	2	

A rapid binary, of which all the measures found are given. The period may be six or seven years.

Common p.m. of 0."243 towards 106°.

See also:—1893, Burnham, *Astronomy and Astrophysics*, vol. xii. p. 681.

No. 15. Dunlop 12. Lac. 1069. **6.9**
3^h 13^m 35^s — 64° 48'.7.

7.0 and 9.5

Year	RA	Dec	Star	MAG.	Notes
1835.9	101.8	18.1	h	1 n	
1870.9	102.6	19.3	Russell	1	
1879.6	102.9	19.5	Hargrave	2	

The *comes* is C. G. A. 3595, and it probably shares in the p.m. of the chief star, 0".080 towards 208°.6.

No. 16. β 1177. 1st Munich, 1060. **9.3**
3^h 13^m 47^s — 1° 23'.3.

Both = 10.1

Year	RA	Dec	Star	MAG.	Notes
1890.8	24.7	0.38	β	3 n	

About 9' S.f. 95 Ceti = No. 14

No. 17. λ 23. 15 Eridani. **5.1**
3^h 13^m 57^s — 22° 52'.6.

5.2 and 7.8

Year	RA	Dec	Star	MAG.	Notes
1897.7	283.9	0.30	See	1 n	

24A

3 hrs.

REFERENCE CATALOGUE OF

No. 18. h. 3565. Lal. 6160. ^{MAG.} 5.7
 3^h 14^m 7^s — 18° 55'.3

5.8 white, and 8.7 greenish

1835.8	110.4	5.77	<i>h</i>	2-1 n
1845.9	109.6	5.73	Jacob	1
1853.1	110.4	5.56	"	2
1876.0	111.6	5.94	Cinc.	1
1893.1	116.3	5.64	Glasenapp	2

No. 19. Jacob [1]. τ_4 Eridani. ^{MAG.} 3.8
 3^h 15^m 4^s — 22° 7'.3
 Yellow.

Comes = 9.6

1858.0	287.0	5.47	Jacob	2 n
1877.9	287.1	4.77	Cinc.	1
1880.0	281.8	5.41	β	1
1897.7	287.8	6.09	See	1

β also measured four other, but more distant faint stars.

The p.m. of the chief star is 0".041 towards 26°.0.
 The combined mag. in the C. P. D. is 5.7.
 Howe 4, a minute pair, is closely N.pr.

No. 20. Innes 56. C. Z. 3 h. 426. ^{MAG.} 8.5
 3^h 15^m 6^s — 43° 0'.4

8.7 and 10.5

1896.8	260. ±	2½" ±	Innes	1 n
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Bris. 553, mag. 7.5, is N.f.

No. 21. Innes 150. C. Z. 3 h. 460. ^{MAG.} 8.2
 3^h 15^m 56^s — 63° 26'.3

8.4 and 9.9

1897.1	355. ±	3. ±	Innes	1 n
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ζ_2 Reticuli, mag. 5.1, is 33' N.

No. 22. β 531. Lal. 6275. ^{MAG.} 6.5
 3^h 18^m 25^s — 8° 8'.6

Comes = 12.0

1877.9	60.1	2.43	β	2 n
1891.7	53.6	2.94	"	3

Common p.m. of 0".247 towards 180°.

No. 23. Innes 151. C. Z. 3 h. 513. ^{MAG.} 8.2
 3^h 18^m 39^s — 41° 40'.6

8.9 and 9.1

1897.6	160. ±	1. ±	Innes	2 n
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The preceding star of a group.

No. 24. β 12. Lal. 6312. ^{MAG.} 6.3
 3^h 19^m 43^s — 14° 20'.8

6.5 white, and 8.5 reddish

1875.4	271.8	2.35	Dembowski	4 n
1877.8	273.4	2.30	Cinc.	3
1886.8	274.8	2.45	L. McC.	5-4
1888.5	272.6	2.31	Haverford'	2

No. 25. h. 3576. Lac. 1100. ^{MAG.} 6.8
 3^h 21^m 14^s — 46° 1'.0

7.0 yellow, and 8.7 blue

1836.5	341.0	4.18	<i>h</i>	2 n
1879.0	340.4	3.03	Hargrave	1
1895.9	340.7	.....	Doberck	3
1897.1	341.8	3.29	See	2

Separately observed on the meridian at Cordoba.
 Prof. See's measure is from his λ_{24} , which is identified as C. Z. 3 h. 618, an 8.5 mag. star about 30' N.f. the above pair. C. Z. 3 h. 618 is single in the 7-inch telescope at the Cape, and it has been presumed that Prof. See really measured *h* 3576.

No. 26. β 1180. Lal. 6417. ^{MAG.} 8.2
 3^h 23^m 23^s — 4° 54'.5

8.6 and 9.6

1890.82	24.8	0.44	β	3 n
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An 11.5 mag. star at 118°, 7".

No. 27. Innes 57. C. Z. 3 h. 686. ^{MAG.} 9.0
 3^h 24^m 0^s — 59° 38'.2

9.3 and 10.4

1896.9	210. ±	1.6 ±	Innes	2 n
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C. G. A. 3804, mag. 8.7, is 12 sec. f.

SOUTHERN DOUBLE STARS.

3 hrs.

25A

No. 28.	Innes 58.	χ_3 Fornacis.	MAG. 6.6
	$3^h 24^m 20^s$	$-36^\circ 12'.0$	
	Comes = 10.5		
1896.9	$250.^\circ \pm 6.^\circ$	Innes	2 n
The central star of a group.			
No. 29.	Σ 407.	Lal. 6490.	MAG. 8.1
	$3^h 25^m 13^s$	$-11^\circ 29'.3$	
	8.4 and 9.6		
1833.0	$39.^\circ$	2.33	Σ 3 n
1868.2	45.4	2.57	Dembowski 4
1879.0	48.6	2.28	β 3
1881.0	44.2	2.71	Pritchett 1
1886.6	42.6	2.90	L. McC. 1
1888.1	47.2	2.73	Hall 3
Common p.m. of $0''.176$ towards $204^\circ.7$.			
No. 30.	Σ 408.	W.B. 3 h. 412.	MAG. 7.8
	$3^h 25^m 40^s$	$-4^\circ 36'.9$	
	8.5 and 8.7		
1832.0	347.5	1.37	Σ 3 n
1841.7	342.5	1.62	$O\Sigma$ 1
1864.0	338.4	$1.25 \pm$	Dembowski 2
1886.7	336.2	1.48	L. McC. 3
1888.1	339.0	1.24	Hall 3
1895.9	333.4	.....	Doberck 3
Some change.			
Other measures.			
No. 31.	λ 26.	Lac. 1128.	MAG. 6.9
	$3^h 28^m 8^s$	$-24^\circ 57'.3$	
	Both = 7.7		
1897.8	$180.^\circ \pm 0.17$	See	1 n
No. 32.	Cordoba [8].	ϵ Eridani.	MAG. 3.7
	$3^h 28^m 13^s$	$-9^\circ 47'.8$	
	Companion = 9.0		
1882.0	S. $7''$	Cordoba	6 n
The p.m. of the chief star is $0''.997$ towards $270^\circ.6$.			
The companion was carefully looked for on five nights in 1895 and 1896 by the writer, but no star as bright as 9.0 was seen within $5'$. The only observations of it are the meridian observations made at Cordoba on six occasions.			
No. 33.	β 532.	D.M.— 10° , 696.	MAG. 8.6
	$3^h 28^m 23^s$	$-10^\circ 23'.0$	
	Comes = 12.2		
1878.3	266.7	3.05	β 3 n
1891.9	271.2	3.05	" 2
Lal. 6585, mag. 8.0, is about $85''$ N.pr.			
No. 34.	λ 27.	Ö.A. 2344.	MAG. 8.5
	$3^h 28^m 26^s$	$-19^\circ 35'.7$	
	9.0 and 9.6		
1897.8	351.1	0.34	See 1 n
No. 35.	β 308.	Lal. 6709.	MAG. 8.3
	$3^h 33^m 2^s$	$-7^\circ 58'.2$	
	8.6 and 9.8		
1876.0	332.9	1.65	Hall 3 n
1876.8	329.9	1.50	Dembowski 3
1886.7	331.7	1.78	L. McC. 3
1888.0	331.9	1.81	Hall 3
No. 36.	β 534.	Lal. 6741.	MAG. 7.2
	$3^h 33^m 59^s$	$-8^\circ 50'.0$	
	Comes = 10.9		
1877.9	196.2	2.32	β 2 n
1891.9	193.1	2.58	" 2
No. 37.	Dunlop 15.	Piazz 3 h. 126.	MAG. 6.7
	$3^h 36^m 11^s$	$-40^\circ 40'.6$	
	7.2 and 7.9		
1836.0	326.6	8.81	h 4 n
1847.3	326.9	8.09	Jacob 3
1882.2	327.5	7.96	Tebbutt 1
1897.1	327.1	7.83	See 2
No. 38.	Sellors 5.	C.Z. 3 h. 1139.	MAG. 7.2
	$3^h 38^m 46^s$	$-48^\circ 33'.3$	
	Comes = 10.1		
1892.0	188.2	1.72	Sellors 3 n
No. 38a.	Leavenworth.	W.B.	MAG. 8.1
	$3^h 39^m 28^s$	$-13^\circ 43'.0$	
	8.3 and 10.1		
1886.8	359.4	1.18	L. McC. 2 n
1888.9	358.6	1.08	Haverford 2

D

26A.

3 hrs.

REFERENCE CATALOGUE OF

No. 39.	h. 3589.	Lac. 1214.	MAG.	
	3 ^h 40 ^m 34 ^s	— 40° 58'.3.	6.6	
	Comes = 9.9			
1837.1	344.8	6.58	<i>h</i>	1 n
1883.0	349.0	4.64	Hargrave	1
1897.1	348.1	5.18	See	2
A physical system, the p.m. of the chief star being 0".096 towards 159°.3.				
No. 40.	β 1003.	Ö.A. 2518.	MAG.	
	3 ^h 41 ^m 13 ^s	— 28° 10'.8.	7.8	
	Comes = 11.5			
1881.8	20.5	2.69	β	2 n
1892.0	30.4	2.48	"	3
No. 41.	Triple.	Lac. 1237.	MAG.	
	3 ^h 42 ^m 1 ^s	— 54° 35'.3.	6.2	
A = 6.8. B = 7.5. C = 9.2 blue.				
A and B = λ 30				
1897.1	290.3	0.63	See	2 n
A + B and C = <i>h</i> 3592				
1837.0	11.3	5.98	<i>h</i>	2 n
1873.0	17.2	5.72	Russell	1
1878.9	17.3	5.13	Melbourne	1
1889.0	11.2	5.12	Pollock	4
1891.1	14.0	5.00	Sellers	2
1894.9	16.8	5.45	Tebbutt	2
1897.0	12.3	5.56	See	3
No. 42.	λ 32.	Piazzi 3 h. 180.	MAG.	
	3 ^h 44 ^m 4 ^s	— 36° 24'.8.	6.7	
	Comes = 13.2			
1897.7	44.0	2.18	See	1 n
No. 43.	β 539.	W.B. 3 h. 809.	MAG.	
	3 ^h 44 ^m 12 ^s	— 1° 48'.8.	9.0	
	9.2 and 11.1			
1877.9	272.2	2.79	β	2 n
1878.0	269.8	2.34	Cinc.	2
1891.9	271.6	2.69	β	2
Bradley 531, mag. 7.5, is about 6' N.f., and β 401 is 59 secs. f.				

No. 44.	Dunlop 16.	<i>f</i> Eridani.	MAG.	
	3 ^h 44 ^m 54 ^s	— 37° 55'.7.	4.5	
	4.9 and 5.6			
1836.5	199.7	8.55	<i>h</i>	2 n
1846.9	200.4	7.17	Jacob	3
1853.1	202.6	7.07	"	6-5
1877.7	204.1	7.59	Cinc.	1
1889.0	205.3	7.34	Haverford	3
1895.9	205.4	7.41	Doberck	5-3
1897.7	206.7	7.81	See	1
Many other measures.				
Called <i>h</i> 3597 in the first <i>Sydney Catalogue</i> , but erroneously so.				

No. 45.	β 401.	Lal. 7109.	MAG.	
	3 ^h 45 ^m 11 ^s	— 1° 49'.6.	7.0	
	Comes = 11.2			
1877.2	254.5	4.65	Dembowski	3 n
1877.9	255.3*	4.42	Cinc.	1
1878.9	256.0	4.18	"	2
1891.9	256.0	4.64	β	2
Near β 539. See No. 43.				

No. 46.	Washburn 66.	Lal. 7187.	MAG.	
	3 ^h 47 ^m 45 ^s	— 8° 47'.3.	8.2	
	Comes = 12.5			
1888.8	31.2	2.20	Washburn	5-3 n
Prof. Comstock assigns a p.m. of 0".16 towards 102° to the chief star.				

No. 47.	h. 338.	30 Eridani.	MAG.	
	3 ^h 47 ^m 45 ^s	— 5° 39'.6.	5.4	
	Comes = 10.2			
1827.±	135.±	10.±	<i>h</i>	1 n
1863.8	136.8	8.28	Winnecke	3-2
1864.4	135.2	8.17	Dembowski	5-4
1878.0	135.3	8.34	β	1
"Large star single" — β .				
Its p.m. is about 0".04.				
Thought to be a new pair when measured by; Winnecke.				

No. 48. H. II. 36. *w* Eridani. ^{MAG.} 4.8
Orange
3^h 49^m 16^s — 3° 15'.0

Companion = 7.3 blue

1833.2	347.3	6.70	Σ	3 n
1851.1	347.5	6.75	Jacob	2
1889.1	346.9	6.60	Maw	2
1892.8	344.6	6.63	Glazenapp	2

Small common p.m.

Many other measures. Also called Σ 470 and 32 Eridani.

Two wide pairs will be found N.p.r.

No. 49. Washburn 67. Lal. 7249. 7.8
3^h 49^m 51^s — 13° 1'.0

8.3 and 9.0

1887.0	153.4	2.97	L. McC.	4 n
1888.3	157.7	3.12	Washburn	3

No. 50. β 541. W.B. 3 h. 923. 8.8
3^h 49^m 54^s — 1° 33'.5

9.0 and 11.0

1877.9	259.8	1.34	β	1 n
1884.8	261.0	1.41	Cinc.	1

The R.A. given by β is in error by about 1^m.

No. 51. Harvard. Piazzi 3 h. 206. 5.6
3^h 50^m 53^s — 40° 38'.8

Noted as double within 30" at Arequipa.
See *Harvard Circular*, No. 18.

With the 7-inch Cape refractor a 10th mag. star is seen 12" ± at 180° ±.

Mag. in C.P.D. = 6.7.

No. 52. β 542. Paris 4610. 8.7
3^h 51^m 20^s — 7° 14'.2

9.1 and 9.9

1877.9	198.4	1.65	β	1 n
1886.8	193.1	1.56	L. McC.	2
1892.0	192.9	1.52	β	3

No. 53. Harvard. Lac. 1304. ^{MAG.} 6.3
3^h 51^m 56^s — 52° 58'.9

Comes = 12.5

1897.1	267.6	22.8	See	2 n
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No. 54. β 543. Lal. 7333. 8.7
3^h 52^m 25^s — 1° 26'.7

Comes = 11.0

1877.8	32.0	11.2	β	1 n
1891.7	28.4	11.2	"	3

This otherwise insignificant pair has a common p.m. of 0".283 towards 228°.3.

It might repay the trouble if all near *comites* to p.m. stars were measured.

No. 55. h. 3611. Lac. 1302. 7.7
3^h 53^m 5^s — 40° 12'.3

8.2 and 8.8

1836.9	139.2	4 ±	h	1 n
1888.0	141.8	4.15	Pollock	2
1891.0	139.0	3.60	Scott	2
1895.9	143.1	.....	Doberck	2
1897.1	143.4	3.95	See	2

In the C. G. A., where both stars are recorded, the mags. are reversed.

No. 56. Washburn 70. W.B. 3 h. 996. 8.5
3^h 53^m 11^s — 5° 11'.1

8.9 and 9.8

1888.1	272.3	3.42	Washburn	3 n
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No. 57. Washburn 71. W.B. 3 h. 1005. 8.7
3^h 53^m 19^s — 9° 11'.8

Comes = 12.2

1888.4	157.2	4.05	Washburn	3-1 n
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W.B. 3 h. 1012, mag. 8.1, is S.f.

28A

3 hrs.

REFERENCE CATALOGUE OF

No. 58. β 1042. B.D.—3°, 651. 9.0
 $3^h 53^m 40^s$ — $3^\circ 0'.0$.

9.4 and 10.2

1888.9 35.1 1.09 β 4 n
 Lal. 7372, mag. 7.1, is $55''$ N.pr.

No. 59. Σ 489. Pos. Mediæ 401. 8.6
 $3^h 57^m 28^s$ — $7^\circ 17'.5$.

9.3 and 9.5

1831.1 195.1 3.29 Σ 3 n
 1867.1 196.1 2.93 Dembowski 3
 1886.9 197.0 3.22 L. McC. 3
 1893.0 197.7 3.05 Glasenapp 2

No. 60. β 1004. Lac. 1326. 6.7
 $3^h 58^m 12^s$ — $34^\circ 45'.6$.

7.3 and 7.7

1881.8 154.1 1.79 β 2-3 n
 1895.1 144.8 1.54 Sellors 3
 1897.7 144.2 1.77 See 1

Noted as double at Cordoba.

A 11.3 mag. star $63''$ distant.

No. 61. Innes 269. Bris. 646. 7.3
 $3^h 58^m 39^s$ — $54^\circ 41'.1$.

Comes = 10.0

1898.0 $87. \pm$ $2.5 \pm$ Innes 1
 Lac. 1342, mag. 7.2, is $48''$ N.pr.; and Bris. 644, a
 coarse pair noted at Cordoba in 1874, is $6'$ N.pr.

SOUTHERN DOUBLE STARS.

4 hrs.

29A

No. 1. Washburn 72. B.D.—9°, 806. 9.0
4^h 0^m 2^s — 9° 1'.1.

9.7 and 9.9

1888.1 33.1 2.03 Washburn 3 n

No. 2. Russell 38. Lac. 1592. 6.4
4^h 0^m 55^s — 85° 33'.6.

6.7 and 7.9, both white

1871.0 236.3 1.58 Russell 2 n
1877.0 246.0 2.04 Melbourne 1
1891.0 244.3 1.75 Sellors 3
1893.0 244.7 1.76 „ 2
1894.1 247.9 1.28 „ 1

Also registered as Russell 47 and Russell 51.

Seen also at the Cape in 1873, and at Cordoba in 1874.

No. 3. Pollock [2]. Lac. 1365. 8.0
4^h 1^m 5^s — 59° 51'.3.

8.5 and 9.2

1891.1 109.0 2.5 ± Sellors 1 n
1896.1 107.8 1.89 „ 3

Also catalogued as Innes 2.

First seen by Pollock in 1887. See *Astr. Nach.*, No. 3423.

Cape, 1880, No. 1745, mag. 8.7, is 3' N.pr.

No. 4. Innes 152. C. Z. 4 h. 12. 7.6
4^h 1^m 13^s — 35° 43'.0.

8.1 and 8.6

1897.1 70. ± 0.65 ± Innes 1 n

The pr. star of an elongated group.

No. 5. Howe. Ö.A. 2823. 8.0
4^h 3^m 2^s — 29° 4'.5.

8.6 and 8.9

1878.1 167.4 1.22 Cinc. 1 n
1884.9 169.1 1.21 „ 1

No. 6. Innes 153. Lac. 1367. 7.1
4^h 4^m 26^s — 33° 7'.4.

7.7 and 8.0

1897.1 320. ± 0.9 ± Innes 1 n
1897.7 337.4 0.62 See 1

No. 7. Howe 5. Lal. 7947. 7.5
4^h 8^m 57^s — 28° 47'.8.

8.2 and 8.3, both white

1876.0 33.1* 2.57 Cinc. 4-1 n
1877.4 34.0 2.42 „ 2
1884.9 36.3 2.41 „ 1

No. 8. H. N. 24. A Eridani. 4.9
4^h 9^m 38^s — 10° 30'.3.

Comes = 10.0

1809.0 175.0 H 1 n
1831.7 153.9 6.35 Σ 4
1855.9 151.1 6.36 Dembowski 3
1856.5 149.9 6.46 Morton 4
1868.2 150.9 6.46 Dembowski 4
1878.9 149.4 6.31 Cinc. 2
1888.1 150.1 6.44 Hall 3
1891.4 150.2 6.49 Haverford 2-1

Common p.m. of 0".164 towards 193°.0.

Other measures.

Also known as Σ 516.

At present the earlier angles seem irreconcilable.

No. 9. H. II. 80. o₂ Eridani. 4.5
4^h 10^m 40^s — 7° 48'.5.

A = 4.5 B = 9.2 C = 10.9

A and B

1888.8 105.5 82.15 β 2 n

B and C = W.B. 4h, 166

1891.78 97.4 2.48 β 4 n
1893.21 93.8 2.18 Comstock 1

[contd.]

30A

4hrs.

REFERENCE CATALOGUE OF

Many other measures.

Common p.m. of $4''.055$ towards $211^\circ.9$, in which the three stars participate, forming one of the most remarkable systems in the heavens.

The period of B and C is 180 years, and although the stars are so faint, the semi-axis major is upwards of $4''$.

Full particulars of this important triple will be found in a paper by β in the *Monthly Notices of the R. A. S.*, vol. liii. p. 478.

From Dr Gill's heliometer determinations the parallax of the chief star is $0''.166$.

There is an 11.9 mag. star between A and B + C, but it is not connected with the system.

See also:—

1882. Hall, A., "Motion," *Sidereal Messenger*, vol. i. p. 94.
 1886. Gore, J. E., "Motion," *M. N. R. A. S.*, vol. xlvi. pp. 291-293.
 1893. Burnham, S. W., "Orbit," *M. N. R. A. S.*, vol. liii. pp. 478-482.
 1896. Glasenapp, S. von, "Orbit," *Astr. Nachr.*, No. 3357.
 1896. Stichtenoth, A., "Orbit," *Astr. Nachr.*, No. 3366.

No. 10. β 548. Lal. 8027. ^{MAG.} 7.5
 $4^h 11^m 50^s$ — $10^\circ 20' 0.$

Comes = 11.6

1877.9	347.0	6.24	β	1 n
1879.1	345.3	.....	Cinc.	1
1891.9	345.4	6.10	β	2

No. 11. h. 3641. Lac. 1425. 5.3
 $4^h 13^m 29^s$ — $62^\circ 26' 6.$

Comes = 10.8

1837.0	289.6	6.90	h	1 n
1874.0	270.1	8.39	Russell	1
1879.1	269.0	7.82	Hargrave	1
1897.0	267.2	7.69	See	1

Also registered as h 3748.

α Reticuli, mag. 3.3, is $17'$ S.f., and has a distant faint companion.

No. 12. Innes 270. ν_4 Eridani. ^{MAG.} 3.8
 $4^h 14^m 7^s$ — $34^\circ 2' 5.$

4.2 and 5.2

1898.1 $330.0 \pm 0.5 \pm$ Innes 3 n

Also called X Eridani.

The p.m. is very small.

A faint star is N.

No. 13. Gale. Lac. 1430. 6.4
 $4^h 14^m 50^s$ — $61^\circ 11' 6.$

6.6 and 8.1

1897.3 339.0 0.95 Innes 1 n

Also seen at Arequipa in 1891.

No. 14. h. 3642. Lac. 1419. 6.7
 $4^h 15^m 17^s$ — $34^\circ 8' 8.$

6.9 and 8.9 reddish

1837.9	157.6	5.78	h	2 n
1848.8	159.4	5.93	Jacob	4
1876.0	160.9	7.13	Cinc.	2
1879.1	157.4	6.39	Hargrave	1
1896.0	159.8	5.71	Doberck	3-2

No. 15. λ 35. C. Z. 4 h. 472. 8.5
 $4^h 15^m 27^s$ — $31^\circ 49' 1.$

Comes = 14.3

1897.8 126.4 2.41 See 1 n

No. 16. λ 36. Lal. 8212. 7.3
 $4^h 16^m 26^s$ — $19^\circ 34' 4.$

Comes = 13.7

1897.7 347.0 7.92 See 1 n

SOUTHERN DOUBLE STARS.

4 hrs.

31 A

No. 17. Rumker 3. θ Reticuli. 6.1		MAG.	
4 ^h 16 ^m 33 ^s — 63° 29'.9.			
6.3 and 8.4.			
1835.8	6.1	6.20	<i>h</i> 2 n
1874.0	6.3	5.20	Russell 1
1877.0	3.8	4.08	Melbourne 1
1897.1	4.0	5.19	See 2

Called *h* 3644 in error in the first *Sydney Catalogue*.

No. 18. Σ 536. Lal. 8222. 7.1		MAG.	
4 ^h 17 ^m 13 ^s — 4° 54'.8.			
7.6 and 8.2, both white			
1831.0	149.5	1.75	Σ 2 n
1834.6	155.4	1.81	,, 2
1867.3	154.4	1.70	Dembowski 3
1874.1	160.2	1.40	Seabroke 2-1
1879.0	160.4	1.50	Cinc. 2
1886.5	163.2	1.92	L. McC. 3
1888.1	162.3	1.56	Hall 3
1893.0	164.4	1.66	Haverford 2

Slow increase in angle.
Other measures.

No. 19. β 744. Piazzini 4 h. 68. 6.2		MAG.	
4 ^h 17 ^m 22 ^s — 25° 57'.8.			
Both = 7.0			
1891.78	306.6	0.79	β 3 n
1894.10	301.4	0.59	Sellors 2-1
1897.73	312.1	0.52	See 1

This is the chief star of the coarse triple = *h* 3644.

No. 20. Hough 330. Göttingen 1166. 9.0		MAG.	
4 ^h 18 ^m 19 ^s — 0° 20'.9.			
9.2 and 11.2			
1890.1	19.6	1.17	Hough 2 n

Lal. 8168, mag. 6.3, about 2 mins. pr., 1' N., has been registered as a double star = Hough 329, the companion of the 13th mag. being 33" distant.

No. 21. Innes 271. Lac. 1437. 7.5		MAG.	
4 ^h 18 ^m 32 ^s — 43° 1'.5.			
7.7 and 9.9			
1898.0	150.±	2.3±	Innes 1 n

No. 22. Triple. Lac. 1435. 7.2		MAG.	
4 ^h 18 ^m 33 ^s — 41° 27'.1.			
A = 7.2 B = 9.5 C = 10.0			
A and B + C = <i>h</i> 3646			
1836.9	135.8	60.±	<i>h</i> 1 n
1898.0	140.±	50.±	Innes 1

B and C = C. P. D. - 41°, 475 = Innes 272.

1898.0	170.±	1.±	Innes 1 n
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No. 23. Σ 544. W.B. 4 h. 369. 8.2		MAG.	
4 ^h 20 ^m 2 ^s — 8° 58'.6.			
8.6 and 9.5			
1831.7	356.7	2.14	Σ 3 n
1853.1	353.5	2.33	Jacob 3-2
1867.5	353.8	2.33	Dembowski 3
1881.4	353.0	2.64	Cinc. 2
1886.9	353.3	2.71	L. McC. 1
1888.0	352.5	2.86	Haverford 1

Another star 2' pr.

No. 24. β 403. Lal. 8347. 7.3		MAG.	
4 ^h 20 ^m 39 ^s — 2° 27'.7.			
7.5 and 9.0			
1876.1	100.3	2.00	Dembowski 1 n
1888.4	98.3	1.95	Haverford 3
1893.1	104.2	1.79	Glaserapp 2

The p.m. is insensible.
Other measures.

In β 's original catalogue there is an error of 10' in declination followed by later observers.

No. 25. Σ 547. W.B. 4 h. 383. 9.2		MAG.	
4 ^h 20 ^m 49 ^s — 1° 37'.4.			
9.4 and 11.0			
1831.4	344.3	4.25	Σ 3 n
1878.0	9.8	2.31	β 3
1881.8	14.8	2.40	,, 3
1890.8	28.5	2.01	,, 3

Other measures.

Not seen by Dembowski and others from 1865 to 1877.

The change is due to the p.m. of the smaller star = 0".052 towards 137°.8:—

A 7.5 mag. star is S.pr.

See:—

1878.	Burnham, S.W., <i>Astr. Nachr.</i> , No. 2176.
,,	Dembowski, E., " " " 2186.
1891.	Burnham, S.W., <i>Observatory</i> , " 171.

32A

4 hrs.

REFERENCE CATALOGUE OF

No. 26. Innes 59. Piazzì 4 h. 92. ^{MAG.} 6.6
 4^h 21^m 14^s — 34° 58'.9.

A = 6.6 B = 9.5 C = 10.0

A and B + C

1896.8	210.° ± 60." ±	Innes	1 n
1897.7	197.6 42.63	See	1

B and C

1896.9	267.° ± 3." ±	Innes	2 n
1897.7	280.6 3.67	See	1

The small pair is = C. P. D. - 35°, 482, mag. 10.4.

No. 27. Rumker 4. Lac. 1475. 6.5
 4^h 22^m 15^s — 57° 17'.8.

7.0 and 7.7

1834.9	228.5	5." ±	h	1 n
1836.9	231.8	7.10	"	1
1851.1	231.5	6.55	Jacob	1
1873.9	233.1	6.92	Russell	1
1882.2	236.2	6.36	Tebbutt	1
1895.9	237.3	6.65	Doberck	2
1897.0	236.0	5.43	See	2

Estimates of the magnitude of the chief star vary from 6.2 to 8.2.

Separately observed on the meridian at the Cape and other observatories.

No. 28. β 311. Lac. 1451. 6.2
 4^h 22^m 45^s — 24° 18'.3.

6.7 and 7.2

1875.9	148.4*	.....	Cinc.	1 n
1877.6	147.7	0.89	"	2-1
1891.7	147.5	0.98	Haverford	2
1897.7	153.2*	0.70	See	1

No. 29. Sellors 6. Lac. 1477. 6.9
 4^h 23^m 5^s — 53° 20'.4.

7.1 and 9.2

1892.1	98.4	0.81	Sellors	2 n
1895.1	93.1	0.76	"	3

No. 30. h. 3650. Lac. 1464. ^{MAG.} 6.8
 4^h 23^m 15^s — 40° 45'.3.

6.9 and 9.3

1836.9	184.1	4.95	h	2 n
1847.5	183.1	3.33	Jacob	2
1879.1	182.0	3.20	Hargrave	1
1896.0	180.5	.....	Doberck	4
1897.1	181.3	3.45	See	2

No. 31. β 184. Lal. 8474. 6.7
 4^h 23^m 37^s — 21° 43'.5.

7.1 and 8.1

1873.9	270.5	1.2 ±	β	1 n
1877.5	262.5	1.09	Cinc.	2
1889.0	261.4	1.12	Haverford	3-2
1891.7	259.2	1.09	"	1
1895.9	259.8	.....	Doberck	3
1897.8	240.4	1.30	See	1

No. 32. Innes 154. Lac. 1503. 7.5
 4^h 27^m 37^s — 35° 59'.3.

8.0 and 8.5

1897.1	307.° ±	0.6 ±	Innes	2 n
1898.1	310.° ±	0.6 ±	"	2

Piazzì 4h. 118, mag. 6.4, is N.pr., and β 746 is closely S.f.

No. 33. β 746. C. Z. 4 h. 919. 8.0
 4^h 27^m 57^s — 36° 7'.2.

8.4 and 9.4

1879.8	30.° ±	1.2 ±	β	1 n
1895.1	11.9	1.05	Sellors	3

The S.f. of 3 stars.
 See also No. 32.

No. 34. Σ 564. B.D.—12°, 924. 9.4
 4^h 28^m 33^s — 12° 22'.1.

10.1 and 10.2

1831.7	346.8	3.44	Σ	3 n
1867.7	343.4	3.38	Dembowski	3
1879.4	344.0	3.48	Cinc.	2

Combined mag. at Cinc. = 6.8.

SOUTHERN DOUBLE STARS.

4 hrs.

33A

No. 35. β 881. 46 Eridani. MAG. 5.6
 $4^h 29^m 2^s$ — $6^\circ 56' 9''$.

Comes = 10.2

1879.0	57.0°	1.47	β	4 n
1879.4	52.2	1.33	Cinc.	2-1
1891.8	52.7	1.29	β	3

The p.m. is only about $0''.008$.

No. 36. β 747. Lac. 1518. 7.5
 $4^h 29^m 32^s$ — $38^\circ 29' 6''$.

7.7 and 9.7

1879.8	$240.^\circ \pm$	$2.5 \pm$	β	1 n
1894.1	218.4	2.25	Sellors	2

First seen at Cordoba in 1876.

No. 37. β 185. Lal. 8745. 8.3
 $4^h 32^m 18^s$ — $15^\circ 7' 6''$.

8.5 and 10.5

1875.8	235.4°	3.00	Dembowski	4-3 n
1877.6	235.3	2.75	Cinc.	2

About $40'$ S.f., 53 Eridani, mag. 3.9.

A star, mag. 9.2, is closely N.f.

No. 38. β 882. B.D.— 11° , 918. 9.4
 $4^h 33^m 10^s$ — $11^\circ 20' 9''$.

9.8 and 10.8

1880.1	231.6°	2.04	β	1 n
1891.9	226.4	2.25	"	3

An 8.3 mag. star 14 secs. f. 1' S.

No. 39. h. 3672. C. Z. 4 h. 1142. 8.3
 $4^h 34^m 59^s$ — $35^\circ 29' 9''$.

8.7 and 9.7

1836.9	289.6°	$3.5 \pm$	h	2 n
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Both stars observed on the meridian at Cordoba in 1880. Change doubtful.

No. 40. β 1236. Lal. 8833. MAG. 7.3
 $4^h 35^m 18^s$ — $21^\circ 26' 6''$.

7.4 and 10.4

1891.8	118.3°	1.42	β	3 n
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An 8.9 mag. star = Ö.A. 3266 is $40''$ N.pr.

No. 41. Howe 6. Ö.A. 3270. 9.0
 $4^h 35^m 25^s$ — $20^\circ 5' 7''$.

9.4 and 10.4

1877.1	98.8°	3.46	Cinc.	1 n
1881.7	95.9	3.20	"	1
1886.7	96.1	3.06	L. McC.	1

Near 54 Eridani, mag. 4.5, which was considered double by Ormond Stone and Dembowski, but found to be single by β .

No. 42. Harvard. α Cæli. 4.5
 $4^h 37^m 20^s$ — $42^\circ 3' 2''$.

Noted as double within $30''$ at Arequipa.From *Harvard Circular*, No. 18.The p.m. of the chief star is about $0''.2$.

No. 43. Innes 60. Cape 1880, 2025. 9.0
 $4^h 38^m 6^s$ — $45^\circ 53' 8''$.

9.7 and 9.8

1896.9	$95.^\circ \pm$	$2.^\circ \pm$	Innes	2 n
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Mag. in C.P.D. = 8.3.

No. 44. h. 3683. Lac. 1583. 6.6
 $4^h 38^m 39^s$ — $59^\circ 8' 5''$.

7.2 and 7.5

1835.5	81.1°	$3.^\circ \pm$	h	2 n
1836.4	81.2	3.82	"	2
1879.1	79.9	3.39	Sydney	2
1891.0	77.0	1.88	Sellors	2
1897.1	85.1*	0.92	See	3
1897.1	79.5*	1.^\circ \pm	Cogshall	2
1898.0	$80.^\circ \pm$	$1.2^\circ \pm$	Innes	2

Separately observed at Cordoba in 1874 on the meridian. [contd.]

E

Some decrease in the distance with a nearly stationary angle.

Prof. See considers that this pair is a binary in a period of forty-four years, [see *M. N. R. A. S.*, vol. lvii, pp. 398-401], a conclusion assailed at the time and now quite untenable in view of the measure of 1891, which was omitted by Prof. See, and the estimates of 1898, which placed the smaller star in the N.f. quadrant.

No. 45. H. III. 99. 55 Eridani. MAG. 6.0
4^h 38^m 47^s — 8° 59'.0.

6.5 and 7.1

1783.1	314.2	.....	H	1 n
1831.2	318.3	9.13	Σ	4
1845.1	316.7	9.06	Philpott	4
1851.1	316.3	9.17	Jacob	2
1859.9	317.1	9.02	Morton	2
1865.8	316.1	9.00	Dembowski	3
1883.0	316.2*	9.41	Cinc.	1
1893.0	316.4	8.89	Glasenapp	2

Probably stationary. Common p.m. of 0".024 towards 205°.2.

Also known as Σ 590.

Many other measures.

No. 46. Cordoba [9]. Lac. 1574. 7.4
4^h 39^m 4^s — 48° 0'.8.

7.5 and 10.0

1896.1	233.7	3.41	Sellors	3 n
1897.1	226.3	3.86	See	1

From meridian observations at Cordoba about 1880, this pair seems unchanged.

No. 47. β 186. Lal. 8986. 8.0
4^h 41^m 8^s — 7° 10'.0.

8.2 and 10.0

1875.8	174.1	2.00	Dembowski	3 n
1877.9	175.3	1.71	Cinc.	1
1879.1	178.5	1.33	"	1
1886.6	177.5	1.79	L. McC.	2
1888.5	176.1	1.76	Haverford	2

No. 48. β 312. Lal. 9065. MAG. 7.8
4^h 43^m 27^s — 20° 59'.4.

8.0 and 9.5

1868.1	343.8	3.13	Harvard	1 n
1876.0	344.8	3.24	Cinc.	3
1877.5	344.6	3.24	"	2
1888.1	345.8	3.26	Hall	3

Very slow change.

The date of the Harvard measure might be 1870.1, both being given in the *Harvard Annals*, vol. xiii.

β's by priority of publication.

λ 39, a very faint pair 2".6 apart, is near this position.

No. 49. h. 3696. C.P.D.—56°, 732. 8.4
4^h 45^m 58^s — 56° 10'.9.

8.8 and 9.5

1834.9	266.9	1.8 ±	h	2 n
1873.1	278.7	3.62	Russell	1
1895.1	287.4	3.59	Sellors	3

Some change.

No. 50. Cape 4. Lac. 1638. 7.3
4^h 46^m 8^s — 61° 39'.0.

7.5 and 9.2

1891.1	36.5	2.64	Sellors	1 n
1894.1	37.1	2.82	"	2

Noted as a double at the Cape in 1876, and separately observed on the meridian at Cordoba in 1879.

No. 51. Triple. Lac. 1627. 7.5
4^h 46^m 9^s — 50° 3'.5.

A = 8.3 B = 8.3 C = 10.3

A and B = λ 40

1897.1	284.8	0.43	See	1 n
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A + B and C = Cordoba [10]

1879.0	259.0	4.70	C. G. A.	3 n
1897.1	257.1	5.80	See	2

SOUTHERN DOUBLE STARS.

4 hrs.

35A.

No. 52. Cordoba [11]. C. Z. 4 h. 1573. ^{MAG.} 8.0
 4^h 46^m 42^s — 39° 21'.2.

8.5 and 9.2

1881 N.f. 3." C. G. A. 3 n

No. 53. h. 3697. Lac. 1626. 6.0
 4^h 47^m 1^s — 41° 29'.6.

Comes = 8.6

1835.8 284.6 10." ± h 1 n

1881.3 281.6 12.2 Hargrave 1

1897.1 280.9 14.9 See 3

Well seen on Cape photo plates, and apparently not much changed in sixty years.

No. 54. h. 3699. C. Z. 4 h. 1613. 7.7
 4^h 47^m 44^s — 45° 50'.3.

Comes = 12.3

1835.0 142.5 5." ± h 1 n

No. 55. β 316. Lal. 9181. 8.0
 4^h 47^m 51^s — 5° 27'.0.

8.7 and 8.8

1876.1 178.4 0.99 Hall 2 n

1878.5 178.5 1.11 Cinc. 2-1

1888.1 178.6 1.01 Hall 3

1888.7 179.2 1.14 Haverford 3

N.pr. ω Eridani, mag. 4.2.

No. 56. Innes 273. C. Z. 4 h. 1630. 9.0
 4^h 48^m 3^s — 45° 5'.7.

9.6 and 9.9

1898.3 350. ± 1." ± Innes 1 n

C. Z. 4 h. 1563, mag. 8.5 = h 3694, a wide pair, is S.pr.

No. 57. β 748. B.D.—7°, 920. 9.5
 4^h 48^m 16^s — 7° 51'.2.

10.2 and 10.3

1879.7 131.4 1.03 β 2 n

1891.8 131.1 1.25 " 2

The pr. of a small triangle of stars in the field:—β.

No. 58. Dunlop 18. Pictoris. ^{MAG.} 5.6
 4^h 48^m 42^s — 53° 37'.9.

6.0 and 6.9, both yellow

1835.0 57.9 12." h 2 n

1878.5 58.0 12.1 Melbourne 2

1895.9 58.4 12.1 Doberck. 2

Fixed.

Called h 3702 in error in the first *Sydney Catalogue*.

No. 59. λ 42. Lac. 1651. 6.9
 4^h 49^m 2^s — 51° 53'.6.

7.6 and 7.7

1897.1 117.2 0.48 See 1 n

No. 60. Σ 614. W.B. 4 h. 1045. 8.0
 4^h 49^m 58^s — 0° 42'.5.

8.6 and 9.0

1832.1 68.4 4.15 Σ 5 n

1867.2 69.1 4.21 Dembowski 3

1875.9 69.2 2.5 ± Cinc. 1

No. 61. h. 3707. C.P.D.—59°, 393. 9.2
 4^h 51^m 29^s — 59° 55'.2.

9.4 and 11.0

1835.0 265.6 3." ± h 1 n

Attached to the nebula h 2678.

No. 62. h. 3721. C.G.A. 5721 + 20. 7.9
 4^h 53^m 19^s — 80° 48'.7.

8.3 and 9.3

1836.1 219.4 2.5 ± h 1 n

1879.1 221.6 2.55 Hargrave 1

The R.A. in the first *Sydney Catalogue* is erroneous.

36A

4 hrs.

REFERENCE CATALOGUE OF

No. 63.	β 314.	Lal. 9420.	MAG.	
	4 ^h 54 ^m 33 ^s	— 16° 31'.9.	5.4	
	5.8 and 6.8			
1876.7	324.9*	0.43	Dembowski	4-3 n
1879.4	333.3	0.5 ±	Cinc.	2
1889.1	326.9	1.05	β	3
Common p.m. of 0".3 towards 0°.				
At 54" there is an 8.2 mag. star.				
No. 64.	Σ 631.	Lal. 9460.	MAG.	
	4 ^h 56 ^m 4 ^s	— 13° 39'.1.	7.3	
	7.5 and 9.3			
1831.7	104.8	5.41	Σ	3 n
1867.9	105.6	5.48	Dembowski	4
1878.0	104.1	5.79	Cinc.	3
No. 65.	h. 3715.	Lac. 1698.	MAG.	
	4 ^h 56 ^m 52 ^s	— 49° 36'.4.	7.1	
	7.3 and 8.9			
1835.9	110.7	11. ±	h	2 n
1881.2	109.9	8.97	Hargrave	2
1897.0	113.9	9.61	See	3
The <i>comes</i> has been separately observed on the meridian at the Cape and Cordoba				

No. 66.	λ 44.	Ö.A. 3581.	MAG.	
	4 ^h 57 ^m 7 ^s	— 23° 51'.4.	7.5	
	7.7 and 10.0			
1897.8	333.8	1.93	See	1 n
No. 67.	Σ 636.	Lal. 9528.	MAG.	
	4 ^h 58 ^m 15 ^s	— 8° 48'.3.	7.0	
	7.2 and 8.8			
1830.8	100.4	3.74	Σ	4 n
1867.3	103.5	3.54	Dembowski	3
1886.7	100.1	3.93	L. McC.	1
As with all stars of this class there are many other measures.				
No. 68.	β 884.	Lal. 9534.	MAG.	
	4 ^h 58 ^m 19 ^s	— 12° 34'.8.	8.3	
	9.0 and 9.1			
1879.1	19.0	0.54	β	2-1 n
1892.0	20.7	0.54	"	3

SOUTHERN DOUBLE STARS.

5hrs.

37A

No. 1. Innes 274. C.Z. 4 h. 2075. ^{MAG.} 8.0
 5^h 0^m 20^s — 50° 55'.8.

Comes = 9.5

1898.3 27^o. ± 3". ± Innes 1 n

No. 2. Cordoba [12]. C.Z. 5 h. 22. ^{MAG.} 8.5
 5^h 0^m 39^s — 40° 44'.5.

9.0 and 9.5

1880.9 S.pr. 3" C. G. A. 3 n
 Followed by two stars of 8.9 and 8.4 mag.

No. 3. Jacob [2]. γ Cæli. 4.6
 5^h 0^m 48^s — 35° 37'.2.

4.7 and 9.6

1847.1 311.8 2.92 Jacob 1 n
 1851.0 315.5 3.15 " 2
 1852.8 315.7 2.84 " 5
 1854.2 315.6 2.66 " 3
 1857.1 315.8 2.90 " 11-10
 1882.2 318.3 2.23 Russell 1
 1891.1 311.1 3.12 Sellors 2
 1894.1 307.7 2.34 " 1
 1897.1 313.4 3.17 See 2

Common p.m. of α . 123 towards 125°.7.

The mag. in the C. P. D. is 6.0.

This star is also indexed as Russell 56 and β 750.

No. 4. λ 45. Lac. 1730. 8.0
 5^h 1^m 55^s — 56° 26'.5.

8.7 and 8.8

1897.1 114.1 0.39 See 2 n

h 3724 = C.Z. 5 h. 16, two 9.3 mag. stars 3" apart,
 is about 35' N.pr.

No. 5. Hargrave 2. Lac. 1788. 6.8
 5^h 3^m 46^s — 74° 28'.8.

Both = 7.6

1883.1 167.3 0.75 Hargrave 1 n
 1894.1 170.8 0.82 Sellors 1

No. 6. h. 3728. Lac. 1737. ^{MAG.} 7.1
 5^h 5^m 17^s — 41° 21'.0.

Comes = 9.5

1836.9 263.5 14. ± h 1 n
 1853.1 260.5 9.8 Jacob 2
 1879.1 259.5 10.3 Hargrave 1
 1881.2 258.5 8.8 " 1
 1897.1 261.1 10.1 See 4

The p.m. of the chief star is α . 35 towards 335°.4.

This pair is well shown on Cape photo plates.

The date of Hargrave's first observation is mis-
 printed in the *Mem. R. A. S.*

No. 7. λ 47. Lal. 9765. 7.6
 5^h 5^m 30^s — 22° 37'.0.

Comes = 13.4

1897.8 39.3 3.52 See 2 n

No. 8. β 885. Lal. 9758. 7.8
 5^h 5^m 54^s — 1° 53'.3.

8.3 and 8.8

1880.8 196.1* 0.71 β 3 n
 1888.9 190.7 0.65 Haverford 2
 1892.1 186.5 0.72 " 1

No. 9. h. 3727. C.P.D.—19°, 760. 9.8
 5^h 6^m 6^s — 19° 1'.0.

10.2 and 11.2

1835 32.3 2. ± h 1 n

No. 10. β 1006. B.D.—2°, 1169. 9.2
 5^h 7^m 17^s — 2° 18'.9.

9.4 and 10.9

1882.0 201.7 0.78 β 2 n
 1891.9 203.5 0.66 " 2
 B.D.—2°, 1170, mag. 9.5, is 52" distant.

No. 11. H. III. 67. ι Leporis. MAG. 4.7
 $5^h 7^m 38^s$ — $11^\circ 59' 3''$.

Comes = 11.0

		"	"	MAG.
1832.3	337.6	12.8	Σ	6 n
1856.6	336.6	13.1	Morton	2
1867.7	336.2	12.6	Dembowski	4
1880.4	337.8	12.4	β	3
1885.1	336.6	13.3	Cinc.	1

The p.m. is very small.

Also known as Σ 655.

No. 12. Σ 661. κ Leporis. MAG. 4.4
 $5^h 8^m 37^s$ — $13^\circ 3' 6''$.

4.5 yellow, and 7.2 white

		"	"	MAG.
1832.2	358.7	3.05	Σ	6 n
1856.9	356.4	2.76	Dembowski	1
1857.9	360.0	3.25	Morton	1
1878.8	358.5	2.51	Cinc.	2
1880.4	360.7	2.67	β	3
1886.8	358.0	2.67	L. McC.	3

Common p.m. of $0''.035$ towards $256^\circ 9'$.

Other measures.

No. 13. λ 48. C.P.D.— 28° , 801. MAG. 9.1
 $5^h 8^m 53^s$ — $28^\circ 34' 9''$.

9.3 and 11.2

	"	"	"	MAG.
1897.8	2.1	2.32	See	1 n

No. 14. Rigel. β Orionis. MAG. 0.3
 $5^h 9^m 44^s$ — $8^\circ 19' 0''$.

Comes = Greenwich 1880, 864, mag. 8.0

Hf. II. 33

		"	"	MAG.
1831.5	199.8	9.14	Σ	3 n
1849.2	199.8	9.66	Philpott	1
1865.3	201.1	9.47	Dembowski	5
1887.2	202.0	9.61	Tarrant	2
1890.2	201.4	9.30	Maw	2
1893.1	202.6	9.46	Glaserapp	2

Many other measures.

The p.m. is very small:

Also recorded as Σ 668.

A more distant star noted by Mitchel has been measured by β .

The *comes* has been measured as a close double = β 555.

Both = 8.7 mag.

		"	"	MAG.
1878.14	172.8	0.35	β	3-2 n
1878.80	54.5	0.25	Russell	2-1
1879.76	158.7	0.42	Cinc.	1
1880-82	Elongated?		β	-
1889-91	Single		"	6

Mr Russell's angle is the mean of two estimations: the duplicity was considered certain.

Also seen by Mr W. H. Sadler.

The duplicity was also seen by Mr W. J. Macdonnell of Port Macquarie, N.S.W., with a 6-inch Grubb refractor.*

See:—

Burnham, S.W., *M. N. R. A. S.*, vol. xxxviii. pp. 476-8.

No. 15. h. 3735. Lac. 1759. MAG. 7.7
 $5^h 9^m 47^s$ — $32^\circ 1' 2''$.

Comes = 8.1

		"	"	MAG.
1836.4	150.8	7.59	<i>h</i>	2 n
1876.8	153.2	6.77	Cinc.	1
1893.0	152.3	7.04	Scott	1
1895.9	152.8	7.09	Doberck	3

Lac. 1762, mag. 7.3, is $10'$ S.

No. 16. H. I. 54. W.B. 5 h. 165. MAG. 7.2
 $5^h 9^m 49^s$ — $7^\circ 11' 5''$ Yellow

Comes = 9.0

		"	"	MAG.
1802.7	311.5	.....	H	1 n
1830.8	312.7	4.19	Σ	3
1866.4	313.0	3.99	Dembowski	3
1878.1	312.5	4.04	Cinc.	2

Also registered as Σ 667.

No. 17. h. 3739. Bris. 902. MAG. 8.0
 $5^h 10^m 47^s$ — $47^\circ 59' 5''$.

8.7 and 8.9

		"	"	MAG.
1837.9	278.6	2.±	<i>h</i>	1 n
1873.1	283.9*	3.34	Russell	1
1896.0	285.2*	.....	Doberck	3

Separately observed on the meridian at Córdoba.

* Privately communicated.

SOUTHERN DOUBLE STARS.

5 hrs.

39A

No. 18.	β 318.	Lal. 9873.	MAG. 8.5
	$5^h 11^m 15^s$	$- 3^\circ 35' 7.$	
	9.2 and 9.4		
1876.2	227.2	0.66	Dembowski 3-2 n
1878.6	228.2	0.72 \pm	Cinc. 2
1883.1	226.2	0.55 \pm	Schiaparelli 1
1886.1	229.8	0.59	L. McC. 1
Common p.m. of $0''.114$ towards 180° .			

No. 19.	Howe.	C. Z. 5 h. 381.	8.3
	$5^h 11^m 40^s$	$- 29^\circ 37' 5.$	
	8.8 and 9.3		
1877.1	231.6	2.49	Cinc. 2 n

No. 20.	h. 3743.	C. Z. 5 h. 408.	8.5
	$5^h 11^m 48^s$	$- 60^\circ 6' 1.$	
	8.9 and 9.9		
1836.0	120.9	3.5 \pm	<i>h</i> 2 n
1880.1	129.0	4.42	Hargrave 1

No. 21.	h. 3746.	Lac. 1831.	7.8
	$5^h 11^m 51^s$	$- 72^\circ 10' 9.$	
	8.4 and 8.8		
1834.9	262.2	3. \pm	<i>h</i> 1 n
1873.0	263.5	4.88	Russell 1
Separately observed on the meridian at Cordoba. Fixed.			

No. 22.	Cordoba [13].	Ö.A. 3846.	8.8
	$5^h 14^m 2^s$	$- 27^\circ 35' 6.$	
	9.3 and 9.8		
1880.9	N.pr.	2. \pm	C. G. A. 4 n

No. 23.	Innes 61.	Lac. 1805.	7.8
	$5^h 15^m 14^s$	$- 41^\circ 8' 9.$	
	8.3 and 9.0		
1897.1	95.5	0.64	See 2 n
Found on 24th Nov. 1896.			

No. 24.	β 189.	Lal. 10,023.	MAG. 6.7
	$5^h 15^m 32^s$	$- 5^\circ 28' 1.$	
	<i>Comes</i> = 10.9		
1875.9	283.6	4.27	Dembowski 3 n
1891.9	286.5	4.09	β 3

No. 25.	β 190.	W.B. 5 h. 300.	8.0
	$5^h 15^m 36^s$	$- 8^\circ 7' 8.$	
	8.6 and 9.0		
1876.1	355.3	0.71	Dembowski 4-2 n
1878.0	1.1	0.5 \pm	Cinc. 1
1879.9	3.8	0.53	β 4
1881.2	4.9	0.57	" 2
1891.0	358.5	0.54	" 3

A 9.0 mag. star, W.B. 5 h. 301, $35''$ N., constitutes with β 190 the old pair H. IV. $87 = \Sigma$ 692.

No. 26.	h. 3750.	Lal. 10,063.	4.8
	$5^h 16^m 11^s$	$- 21^\circ 20' 4.$	
	<i>Comes</i> = 9.5		
1835.9	295.3	3. \pm	<i>h</i> 1 n
1877.6	278.1	4.01	Cinc. 4
1879.1	283.3	4.26	β 1
1879.4	280.4	3.59	Cinc. 2
1896.9	277.2	3.15	Scott 2

No. 27.	h. 3752.	Piazzi 5 h. 70.	5.2
	$5^h 17^m 40^s$	$- 24^\circ 52' 2.$	
	5.4 yellow, and 7.4 blue		
1837.4	110.3	3.33	<i>h</i> 2 n
1851.1	107.6	2.98	Jacob 2
1856.1	110.0	2.86	Secchi 1
1876.1	104.5	3.48	Cinc. 3
1877.0	104.7	3.55	" 1
1878.7	103.4	2.88	" 3-1
1889.0	106.6	3.30	Tarrant 2
1892.9	104.0	3.30	Haverford 2
1896.0	107.5	.....	Doberck 3
1897.8	102.1	3.31	See 1

Other measures.

C. Z. 5 h. 599, mag. 9.0, is $59''$ S.f.

40A

5 hrs.

REFERENCE CATALOGUE OF

No. 28. Washburn 73. Ö.A. 3901. 8.5
 $5^{\text{h}} 18^{\text{m}} 13^{\text{s}}$ — $17^{\circ} 22'.2$.

8.7 and 10.2

1888.2	48.9	2.42	Washburn	3-2 n
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No. 29. H. II. 102. Lal. 10,125. 5.8
 $5^{\text{h}} 18^{\text{m}} 31^{\text{s}}$ — $8^{\circ} 30'.6$.

6.0 and 7.9

1783.7	142.4	H	1 n
1830.5	146.0	5.93	Σ	3
1867.8	142.8	5.97	Dembowski	4
1879.7	144.0	5.75	Cinc.	1
1893.1	144.0	5.55	Glasenapp	2
1896.0	140.5	5.95	Doberck	3-2

Also known as Σ 701.

No. 30. C.A.F. Peters. Bradley 757. 7.2
 $5^{\text{h}} 18^{\text{m}} 46^{\text{s}}$ — $0^{\circ} 57'.6$.

7.9 and 8.0

1863.2	170.7	1.63	OΣ	1 n
1863.9	173.6	1.±	Winnecke	1
1866.1	171.0	1.43	Dembowski	5-4
1872.2	167.3	1.67	OΣ	1
1876.0	171.2	2.14	Cinc.	4-3
1886.0	169.0*	1.95	L. McC.	1

Small common p.m.

Separately observed on the meridian at the Radcliffe Observatory.

Discovered independently by Winnecke in 1863.

No. 31. Ormond Stone. Lal. 10,131. 8.0
 $5^{\text{h}} 18^{\text{m}} 51^{\text{s}}$ — $10^{\circ} 30'.6$.

Both = 8.8

1878.0	121.2	1.10	Cinc.	1 n
1888.6	119.5	1.10	Haverford	2
1892.1	123.6	1.12	"	2
1893.0	126.8	1.15	"	2

No. 32. Dawes 5. η Orionis. 3.5
 $5^{\text{h}} 19^{\text{m}} 27^{\text{s}}$ — $2^{\circ} 29'.3$.

3.7 and 4.9

1848.2	86.6	0.94	Dawes	9-7 n
1853.1	85.4	1.07	Jacob	5-3
1870.3	84.4	0.99	OΣ	8
1874.6	84.6	1.00	Dembowski	4-3
1877.9	82.8	0.97	Cinc.	2
1878.0	82.5	1.02	Schiaparelli	4
1883.6	86.2	1.13	Engelmann	7
1888.2	87.5	1.13	Hall	3

Change very doubtful.

The p.m. is small.

No. 33. β 556. Lal. 10,159. 8.0
 $5^{\text{h}} 19^{\text{m}} 39^{\text{s}}$ — $2^{\circ} 35'.3$.

Comes = 11.3

1878.2	238.2	0.79	β	1 n
1879.1	247.2	0.74	"	1
1891.8	239.2	0.89	"	3

Near η Orionis.

No. 34. Innes 275. C. Z. 5 h. 684. 8.2
 $5^{\text{h}} 19^{\text{m}} 52^{\text{s}}$ — $36^{\circ} 46'.2$.

8.7 and 9.2

1898.1	10.±	1.1	Innes	1 n
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No. 35. β 319. Ö.A. 3957. 7.5
 $5^{\text{h}} 22^{\text{m}} 7^{\text{s}}$ — $20^{\circ} 48'.1$.

Comes = 11.3

1876.1	231.3	3.98	Hall	3 n
1876.8	229.4	3.85	Howe	1
1879.1	226.6	3.72	β	1
1891.1	229.8	4.29	Hall	2

Other measures.

β Leporis, mag. 3.0, is f, a little S.

No. 36. λ 53. Lal. 10,310. 8.3
 $5^{\text{h}} 23^{\text{m}} 20^{\text{s}}$ — $20^{\circ} 59'.9$.

Both = 9.1

1897.8	15.0	0.30	See	1 n
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No. 37. β 320. β Leporis. ^{MAG.} 3.0
 $5^h 23^m 57^s$ — $20^\circ 50' 3.$

Comes = 9.6

1876.4	284.5	2.83	Dembowski	4-3	n
1877.3	283.1	2.80	Cinc.		4
1878.1	283.6	2.64	Russell		5
1878.4	286.7	2.62	β		10
1879.2	285.0	2.88	Schiaparelli		8
1880.4	288.3	2.77	Pritchett		3
1881.0	284.0	2.65	β		2
1882.7	287.0	3.03	Schiaparelli		8
1891.1	282.1	2.89	Hall		2
1897.8	288.5	3.05	See		2

Probably fixed, with a common p.m. of $0''.082$ towards $194^\circ.9$.

C. P. D. mag. = 4.1.

Mr Russell's estimates of the magnitude of the chief star vary from $3\frac{1}{2}$ to 9, and of the *comes* from 9 to 13, perhaps due to misprints.

See:—

1882. Hall, A., "Measures," *Astr. Nachr.*, Nos. 2295 and 2430.

No. 38. Dawes 6. Lal. 10,308. 6.8
 $5^h 23^m 58^s$ — $3^\circ 23' 3.$

7.4 and 7.7, both white

1854.1	80.3	0.82	Dawes		2 n
1866.9	79.4	0.6 \pm	Harvard		3
1875.8	84.4	0.69	Dembowski	4-3	
1878.0	87.2	0.82	Cinc.		1
1882.1	83.6	0.68	"		1

No. 39. Σ 725. 31 Orionis. 4.9
 $5^h 24^m 39^s$ — $1^\circ 10' 2.$

Comes = 11.0

1829.4	87.5	12.7	Σ		3 n
1868.0	87.8	12.6	Dembowski		4
1879.1	88.4	12.7	Cinc.		2-1
1881.7	85.9	12.7	"		1

Probable common p.m. of $0''.03$ toward 220° .

The chief star is orange-coloured, and has been considered variable.

No. 40. h. 3768. C.P.D.— $66^\circ, 414. 9.0$
 $5^h 26^m 5^s$ — $66^\circ 40' 6.$

9.6 and 10.0

1835.5 31.8 1.7 \pm h 2 n
 Involved in a thick nebulous mist like dust:—h.

The nebula is h 2858.

Seen in 1897.3. The stars form the nuclei of an elongated nebula.

See also No. 48.

No. 41. Innes 276. Lac. 1920. 6.4
 $5^h 27^m 31^s$ — $68^\circ 42' 1.$

7.0 and 7.3

1898.0 210. \pm 0.5 \pm Innes 1 n
 The p.m. is about $0''.08$ towards 180° .

No. 42. Harvard 73. Lal. 10,437. 5.2
 $5^h 27^m 38^s$ — $1^\circ 39' 8.$

Comes = 9.5

1872.1	357.1	1.53	Harvard		1 n
1889.1	358.2	2.20	β		3

Also registered as β 1048.

No. 43. Innes 62. C. Z. 5 h. 972. 8.0
 $5^h 27^m 48^s$ — $47^\circ 16' 5.$

8.5 and 9.2

1896.9 175. \pm 0.9 \pm Innes 2 n
 This pair is in the small group, of which Lac. 1888, mag. 5.6, is the brightest star.

The pair is 24 secs. f. 8' S.

Lac. 1888 has a distant companion.

No. 44. β 1049. Schj. 1825. 8.3
 $5^h 28^m 2^s$ — $1^\circ 47' 6.$

8.7 and 9.7

1888.9 296.1 0.76 β 4 n

This and the following pair (Σ 734) compose the old pair H V. 119, $243^\circ, 30''$.

F

42.A

5 hrs.

REFERENCE CATALOGUE OF

No. 45. Σ 734. W.B. 5 h. 631. 7.5
 $5^h 28^m 4^s$ — $1^\circ 47'.4$

7.7 and 9.2

Year	α	δ	Star	MAG.
1832.9	356.4	1.78	Σ	5 n
1867.8	353.8	1.65	Dembowski	3
1888.9	355.2	1.61	β	4
1892.9	354.2	1.64	Haverford	2

See also the preceding pair.

Other measures.

No. 46. Dunlop 22. Lac. 1889. 7.2
 $5^h 28^m 4^s$ — $42^\circ 22'.5$

Comes = 8.0

Year	α	δ	Star	MAG.
1835.0	171.8	8.46	h	2 n
1846.8	170.2	7.45	Jacob	1
1880.1	169.8	6.48	Hargrave	1
1897.1	169.2	7.47	See	4-3

Separately observed on the meridian at Cordoba.

No. 47. h . 3766. a Leporis. 2.7
 $5^h 28^m 19^s$ — $17^\circ 53'.6$

Comes = 10.7

Year	α	δ	Star	MAG.
1835	154.8	25." \pm	h	1 n
1878	154.8	36.0	β	1
1884	156.5	35.4	Cinc.	1

The p.m. is small.

No. 48. Hargrave. C. Z. 5 h. 1065. 8.0
 $5^h 29^m 12^s$ — $66^\circ 41'.4$

Both = 8.8

Year	α	δ	Star	MAG.
1883.2	16.9	2.30	Hargrave	1 n
1895.1	21.2	1.58	Sellors	3

The first measure quoted was originally set against h 3768 (a pair which is about 3^m pr.).

No. 49. h . 3770. \ddot{O} . A. 4067. 7.6
 $5^h 29^m 23^s$ — $24^\circ 24'.1$

Comes = 10.4

Year	α	δ	Star	MAG.
1835.1	10.0	12." \pm	h	1 n

Seen in 1897; no great change shown.

No. 50. Washburn 76. B.D. 9.3
 $5^h 29^m 32^s$ — $14^\circ 25'.8$

A = 10.1 B = 10.3 C = 11.8

A and B

1888.9 252.2 1.80 Washburn 2 n

A and C

1888.5 219.6 2.76 Washburn 4-2 n

No. 51. β 13. W.B. 5 h. 676. 8.0
 $5^h 29^m 36^s$ — $4^\circ 33'.2$

8.3 and 9.4

Year	α	δ	Star	MAG.
1876.1	128.8	1.38	Dembowski	1-2 n
1879.1	131.8	0.99	Cinc.	1
1892.0	131.6	1.10	β	3

Fixed.

Another double star in the field—see No. 53.

No. 52. Harvard. Lac. 1922. 6.6
 $5^h 29^m 40^s$ — $64^\circ 0'.2$

Noted as having a comes within $30''$.See *Harvard Circular*, No. 18.

No. 53. Σ 743. Pos. Med. 602. 8.0
 $5^h 29^m 46^s$ — $4^\circ 27'.5$

8.4 and 9.2

Year	α	δ	Star	MAG.
1830.7	277.8	1.82	Σ	4 n
1857.9	276.8	1.7 \pm	Dembowski	1
1887.1	276.8	1.78	Tarrant	5

No change.

No. 54. θ Orionis. Nebula.
 $5^h 30^m 25^s$ — $5^\circ 28'.0$

The celebrated trapezium.

A very full description by β will be found in the *M. N. R. A. S.*, vol. xlix., 1889, or *Lick Publications*, vol. ii. He considers the stars fixed and sees no variability.

It may here be remarked that none of the many close pairs in Orion show certain signs of motion.

SOUTHERN DOUBLE STARS.

5 hrs.

43A

No. 55. Dawes 4. ϵ Orionis. MAG. 4.6
 $5^h 30^m 27^s$ — $4^\circ 54'.2$.

Comes = 8.6

1853.1	219.1	1.65	Jacob	3-1 n
1866.9	214.7	.....	Harvard	1
1876.1	217.7	1.73	Dembowski	4-3
1879.9	214.7	1.64	Cinc.	2
1892.1	214.2	1.54	Haverford	2
1893.0	217.8	1.80	"	2

This fine and somewhat difficult pair, although found in England, is not included in most English catalogues of double stars.

Fixed.

Two stars closely following, one = 5.0 mag.

No. 56. H. III. 12. ϵ Orionis. 3.0
 $5^h 30^m 32^s$ — $5^\circ 58'.5$.

Comes = 8.3

1781	133.9	.....	H	1 n
1820	141.5	.....	Σ	1
1832	142.2	11.3	"	3
1854	141.9	11.1	Morton	4
1867	142.0	11.4	Dembowski	3
1887	140.6	11.2	Tarrant	2

Many more distant stars.

The p.m. is small.

Also called Σ 752.

No. 57. H. II. 26. W.B. 5 h. 706. 7.0
 $5^h 30^m 34^s$ — $4^\circ 25'.8$.

C. G. A. 6488 = 9.0

1831.2	59.2	4.29	Σ	3 n
1866.4	61.7	4.09	Dembowski	3
1877.3	59.0	4.65	Cinc.	4
1887.1	60.6	4.43	Tarrant	5
1893.1	61.3	3.85	Glazenapp	2

Also recorded as Σ 750.

No. 58. Dawes 3. Lal. 10,567. 8.2
 $5^h 31^m 0^s$ — $5^\circ 41'.6$.

8.6 and 9.4

1849.4	183.7	1.1	Dawes	3 n
1866.9	182.2	.....	Harvard	1
1875.4	174.9	1.06	Dembowski	4-2

A 7.8 mag. star is about 21 secs. f.

The Harvard angle is printed $128^\circ.2$.

No. 59. Σ 754. Lal. 10,590. MAG. 6.6
 White

 $5^h 31^m 43^s$ — $6^\circ 7'.6$

Comes, C. G. A. 6511 = 9.9 blue

1830.1	287.6	5.17	Σ	3 n
1867.1	287.6	5.18	Dembowski	3
1879.7	286.3	5.40	Cinc.	1

No. 60. β 1050. Bond 974. 10.2
 $5^h 31^m 54^s$ — $5^\circ 23'$.

10.5 and 11.7

1889.0	283.6	0.67	β	3 n
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In the great nebula, 5' S. 92 secs. f. θ_1 Orionis:— β .

No. 61. Σ 757. W.B. 5 h. 747. 8.9
 $5^h 32^m 24^s$ — $0^\circ 18'.0$.

9.5 and 9.8, both white

1831.2	239.8	1.68	Σ	3 n
1868.8	239.3	1.70	Dembowski	3
1878.6	239.6	1.50	Cinc.	2
1893.2	243.7	0.9	Glazenapp	2

An 11" pair, H. III. 111 = Σ 758, is 51" f.

No. 62. β 89. Lal. 10,608. 9.1
 $5^h 32^m 31^s$ — $1^\circ 28'.9$.

9.3 and 10.8

1875.7	344.2	0.55	\pm Dembowski	3 n
1878.4	356.1	0.81	Cinc.	2-1
1879.6	361.6	0.73	β	4
1886.7	355.6	1.01	L. McC.	1
1888.5	360.1	0.88	Haverford	2

The mag. which is from the B.D., seems too faint.

It agrees, however, with Bessel's determination = 9.0.

Estimates of the chief star by the double star observers vary from 6.6 to 8.0.

S.f. ϵ Orionis.

No. 63. β 1051. Bond 1096. 9.6
 $5^h 33^m 20^s$ — $4^\circ 57'.0$.

10.1 and 10.7

1889.1	24.7	0.75	β	3 n
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S.f. Lal. 10,628, mag. 6.7.

44A

5hrs.

REFERENCE CATALOGUE OF

No. 64. β 1032. σ Orionis. MAG. 3.7
 $5^h 33^m 43^s$ — $2^\circ 39'.4$

3.9 and 5.6

1888.81	357.0	0.26	β	4 n
1890.81	351.6	0.29	"	3
1891.88	349.7	0.23	"	3

Another star $13''$ away.

Followed by Piazzis 5 h. 173 and 174, two 8.5 mag. stars.

No. 65. β 321a. Lal. 10,726. MAG. 6.7
 $5^h 34^m 52^s$ — $17^\circ 54'.3$

7.0 and 8.3

1877.1	143.6	1.00	Cinc.	1 n
1877.3	144.5	0.68	Dembowski	3
1879.5	139.2	0.99	β	3
1888.9	141.2	0.76	Haverford	2

There are several fainter stars in the field—among them the double star Lal. 10,728. See No. 66.

No. 66. β 321b. Lal. 10,728. MAG. 8.6
 $5^h 34^m 56^s$ — $17^\circ 55'.4$

9.1 and 9.8

1877.1	360.2	1.49	Cinc.	1 n
1877.3	357.7	1.26	Dembowski	4
1879.5	359.4	1.49	β	3
1888.9	358.8	1.40	Haverford	2

 β 321a is $89''$ N.pr. See No. 65.

No. 67. h. 3784. Lac. 1944. MAG. 8.2
 $5^h 35^m 22^s$ — $46^\circ 8'.8$

Comes = 9.5

1836.5	49.9	3. \pm	h	2 n
1852.1	56.0	5. \pm	Gilliss	1
1879.1	58.6	4.65	Hargrave	1
1895.2	62.1	5.18	Sellers	3

The change probably arises from p.m. in one of the stars.

Both stars separately observed on the meridian at Cordoba.

No. 68. β 322. Ö.A. 4178. MAG. 8.3
 $5^h 35^m 29^s$ — $25^\circ 12'.1$

8.5 and 10.0

1877.1	104.2	2.10	Cinc.	1 n
1894.1	104.3	1.97	Sellers	2

Ö.A. 4176, mag. 7.6, is $6'$ S.pr.

No. 69. Kunowsky. ζ Orionis. MAG. 1.9
 $5^h 35^m 43^s$ — $1^\circ 59'.7$

Comes = 5.4

1825.2	153.3	2.34	Σ	5 n
1831.2	151.3	2.35	"	6
1836.2	151.3	2.55	"	5
1853.9	153.7	2.98	Morton	4
1866.1	152.4	2.86	Talmage	3
1866.8	151.9	2.61	Dembowski	3
1872.1	153.8	2.28	Dunér	9
1878.5	151.7	2.51	Cinc.	2
1880.5	151.8	2.87	β	2
1887.0	152.8	2.62	Tarrant	3
1889.2	158.3	2.70	Maw	3
1893.1	157.5	2.84	Glazenapp	2

Another star noted by H, mag. 9.5, N.f. $57''$.

No certain change.

Also known as Σ 774.

No. 70. Harvard. α Columbæ. MAG. 2.7
 $5^h 36^m 1^s$ — $34^\circ 7'.6$

According to *Harvard Circular*, No. 18, this star has a companion within $30''$, seen at Arequipa in 1891.

No. 71. h. 3789. C. Z. 5 h. 1318-9. MAG. 8.9
 $5^h 36^m 36^s$ — $50^\circ 11'.1$

Comes = 9.5

1837.0	3.6	10. \pm	h	1 n
1849.1	0.7	9.14	Jacob	3
1873.1	358.0	9.14	Russell	1

No. 72. Innes 277. Bris. 1025. MAG. 8.0
 $5^h 36^m 38^s$ — $71^\circ 11'.8$

8.1 yellow, and 11.0

1898.3	190. \pm	3.5 \pm	Innes	2 n
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Near three bright nebulae. A wider pair is N.pr. = h 3783.

SOUTHERN DOUBLE STARS.

5hrs.

45A

No. 73. β 1052. Lal. 10,776. ^{MAG.} 6.7 5 ^h 36 ^m 39 ^s — 2° 56'.8.	No. 78. β 15. W.B. 5 h. 1022. ^{MAG.} 8.0 5 ^h 42 ^m 46 ^s — 2° 19'.9.
7.1 and 8.1	8.1 and 10.4
1889.14 189.1 0.66 β 3 n	1875.6 174.3 2.07 Dembowski 2 n
	1878.1 177.9 1.67 Cinc. 1
	1886.9 179.8 2.08 L. McC. 2
No. 74. γ Leporis. 3.8 5 ^h 40 ^m 18 ^s — 22° 28'.8.	No. 79. λ 55. C. Z. 5 h. 1577. 8.5 5 ^h 42 ^m 53 ^s — 47° 25'.3.
Comes, Bradley 836, = 7.3	8.6 and 11.5
1879.0 349.4 94.91 Cape M.O. 2 n	1897.1 308.8 0.90 See 2 n
1889.2 349.6 95.25 Hall 2	
Common p.m. of α'' .480 towards 220°.9.	
No. 75. Washburn 77. 1st Mun. 1493. 9.0 5 ^h 40 ^m 39 ^s — 15° 12'.0.	No. 80. Innes 279. C. Z. 5 h. 1580. 8.5 5 ^h 42 ^m 59 ^s — 43° 18'.2.
9.4 and 10.4	8.8 and 10.1
1888.4 293.4 1.86 Washburn 3-2 n	1898.3 350. ± 0.7 ± Innes 1 n A 9.7 star is pr.
No. 76. Σ 790. Lal. 10,936. 6.7 5 ^h 41 ^m 5 ^s — 4° 18'.4. Orange	No. 81. h. 3802. Lac. 2012. 8.1 5 ^h 43 ^m 24 ^s — 55° 45'.7.
Comes = 9.7 blue	Comes = 9.6
1830.8 89.1 6.82 Σ 3 n	1834.9 305.6 4. ± h 1 n
1851.2 88.2 7.11 Jacob 2	1873.1 308.5 6.98 Russell 1
1866.4 89.3 6.81 Dembowski 3	Separately observed on the meridian at Cordoba.
1884.5 88.3 6.95 Cinc. 2	
Both stars observed on the meridian at Cordoba. Also called South 497.	No. 82. Washburn 78. B.D. 9.0 — 12°, 1275. 5 ^h 44 ^m 1 ^s — 12° 49'.0.
	9.7 and 9.9
	1888.2 167.7 1.84 Washburn 3 n
No. 77. Innes 278. Bris. 1050. 8.5 5 ^h 42 ^m 37 ^s — 68° 45'.3.	No. 83. h. 3799. Ö.A. 4329. 8.6 5 ^h 44 ^m 3 ^s — 18° 44'.0.
8.7 and 10.2	9.2 and 9.6
1898.3 180. ± 1. ± Innes 1 n	1835.9 148.5 2.5 ± h 1 n
Closely N.f. Lac. 2037, mag. 7.5.	1877.1 149.1 4.25 Cinc. 1
In the nubecula major, near the looped nebula.	

46A

5hrs.

REFERENCE CATALOGUE OF

No. 84. Jacob [3]. Lal. 11,086. 5.8
 $5^h 45^m 4^s$ — $14^\circ 30'.8$.

6.0 and 8.0

					MAG.
1845.8	185.2	1.8 ±	Jacob	1 n	
1846.4	184.0	1.8 ±	"	1	
1876.2	179.4	2.73	Dembowski	4	
1878.1	182.6	2.29	Cinc.	1	
1881.1	182.5	2.72	β	1	
1888.1	178.8	2.82	Haverford	3	
1893.0	178.6	2.48	"	2	

Jacob's R.A. was 20_m in error, probably by a slip of the pen, as it was observed by him twice, and the star was rediscovered independently as β 94.

Very slow change shown.

No. 85. β 1188. Lal. 11,084. 8.2
 $5^h 45^m 34^s$ — $1^\circ 27'.4$.

8.4 and 10.9

1890.8	106.0	1.23	β	3 n
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Perhaps noted as double at Göttingen. See Zone Observations, 1869.

A 9.0 mag. star 25" S.f. makes with β 1188 the old pair Σ 809.

No. 86. Innes 63. Lac. 2024. 7.1
 $5^h 45^m 39^s$ — $48^\circ 57'.0$.

7.3 and 9.0

1897.0	8. ±	1.3 ±	Innes	3 n
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Independently discovered at Sydney by Mr Sellors in January 1897.

A 10^m star S.f. 90" ±

No. 87. h. 3812. C. Z. 5 h. 1844. 8.6
 $5^h 48^m 24^s$ — $59^\circ 52'.0$.

9.2 and 9.6

1836.0	190.9	2.5 ±	h	1 n
1873.1	190.3	2.43	Russell	1

No. 88. h. 3807. C. Z. 5 h. 1824. 8.3
 $5^h 48^m 30^s$ — $41^\circ 42'.4$.

Comes = 9.5

1837.1	267.3	4. ±	h	1 n
1880.9	pr.	3. ±	C. G. A.	3

No. 89. Innes 64. Piazzzi 5 h. 274. 5.6
 $5^h 49^m 8^s$ — $37^\circ 39'.1$.

Comes = 11.2

1896.9	250. ±	10. ±	Innes	1 n
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C. P. D. mag. = 6.8;

Another star = 11_m N.f. at a greater distance.

No. 90. Innes 16. Piazzzi 5 h. 278. 7.0
 Orange

 $5^h 49^m 27^s$ — $38^\circ 32'.9$.

Comes = 11.0

1896.2	121.9	1.54	Sellors	3 n
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No. 91. Sellors 15. Lac. (1680)
 = Bris. 1099 6.9

 $5^h 52^m 17^s$ — $61^\circ 51'.4$.

7.4 and 7.9

1895.1	324.4	0.71	Sellors	3 n
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No. 92. Σ 826. Göttingen 1792. 8.7
 $5^h 53^m 50^s$ — $1^\circ 20'.0$.

9.1 and 10.1

1832.4	115.5	1.84	Σ	4 n
1867.4	122.2	2.22	Dembowski	3
1877.7	125.7	2.18	β	2
1878.1	124.4	2.09	Cinc.	1
1886.9	121.0	1.94	L. McC.	1

No. 93. Cape 5. Lac. 2086. 7.7
 $5^h 53^m 58^s$ — $41^\circ 46'.0$.

8.3 and 8.7

1895.1	210.1	1.67	Sellors	3 n
1897.2	209.4	1.82	See	2

Independently noted at Cordoba in 1876.

SOUTHERN DOUBLE STARS

5 hrs.

47 A

No. 94. South 504. Lal. 11,376. ^{MAG.} 8.6
 5^h 54^m 10^s — 20° 10'.4

Comes = 8.9

1851.2	73.7*	3.59	Jacob	3-2 n
1877.5	70.3	3.78	Cinc.	2
1883.4	71.3	4.00	"	2-1

Other measures.

No. 215 in Struve's first catalogue.

No. 95. Innes 155. Lac. 2092. 8.0
 5^h 55^m 33^s — 33° 49'.6

8.2 and 10.2

1897.1	20. ±	1.5 ±	Innes	1 n
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Piazzi 5h 320 mag. 5.9 orange (C. P. D. mag. 7.4),
 is some way S.f.

No. 96. β 564. 1st Mun. 1636. 9.3
 5^h 56^m 0^s — 1° 34'.3

9.5 and 11.3

1878 ±	90. ±	1. ±	β	1 n
1892.0	70.9	1.29	"	2

No. 97. h. 3823. C. Z. 5 h. 2152. 7.5
 5^h 56^m 37^s — 31° 2'.8

8.2 and 8.4, both orange

1836.9	130.5	4.84	h	4 n
1851.1	130.5	4.00	Jacob	2
1852.4	130.3	3.93	Maclear	2
1856.1	129.8	3.75	Secchi	1
1877.0	121.0	3.82	Cinc.	2
1881.1	123.0	2.88	Pritchett	1
1888.1	115.3	3.04	Haverford	2
1894.1	115.0	2.30	Sellers	1
1896.0	114.9	.....	Doberck	2

Angle and distance decreasing.

In the C. P. D. the combined mag. = 8.6.

See:—

1888. Leavenworth, H. P., "Motion," *Sideral Messenger*, vol. vii. p. 172.

No. 98. β 16. 3 Monocerotis. 5.1
 5^h 57^m 8^s — 10° 35'.9

5.2 and 8.4

1875.6	354.8	1.62	Dembowski	2 n
1878.2	354.9	1.68	Cinc.	1
1889.0	353.9	1.88	Haverford	4-3

In the *Radcliffe 1890 Catalogue* this is noted as a pale blue star.

Small common p.m.

No. 99. Σ 836. W.B. 5 h. 1417. 8.3
 5^h 57^m 30^s — 2° 21'.7

8.5 and 10.7

1832.5	27.8	1.93	Σ	3 n
1867.8	31.7	2.00	Dembowski	3

No. 100. λ 58. Ö.A. 4575. 9.1
 5^h 58^m 36^s — 21° 48'.3

9.2 and 12.5

1897.8	206.2	1.72	See	1 n
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No. 1. h. 3831. C. Z. 6 h. 13. MAG. 7.7
 6^h 1^m 4^s — 41° 9'.0.

Both = 8.5

		"	h	MAG.
1837.0	135.2	2.5 ±	h	2 n
1854.1	136.2	2.70	Jacob	2
1879.2	134.3	2.56	Hargrave	1
1896.0	134.1	.....	Doberck	2

No. 2. Argelander [1]. Ö.A. 4618. 7.8
 6^h 1^m 10^s — 25° 1'.2.

8.5 and 8.7

		"		MAG.
1876.0	295.6	4.69	Cinc.	5 n
1879.2	293.6	4.67	"	2

No. 3. h. 3834. Piazzì 5 h. 348. 5.8
 6^h 1^m 48^s — 45° 4'.7.

5.9 and 8.8, both yellow

		"	h	MAG.
1837.9	247.7	1.3 ±	h	1 n
1854.1	237.3	2.58	Jacob	2
1873.1	230.6	3.04	Russell	1
1895.1	226.4	3.62	Sellers	3
1897.1	224.7	3.75	See	6-5

Change.

Common p.m. of α .256 towards 348°.0, which is very similar in amount and direction to that of Piazzì 5h, 346, a star of the 6.4 mag. about 3' N.pr.

Both components of h 3834 have been observed on the meridian at Cordoba.

In the first *Sydney Catalogue of Double Star Measures* this system is erroneously referred to as "After h 3834."

No. 4. Dunlop 23. Lac. 2145. 6.9
 6^h 2^m 11^s — 48° 26'.9.

7.6 and 7.8

		"		MAG.
1826.	329.	3. ±	Dunlop	1 n
1835.0	342.5	3.86	h	1
1846.8	347.6	3.33	Jacob	2
1854.2	352.2	2.28	"	2
1856.5	354.1	2.30	"	4
1873.1	2.1	2.90	Russell	1
1881.2	11.4	2.46	Tebbutt	2
1882.2	11.6	2.35	Russell	1
1892.3	25.4	1.35	Sellers	3
1897.0	32.8	1.92	Tebbutt	3

Many other measures.

Common p.m. of α .111 towards 243°.3.

Mr Tebbutt has called attention to the magnitude of the chief star, which has been rated from 6.0 to 8.5 in a series which suggests a period of fourteen years more or less. It has, however, never been rated less than the other component.

Called h 3835 in error in the first *Sydney Catalogue*.

See:—

1881. Tebbutt, J., "Motion," *Observatory*, vol. iv. p. 211.

No. 5. Σ 850. W.B. 5 h. 1554. MAG. 9.2
 6^h 2^m 23^s — 3° 58'.8.

Comes = 11.0

		"		MAG.
1832.5	15.8	2.09	Σ	3 n
1867.5	16.7	2.22	Dembowski	3

No. 6. Triple. 4 Monocerotis. 6.8
 6^h 3^m 44^s — 11° 7'.8.

A = 6.9, B = 10.6, C = 11.5

A and B = β 17

		"		MAG.
1875.9	178.0	3.16	Dembowski	3 n
1878.1	182.8	2.59	Cinc.	1
1889.1	179.6	3.01	Haverford	2
1892.0	180.4	3.21	β	3

A and C = Knott.

		"		MAG.
1876.8	244.5	8.95	Dembowski	1 n
1892.0	246.8	8.77	β	3

The p.m. of the chief star is about α .03.

No. 7. β 565. Lal. 11,741. 8.2
 6^h 4^m 36^s — 14° 2'.9.

8.3 and 10.9

		"		MAG.
1878.2	100.4	1.02	β	1 n
1892.1	99.9	1.13	"	3

No. 8. β 1242. Schj. 2066. 9.0
 6^h 4^m 38^s — 6° 18'.5.

9.7 and 9.9

		"		MAG.
1891.87	124.5	0.48	β	3 n

In the centre of a faint diffused nebula, H IV. 38.

Another star, 10.7 mag., 44" away, constitutes with β 1242 the pair h 2298.

A 7.5 mag. star is 13' S.

No. 9. Innes 280. C.Z. 6 h. 256. ^{MAG.} 9.0
6^h 6^m 35^s — 46° 15'.8.

Comes = 11.5

1898.3 280.± 4.± Innes 1 n
C.Z. 6 h. 260, mag. 9.0, is 7 secs. f. 4' S.
The magnitudes [from C. G. A.] are considerably underrated.

No. 10. Alvan Clark 3. Lal. 11,793. 6.6
6^h 6^m 47^s — 4° 38'.6.

6.8 and 8.3

1854.1 1.1± A. Clark 1 n
1858.1 170.0 0.85± Jacob 2
1875.7 169.8 0.98 Dembowski 3-2
1892.1 173.8 0.87 β 3
1898.0 174.8 1.00 Aitken 4

"Little or no change":—Aitken.

No. 11. λ 62. Lal. 11,846. 8.7
6^h 7^m 2^s — 22° 48'.1.

9.4 and 9.5

1897.8 96.4 0.50 See 2 n
Prof. See also measures a 13th mag. star 25" distant.

No. 12. β 1017. W.B. 6 h. 124. 9.0
6^h 7^m 28^s — 2° 55'.4.

9.7 and 9.9

1883.± 180.± 0.8± β 1 n
1892.0 161.1 0.65 " 3

No other measures.

No. 13. Cordoba [14]. C.Z. 6 h. 333 8.8
6^h 8^m 24^s — 40° 23'.4.

9.2 and 10.0

1897.1 40.7 1.81 See 2-3 n
The middle of three stars.

No. 14. β 566. • Lal. 11,916. ^{MAG.} 5.6
6^h 9^m 40^s — 4° 32'.3.

Comes = 11.0

1878.0 219.7 1.43 β 1 n
1892.1 209.9 1.87 " 3
In the *Radcliffe* 1890 *Catalogue* this is noted as a green star.

No. 15. β 323. Lal. 11,915. 8.3
6^h 9^m 45^s — 1° 41'.3.

8.5 and 10.2

1876.3 96.3 2.40 Dembowski 2 n
1878.1 93.5 2.16 Cinc. 1
1888.2 96.3 2.14 Hall 2
1889.1 96.9 2.26 Haverford 3

No. 16. β 567. Lal. 11,949. 6.1
6^h 10^m 34^s — 4° 52'.9.

Comes = 10.9

1879.1 249.5 3.83 β 4 n
1892.0 246.8 3.97 " 3

No. 17. Innes 3. Lac. 2224. 6.9
6^h 11^m 30^s — 61° 26'.7.

7.3 and 8.3

1896.1 9.7 1.07 Sellors 3 n

No. 18. [Dunlop 26]. Lac. [2275]. 7.4
6^h 11^m 57^s — 65° 30'.4.

Comes = 8.2

1836.2 114.9 21.5 *h* 3 n
1871.6 115.8 20.9 Russell 2
1879.2 116.8 20.5 Hargrave 1
1885.2 116.8 20.5 Tebbutt 1

The companion is Cape 1880, 2888.
In Lacaille and the first *Sydney Catalogue* the R.A. of the chief star, which is Bris. 1201, is erroneous.

50A

6hrs.

REFERENCE CATALOGUE OF

No. 19.	β 18.	Lal. 12,006.	MAG. 7.0
	$6^h 12^m 3^s$	$-12^\circ 0'.7$	
	7.3 and 8.7		
1876.0	271.9	1.79	Dembowski 3 n
1878.0	273.5	1.54	Cinc. 1
1885.1	276.9	1.77	" 1
1886.5	275.9	1.68	L. McC. 2
1892.9	273.5	1.21	Haverford 1

No. 20.	β 1019.	W.B. 6 h. 287.	9.1
	$6^h 12^m 26^s$	$-3^\circ 0'.7$	

Comes = 10.7

1892.1	274.2	0.81	β 3 n
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W.B. 6 h. 288, mag. 9.1, is 5 secs. f. 3'.7 S.

No. 21.	Hough 338.	Lal. 12,079.	8.3
	$6^h 13^m 56^s$	$-18^\circ 22'.6$	

8.5 and 10.3

1890.2	286.9	1.95	Hough 1 n
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No. 22.	Σ 3116.	Lal. 12,176.	5.3
	$6^h 16^m 45^s$	$-11^\circ 43'.6$	

Comes = 9.1

1831.2	19.2	4.48	Σ 5 n
1847.1	25.1	3.86	Jacob 1
1864.7	24.0	3.85	Dembowski 5
1881.2	24.0	4.26	Cinc. 2-1

See:—

1886. Gore, J. E., "Rectilinear Motion," *M. N. R. A. S.*, vol. xlvii, p. 61.

No. 23.	Innes 281.	C. Z. 6 h. 787.	8.7
	$6^h 17^m 49^s$	$-44^\circ 44'.7$	

Comes = 10.5

1898.1	N. 4.±	Innes 1 n
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The pr. star of a triangle in the finder.

No. 24.	β 568.	Lal. 12,288.	MAG. 6.9
	$6^h 19^m 28^s$	$-19^\circ 44'.0$	

7.2 and 8.3

1878.2	155.1	[1.35]	β 1 n
1878.2	161.0	.....	Cinc. 1
1889.1	148.3	0.80	Haverford 4-1
1892.4	155.2	1.07	" 2-1

Ö.A. 5074, mag. 8.5, = Hough 339, a 5" pair, is about 64 secs. f. 4' N.

No. 25.	β 97.	Lal. 12,260.	7.2
	$6^h 19^m 30^s$	$-1^\circ 21'.8$	

7.5 and 8.8

1876.0	257.8	1.15	Dembowski 3 n
1878.1	261.2	1.10	Cinc. 2
1889.1	260.9	0.93	Haverford 2-1

No. 26.	β 569.	Lal. 12,315.	7.8
	$6^h 20^m 33^s$	$-10^\circ 53'.2$	

8.0 and 10.0

1878.0	120.7	1.84	β 1 n
1878.6	118.8	1.54	Cinc. 2
1886.9	115.2	1.99	L. McC. 2

No. 27.	h. 3857.	Piazzi 6 h. 110.	5.6
	$6^h 20^m 33^s$	$-36^\circ 39'.3$	

Comes = 8.8

1836.5	260.8	12.±	h 2 n
1882.2	254.9	12.24	Hargrave 1
1897.0	255.3	12.81	See 2

Some evidence of a small common p.m.

C. P. D. mag. = 7.2.

Both stars observed on the meridian at Cordoba.

Piazzi 6 h. 112, mag. 7.0, is N.f.

No. 28.	Innes 282.	Lac. 2287.	7.7
	$6^h 21^m 41^s$	$-50^\circ 28'.5$	

7.9 and 9.9

1898.3	300.±	1.±	Innes 1 n
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2° 10' N. of Canopus.

SOUTHERN DOUBLE STARS.

6 hrs.

51A

No. 29. λ 66. Canopus. MAG. -1.0
 $6^h 21^m 44^s$ — $52^\circ 38'.5$.

Comes = 15.0

1897.0 $160. \pm 30. \pm$ See 1 n
 In a fine low power field.

No. 30. h. 3858. Gilliss 277. 7.2
 $6^h 22^m 3^s$ — $34^\circ 58'.8$.

7.6 and 8.6

1836.0 315.5 $3. \pm$ h 1 n
 1849.5 316.7 3.70 Jacob 3
 1857.9 315.2 3.53 " 2
 1876.6 313.3 4.03 Cinc. 1-2
 1877.1 311.7 4.25 " 1
 1897.1 316.8 3.00 Scott 1
 1897.1 316.4 3.86 See 2

 h 's Dec. is 1° in error.

Separately observed on the meridian at Cordoba.

Lac. 2274, mag. 6.2 (C. P. D. mag. 7.4), is $128''$
 S.pr.

No. 31. Innes 156. G Puppis. 6.0
 $6^h 23^m 5^s$ — $48^\circ 7'.0$.

6.1 and 9.0

1897.2 $127. \pm$ $0.95 \pm$ Innes 2 n.

No. 32. Triple. β Monocerotis. 3.9
 $6^h 23^m 58^s$ — $6^\circ 58'.1$.

A = 4.0 B = 7.8 C = 8.2

A and B = H II. 17

1831.2 130.0 7.25 Σ 3 n
 1854.2 131.2 7.34 Dembowski 5
 1889.2 130.6 6.94 Glasenapp 2

B and C = H I. 10

1831.2 101.7 2.46 Σ 3 n
 1854.2 101.6 2.53 Dembowski 5
 1886.8 102.6 2.47 L. McC. 1

A and C

1831.2 122.9 9.49 Σ 3 n

Common p.m. of $0''.076$ towards $296^\circ.4$, but the
 stars are relatively fixed.

Also called Σ 919. β notes a 12.5 mag. star $26''$ distant = β 570.

No. 33. β 753. Piazzini 6 h. 138. MAG. 6.0
 $6^h 24^m 56^s$ — $32^\circ 18'.4$.

6.2 and 7.9

1879.8 $40. \pm$ $1.2 \pm$ β 1 n
 1892.1 47.2 1.29 " 3
 1893.1 37.3 1.17 Sellors 2
 1897.1 38.2 1.36 Aitken 3
 1897.1 45.4 0.93 See 2

"A very fine pair": — β

Sometimes misidentified with λ Canis Majoris,
 mag. 4.7, which is $28''$ secy pr. $13' S$.

No. 34. h. 3863. Lal. 12,509. 7.2
 $6^h 25^m 13^s$ — $22^\circ 31'.5$.

Comes = 9.2

1835. \pm $121. \pm$ $2. \pm$ h 1 n
 1877.1 116.1 2.70 Cinc. 2

No. 35. h. ~~3866~~. Ö.A. 5202. 8.1
 $6^h 26^m 16^s$ — $24^\circ 4'.4$.

Comes = 9.6

1877.6 135.1 4.24 Cinc. 4 n

The only set of measures found.

Separately observed on the meridian at Cordoba.

No. 36. Sellors 7. Lac. 2333. 5.3
 $6^h 27^m 22^s$ — $50^\circ 10'.1$.

5.7 and 6.7

1879.2 267.1 0.72 Russell 1 n
 1893.1 265.2 0.68 Sellors 3
 1897.1 274.7^* 0.69 See 2-3

The original announcement of the discovery of this
 pair suffered so much from errors in printing that it
 passed unnoticed. The rediscovery of the pair by
 Mr Sellors gave a solution of the misprints.

Formerly called Z Puppis.

There is an 8.6 mag. star some distance away, com-
 posing with the above pair the old pair, Dunlop 30.

1835.9 317.8 13.6 h 2 n
 1879.2 318.0 12.5 Russell 1
 1880.0 313.9 13.1 Cru's 3
 1897.1 315.6 13.2 See 3

Mr Russell's measure is set against No. 65 in his
 list of new double stars.

52A

6hrs.

REFERENCE CATALOGUE OF

No. 37.	Innes 4.	Lac. 2320.	MAG.					
	6 ^h 27 ^m 26 ^s	— 40° 22'.6.	6.6					
		7.2 and 7.6						
1895.6	320.±	1.±	Innes	3 n				
1896.1	302.2	1.30	Sellors	3				
1897.2	301.7	0.76	Lowell	2				
No. 38.	β 98.	Lal. 12,564.	MAG.					
	6 ^h 27 ^m 45 ^s	— 5° 15'.9.	7.9					
		8.6 and 8.8						
1876.1	140.8	1.05	Dembowski	3-2 n				
1878.0	138.3	0.7±	Cinc.	1				
1878.1	134.7	0.52±	„	1				
No. 39.	h. 3874.	μ Pictoris.	MAG.					
	6 ^h 30 ^m 29 ^s	— 58° 40'.7.	5.8					
		6.0 and 8.2						
1836.5	230.5	2.9±	h	2 n				
1894.1	236.2	2.05	Sellors	1				
No. 40.	β 754.	Piazzi 6 h. 177.	MAG.					
	6 ^h 31 ^m 5 ^s	— 33° 55'.8.	7.0					
		7.7 and 7.9						
1879.8	20.±	0.5±	β	1 n				
1892.1	22.8	.....	Haverford	1				
1892.2	36.5	0.78	β	2				
1897.8	16.2	0.92	See	1				
No other measures found.								
A 10 th mag. comes 25" pr., and another more distant star N.f.								
No. 41.	Innes 178.	C. Z. 6 h. 1403.	MAG.					
	6 ^h 31 ^m 12 ^s	— 32° 13'.6.	8.3					
		8.6 and 9.8						
1897.3	205.±	0.8±	Innes	2 n				
A faint star to the N.								
No. 42.	β 755.	Piazzi 6 h. 182.	MAG.					
	6 ^h 31 ^m 56 ^s	— 36° 41'.9.	5.7					
		6.1 and 7.1						
1879.8	250.±	1.±	β	1 n				
1887.2	253.1	0.78	Pollock	3-2				
1891.1	252.7	0.91	Sellors	1				
1897.2	260.6	1.09	See	1				
Another star 10 th mag. 21" distant makes with the above the old pair h 3875.								
Recorded as a new triple star in 1897. See <i>Harvard Circular</i> , No. 18.								
No. 43.	Cape 6.	Lac. 2362.	MAG.					
	6 ^h 32 ^m 1 ^s	— 38° 43'.7.	7.7					
		8.4 and 8.5						
1891.1	59.2	1.±	Sellors	2 n				
1893.1	60.2	1.11	„	2				
1897.1	61.6*	1.05	See	2				
First noted at the Cape about 1877.5.								
A 10 th mag. comes closely N.f.								
No. 44.	Ormond Stone.	W.B. 6h.	MAG.					
	989.		9.0					
	6 ^h 34 ^m 50 ^s	— 7° 56'.3.						
		9.5 and 10.0						
1878.1	228.5	0.9±	Cinc.	1 n				
Identification somewhat uncertain.								
No. 45.	Dunlop 31.	Lac. 2402.	MAG.					
			5.0					
	6 ^h 35 ^m 58 ^s	— 48° 7'.8.						
		Companion = 7.5 blue						
1835.9	317.0	13.4	h	3 n				
1847.2	318.7	13.3	Jacob	2				
1857.0	319.0	13.1	„	2				
1872.1	319.3	13.0	Russell	1				
1881.2	318.2	12.7	Tebbutt	1				
Indexed in error as h 3883 in Mr Russell's catalogue.								

SOUTHERN DOUBLE STARS.

6 hrs.

53A

No. 46. Σ 955. Lal. 12,876. ^{MAG.} 8.2
 $6^{\text{h}} 36^{\text{m}} 22^{\text{s}}$ — $7^{\circ} 53'.6$.

A = 9.1 B = 9.7 C = 9.2

A and B

1830.6	272.6	0.88	Σ	4 n
1836.2	266.5	0.89	"	1
1857.1	276.3	1.09	Secchi	1
1872.3	265.9	0.95	Dembowski	6-2
1878.6	270.7	0.92	β	2
1886.7	270.7	0.92	L. McC.	2-1
1889.2	271.5	0.95	Hall	3

A and C

1831.4	188.4	11.4	Σ	4 n
1857.1	188.7	11.3	Secchi	1
1878.1	189.4	11.5	β	1

Other measures.

All evidently fixed.

β notes a faint star $15''$ S. of C.

No. 44 is S.pr.

No. 47. Innes 5. Lac. 2432. ^{MAG.} 6.6
 $6^{\text{h}} 36^{\text{m}} 56^{\text{s}}$ — $61^{\circ} 26'.7$.

6.8 and 8.8

1896.1	271.4	2.40	Sellers	3 n
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The chief star has a p.m. of $0''.1$.

No. 48. λ 70. Lac. 2422. ^{MAG.} 7.5
 $6^{\text{h}} 37^{\text{m}} 23^{\text{s}}$ — $52^{\circ} 44'.4$.

8.2 and 8.3

1897.1	117.1	0.46	See	2-1 n
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No. 49. β 19. Lal. 12,936. ^{MAG.} 7.5
 $6^{\text{h}} 37^{\text{m}} 30^{\text{s}}$ — $15^{\circ} 54'.7$.

Comes = 9.8

1872.1	169.4	4.07	Knott	1 n
1876.3	165.0	3.52	Dembowski	3
1877.1	165.5	3.64	Cinc.	2
1880.8	166.1	3.65	β	3
1885.6	168.7	3.58	Cinc.	2
1888.1	166.6	3.70	Haverford	3

Separately observed on the meridian at Cordoba.

No. 50. β 195. Lac. 2404. ^{MAG.} 7.5
 $6^{\text{h}} 38^{\text{m}} 17^{\text{s}}$ — $23^{\circ} 8'.1$.

Comes = 10.0

1876.1	S.pr.	$5''.\pm$	C. G. A.	3 n
1877.1	217.6	6.05	Cinc.	1

No. 51. Cordoba [15]. C. Z. 6 h. 1789. ^{MAG.} 8.7
 $6^{\text{h}} 38^{\text{m}} 41^{\text{s}}$ — $37^{\circ} 54'.4$.

Comes = 10.1

1880.9	S.pr.	$4''.\pm$	C. G. A.	2 n
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No. 52. Dunlop 32. Piazzini 6 h. 223. ^{MAG.} 6.9
 $6^{\text{h}} 38^{\text{m}} 53^{\text{s}}$ — $38^{\circ} 18'.0$.

Comes = 7.7

1835.4	276.1	8.43	<i>h</i>	2 n
1851.1	277.2	7.97	Jacob	2
1876.1	275.4	7.92	Cinc.	1
1879.2	277.8	8.03	Hargrave	1
1893.1	274.8	8.34	Scott	1
1896.0	278.0	7.30	Doberck	3-2
1897.1	277.0	7.97	See	4

The p.m. is inconsiderable.

No. 53. Innes 283. C. Z. 6 h. 1837. ^{MAG.} 8.0
 $6^{\text{h}} 39^{\text{m}} 21^{\text{s}}$ — $42^{\circ} 28'.4$.

8.2 and 10.2

1898.3	190. \pm	$2''.\pm$	Innes	1 n
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No. 54. A. G. Clark 1. Sirius. — 1.4
 $6^{\text{h}} 40^{\text{m}} 44^{\text{s}}$ — $16^{\circ} 34'.7$.

Comes = 10.0

1862.2	84.6	10.07	Bond	3 n
1872.2	64.3	11.46	Hall	6
1882.2	42.5	9.67	"	7
1885.3	34.7	8.06	"	8
1888.2	23.3	5.78	"	5
1890.3	359.7	4.19	β	3
1897.2	185.4	3.88	Aitken	4-3

[contd.]

The history of this binary is well known.

Prof. See gives the following elements for the orbit:—

$$\begin{aligned} P &= 52.2 \text{ years} \\ T &= 1893.5 \\ e &= 0.62 \quad a = 8''.03 \\ i &= 46.8 \quad \Omega = 34^\circ.3 \\ \lambda &= 131.0 \end{aligned}$$

and this ephemeris:—

$$\begin{array}{ccc} 1899.2 & 158.9 & 4.97 \\ 1900.2 & 149.5 & 5.25 \end{array}$$

and further, adopting¹ a parallax of $0''.38$, and Prof. Auwers' ratio of the masses of the two bodies, he finds the semi-axis major to be 21.1 times that of the Earth's, the mass of Sirius = 1.1 times, and the mass of the companion = 2.36 times that of the Sun.

The mean p.m. of Sirius is about:—

$$1''.2 \text{ towards } 195^\circ.$$

According to the Potsdam spectroscopic observations, Sirius is approaching the Sun at 10 miles per second. This rate is, however, not the mean rate of the system which is still unknown.

There are several faint stars over $40''$ distance.

This double star is the subject of many papers, two very complete ones being:—

1891. Burnham, S. W., *M. N. R. A. S.*, vol. li. pp. 378–388.

1892. Auwers, A., "Beiträge zur Kenntniss des Sirius-Systems," *Astr. Nachr.*, Bd. cxxix. No. 3084–5.

These two excellent papers, with the references they give, bring our knowledge of the system to the time of disappearance of the companion in 1890.

1894. Howard, C. P., "Orbit," *Astronomy and Astrophysics*.

1894. Roberts, A. W., "Orbit," *Ast. Journal*, vol. xiv. No. 328.

1896. See, T. J. J., ["Rediscovery,"] *Ast. Journal*, vol. xvii. No. 385.

1896. Holden, E. S., ["Rediscovery,"] *Ast. Journal*, vol. xvii. No. 388.

1896. Hussey, W. J., "Brightness of Companion," *Pub. Ast. Soc. Pac.*, vol. viii. No. 50.

1896. Aitken, R. G., "Measures," *Ast. Journal*, vol. xvii. No. 388.

1896. Aitken, R. G., "Measures," *Astr. Nachr.*, No. 3389.

1896. Brown, S. J., "Observations," *Ast. Journal*, vol. xvii. No. 390.

1896. Roberts, A. W., "Orbit," *Astr. Nachr.*, No. 3369.

¹ Gill and Elkin, Heliumeter-Determinations of Stellar Parallax, etc. *Mem. R. A. S.*, Vol. xlviii., 1884. A new determination of the parallax of Sirius was made by Dr Gill in 1888–1889 with the 7-in. heliometer giving $\pi = 0''.370 \pm 0''.0097$. See *M. N. R. A. S.*, vol. lvi., 1898.

1897. Schaeberle, J. M., "Measures," *Ast. Journal*, vol. xvii. No. 394.

1897. Pritchett, H. S., "Observation," *Ast. Journal*, No. 399.

1897. Brenner, L., "Messungen," *Astr. Nachr.*, Bd. cxliii. No. 3421.

1897. Burnham, S. W., "The Orbit," *M. N. R. A. S.*, vol. lvii. pp. 453–456.

1897. Aitken, R. G., "Measures," *Ast. Journal*, vol. xviii. No. 415.

1897. See, T. J. J., "Remarks, etc.," *Ast. Journal*, vol. xviii. No. 418.

1897. Schaeberle, J. M., "Observations," *Ast. Journal*, vol. xviii. No. 420.

1897. Barnard, E. E., "Small Stars Near," *Ast. Journal*, vol. xviii. No. 420.

1898. Aitken, R. G., "Measures," *Ast. Journal*, vol. xviii. No. 424.

1898. See, T. J. J., "Measures," *Astr. Nachr.*, No. 3469.

No. 55. Innes 179. Lac. 2434. ^{MAG.} 6.9
6^h 41^m 13^s — 30° 28'.9.

Comes = 10.2:

1897.8 204.8 5''.40 See 1 n

Similar to the pair *h* 3891 S.f., but smaller. See No. 58.

No. 56. Innes 6. Lac. 2468. 7.0
6^h 41^m 26^s — 61° 39'.3.

7.7 and 7.8.

1896.2 250.0 1''.23 Sellors 3 n

Originally wrongly identified as Lac. 2487, a star 35' N.f., as pointed out by Mr Sellors in the *Astr. Nachr.*, No. 3423.

No. 57. Innes 284. Bris. 1358. 8.5
6^h 41^m 35^s — 64° 25'.4.

Comes = 11.0:

1898.1 pr. 4''.± Innes 1 n

Several more distant comites.

No. 58. β 3891. Piazz β h. 238. MAG. 6.0
 $6^h 41^m 42^s$ — $30^\circ 50' 6''$.

Comes = 8.4

1838.0	222.0	5.02	<i>h</i>	3 n
1847.5	221.6	5.13	Jacob	1
1856.2	220.8	4.90	Secchi	1
1876.1	220.2	5.43	Cinc.	2
1897.8	[203.7]	5.49	See	1

Separately observed on the meridian at Cordoba.
 See also No. 55.

No. 59. Innes 180. Cape 1880, 3201. 8.5
 $6^h 42^m 29^s$ — $52^\circ 19' 1''$.

9.0 and 9.5

1897.4	$322. \pm$	$0.5 \pm$	Innes	2 n
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Lac. 2471, mag. 6.2 orange, is 67 secs. f. and N.

No. 60. Ormond Stone. Ö.A. 5667. 8.6
 $6^h 42^m 45^s$ — $20^\circ 34' 1''$.

Comes = 10.0

1876.0	143.0	2.75	Cinc.	1 n
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Separately observed on the meridian at Cordoba.
 This pair may be Harvard 88.

In the C. G. A., the chief star is called red, but at Cinc. it was noted as blue. In the C. P. D. the combined mag. = 8.5.

Howe has measured two faint pairs N. f. this star.
 The star γ Canis Majoris, mag. 6.0, is 20' S.

No. 61. Σ 971. Schj. 2384. 8.3
 $6^h 43^m 45^s$ — $13^\circ 19' 7''$.

8.9 and 9.2

1829.9	331.0	11.85	Σ	3 n
1867.5	329.0	11.60	Dembowski	3
1881.1	327.5	11.62	Cinc.	2
1886.9	324.5	11.85	L. McC.	1

An 8.4 mag. star is closely S.f.

No. 62. β 20. Lal. 13,170. MAG. 7.8
 $6^h 45^m 19^s$ — $16^\circ 5' 8''$.

Comes = 10.7

1876.4	29.8	3.20	Dembowski	4+3 n
1878.1	30.7	2.90	Cinc.	1
1880.1	34.6	2.99	β	4
1886.1	30.1	3.70	L. McC.	1
1888.5	34.5	3.12	Haverford	3-1

N.f. Sirius.

No. 63. Alvan Clark 4. Lal. 13,173. 5.3
 $6^h 44^m 26^s$ — $15^\circ 1' 9''$.

5.5 and 7.0

1858.1	286.5	1. \pm	Jacob	2 n
1867.1	302.0	.....	Harvard	1
1877.6	297.1	0.98	Cinc.	2
1877.7	286.4	1.06	Dembowski	2
1878.0	292.2	11.01	β	2

No change.

Found in 1852 with a $4\frac{3}{4}$ -inch refractor.

No. 64. Innes 157. Lac. 2484. 7.0
 $6^h 44^m 39^s$ — $54^\circ 35' 1''$.

Comes = 9.8

1897.2	$10. \pm$	$2. \pm$	Innes	1 n
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No. 65. Innes 158. Lac. 2477. 7.2
 $6^h 44^m 44^s$ — $48^\circ 27' 2''$.

7.3 yellow, and 10.5 blue

1897.1	$185. \pm$	$1. \pm$	Innes	1 n
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A 10th mag. star about 60" S.f. and C. Z. 6 h. 2241, mag. 8.7, is 1^m 20^s f.

No. 66. β 324. Lac. 2462. 6.3
 $6^h 45^m 35^s$ — $23^\circ 57' 6''$.

6.5 and 8.5

1877.1	294.0	1.83	Cinc.	1 n
1889.0	293.3	1.71	Haverford	3-2
1892.9	199.0	1.74	"	1
1894.1	208.3	2. \pm	Sellers	1

Ö.A. 5742, mag. 9.3, is 30" pr. and with Lac. 2462 composes the old pair, South 537.

South 538 = Lac. 2461, a 27" pair, is Supr.

No. 67.	β 897.	Lal. 13,198.		MAG.
	6 ^h 45 ^m 43 ^s	— 0° 25'.2.		6.4
	Comes = 11.7			
1879.1	30.9	5.60	β	3 n
1892.0	32.0	6.00	"	3
Common p.m. of 0".204 towards 180°.				
No. 68.	β 898a.	B.D.—15°, 1532.		9.4
	6 ^h 45 ^m 49 ^s	— 15° 54'.4.		
	9.9 and 10.4			
1879.5	271.7	1.54	β	3 n
1892.0	270.3	1.91	"	3
See also next star, No. 69.				
No. 69.	β 898b.	Ö.A. 5753.		8.2
	6 ^h 45 ^m 54 ^s	— 15° 54'.8.		
	Comes = 10.5			
1879.7	356.2	2.95	β	5 n
1886.1	349.8	3.23	L. McC.	1
1892.0	357.5	3.23	β	3
β 898a, which see, is N. pr., and has been measured from β 898b as follows:—				
1879.7	283.1	96.5	β	2 n
1892.0	282.1	96.8	"	3
No. 70.	Washburn 82.	B.D.		9.1
	—11°, 1660.			
	6 ^h 46 ^m 12 ^s	— 11° 40'.5.		
	9.5 and 10.6			
1888.4	222.8	1.70	Washburn	3 n
No. 71.	Innes 181.	C. Z. 6 h. 2289.		8.0
	6 ^h 46 ^m 55 ^s	— 44° 56'.1.		
	8.5 and 9.0			
1897.3	260.±	0.6±	Innes	1 n
No. 72.	Innes 182.	Yarnall ₃ 2843.		8.0
	6 ^h 47 ^m 3 ^s	— 28° 35'.5.		
	8.4 and 9.2			
1897.3	140.±	0.8±	Innes	1 n
A wide double = Yarnall ₃ 2845 and Yarnall ₃ 2846, mags. 8.5 and 9.0, is closely S. f. = h 3896.				

No. 73.	Innes 159.	Lac. 2491.		MAG.
	6 ^h 47 ^m 3 ^s	— 45° 19'.9.		6.4
	Comes = 10.5			Orange
1897.2	315.±	4.5±	Innes	2 n
C. P. D. mag. = 7.8.				
Lac. 2489, mag. 7.0, is S.pr.				
No. 74.	β 325.	Ö.A. 5814.		7.7
	6 ^h 47 ^m 47 ^s	— 26° 27'.7.		
	8.1 and 9.1			
1875.1	20.±	1.6±	β	1 n
1877.1	35.7	1.92	Cinc.	1
1884.1	37.0	.....	"	1
1897.8	37.2	1.81	See	1
Near a missing star, No. 46 of List I. p. (72) of vol. i. of the C. P. D.				
No. 75	Cordoba [16].	C. Z. 6 h. 2396.		8.4
	6 ^h 48 ^m 45 ^s	— 35° 10'.1.		
	9.0 and 9.3			
1880.9	S.f.	4	C. G. A.	3 n
No. 76.	Cape 19.	C. Z. 6 h. 2414.		9.0
	6 ^h 48 ^m 50 ^s	— 47° 37'.8.		
	9.7 and 9.9			
1898.1	120.±	1.2±	Innes	1 n
Found by Mr W. H. Cox with the Transit-Circle.				
No. 77.	Σ 987.	Lal. 13,341.		6.4
	6 ^h 49 ^m 15 ^s	— 5° 43'.7.		
	7.1 and 7.2, both white			
1831.5	163.5	1.13	Σ	3 n
1867.1	162.1	1.10	Dembowski	3
1878.0	164.8	1.29	Cinc.	1
The combined magnitude of this pair has been estimated as follows:—				
	Bessel = 9.0			
	Lal. and Σ = 7.0			
	Dembowski = 6.4 to 6.7			
	Radcliffe, 1890 = 6.7			
	Schönfeld = 6.4			
	Cincinnati = 5.3			

SOUTHERN DOUBLE STARS.

6 hrs.

57A

No. 78. h. 3900. Lac. 2520. ^{MAG.} 7.5
6^h 50^m 36^s — 34° 5'.8.

Comes = 9.5

1838.1	285.9	2.±	h	1 n
1879.2	284.1	2.23	Hargrave	1
1887.2	281.0	2.26	Pollock	1
1897.2	282.3	2.46	See	2

Separately observed on the meridian at Cordoba.

No. 79. Σ 997. μ Canis Majoris. 5.2
6^h 51^m 32^s — 13° 54'.8.

Comes = 8.9

1831.2	343.5	3.22	Σ	3 n
1844.2	340.8	3.13	Mädler	2
1857.1	337.8	2.76	Jacob	4
1869.1	338.1	2.88	Dembowski	4
1877.2	339.9	3.14	Cinc.	1
1887.2	339.8	2.88	Hall	5
1896.0	335.0	.....	Doberck	4

Other measures, but generally showing considerable discordance.

Small p.m.

Σ 990, two stars, 8.6 and 9.0 mags., 3" apart, is 2^m pr. 12' S.

No. 80. Ormond Stone. Lac. 2526 7.3
6^h 51^m 47^s — 25° 23'.4.

Comes = 10.0 bluish

1876.1	99.4	3.61	Cinc.	1 n
1877.1	97.5	3.76	"	2

No. 81. Σ 998. W.B. 6 h. 1530. 9.1
6^h 51^m 56^s — 5° 20'.9.

Comes = 9.4

1831.5	205.5	3.14	Σ	3 n
1867.1	209.5	3.05	Dembowski	3
1879.1	208.2	2.88	Cinc.	3
1886.8	207.7	3.43	L. McC.	1
1893.2	212.6	2.98	Glaserapp	2

Change doubtful.

No. 82. β 327. Lal. 13,492. ^{MAG.} 7.8
6^h 53^m 28^s — 2° 53'.4.

8.5 and 8.7

1876.8	100.8	0.96	Dembowski	2 n
1878.1	97.2	1.1±	Cinc.	1
1881.0	96.1	0.75	β	1
1888.1	96.1	0.75	Haverford	2
1892.1	95.8	0.79	β	3

An 11.4 mag. star is 13" S.f.

No. 83. Innes 65. Lac. 2546. 6.3
6^h 53^m 43^s — 35° 22'.5.

6.5 and 8.0

1896.9	150.±	0.6±	Innes	1 n
1897.3	160.±	.....	"	1
1898.3	190.3	0.26	See	1

Angle increasing?

In a group of four stars.

The limit of difficulty with the Cape Merz refractor of 6.9-inch aperture.

No. 84. Cape 7. ε Canis Majoris. 1.7
6^h 54^m 42^s — 28° 50'.2.

Comes = 9.0

1850.1	160.6	7.48	Maclear	2-1
1878.2	160.2	7.42	β	1
1884.1	161.1	7.99	Cinc.	1
1897.0	160.9	7.85	See	2

The p.m. is small, about 0".016 towards 263°, in which the comes seems to share.

C. P. D. mag. = 3.2. The star is, however, white or violetish.

The first double star found with the Merz refractor at the Cape. It has been registered as a new pair by several later observers.

No. 85. Innes 66. C. Z. 6 h. 2756. 7.7
6^h 54^m 42^s — 35° 17'.0.

7.9 and 9.4

1897.1	255.±	2.±	Innes	2 n
1898.3	255.1	2.13	See	1

C. Z. 6 h. 2754, mag. 9.5, is about 15" pr., making a neat triple star, the wide pair being h 3905, and showing no sign of change.

See also No. 83.

H

58A

6 hrs.

REFERENCE CATALOGUE OF

No. 86.	λ 73.	Lac. 2558.		MAG.
	6 ^h 55 ^m 36 ^s	— 27° 45'.2.		7.8
		8.5 and 8.6		
1897.8	346.1	0.27	See	1 n
No. 87.	β 572.	Lal. 13,623.		7.5
	6 ^h 56 ^m 16 ^s	— 20° 29'.9.		
		<i>Comes</i> = 11.2		
1879.4	143.9	5.07	β	3 n
1892.1	142.6	5.27	"	3.
1897.8	143.5	5.92	See	1
Lal. 13,626, mag. 8.3, is closely S.f.				
No. 88.	Σ 1011.	Lal. 13,616.		8.3
	6 ^h 56 ^m 19 ^s	— 15° 10'.1.		
		8.8 and 9.3.		
1831.2	295.7	4.46	Σ	3 n
1868.9	298.5	4.25	Dembowski	4
1884.1	300.0	4.56	Cinc.	2
1898.3	298.7	4.39	See	1
Other measures.				
No. 89.	Innes.183.	C. Z. 6 h. 2870.		MAG.
	6 ^h 56 ^m 42 ^s	— 25° 30'.2.		7.5
		7.7 and 9.8		
1897.3	.....	3.±	Innes	1 n
1897.8	144.4	3.34	See	1
No. 90.	β 573.	Lal. 13,642.		7.0
	6 ^h 57 ^m 7 ^s	— 10° 44'.4.		
		7.6 and 8.0		
1878.2	244.9	0.8±	Cinc.	2 n
1878.2	246.9	0.82	Dembowski	1
1879.1	248.6	0.75	β	1
No other measures found.				
No. 91.	h. 3932.	Lac. 2689.		7.3
	6 ^h 58 ^m 52 ^s	— 77° 38'.8.		
		<i>Comes</i> = 8.9 red		
1835.6	278.7	7.±	h	2 n
1880.6	282.5	7.81	Hargrave	3.

SOUTHERN DOUBLE STARS.

7 hrs.

59A

No. 1. Dembowski 12. Lal. 13,776. 6.8
7^h 1^m 6^s — 10° 30' 5.

Comes = 10.4

1867.2	278.7	6.12	Dembowski	2 n
1878.2	281.4	6.06	Cinc.	1
1881.1	281.9	6.14	β	1

A more distant comes and the chief star form the old pair Σ 1019.

No. 2. Dunlop 39. Lac. 2640. 5.9
7^h 1^m 43^s — 59° 1' 7.

6.3 and 7.1

1835.0	73.5	2.79	ζ	2 n
1838.1	78.1	2.06	"	1
1847.2	78.4	2.67	Jacob	1
1850.6	76.1	2.69	"	2-1
1877.7	78.0	2.34	Sydney	2
1887.1	85.1	2.38	Tebbutt	1
1893.2	78.6	1.74	Sellers	1

Probably fixed.

The measures made at Hongkong in 1896 (see *Astr. Nach.*, No. 3378), evidently refer to another pair.

The companion is Cape 1840, 808.

No. 3. h. 3928. Lac. 2612. 6.6
7^h 1^m 54^s — 34° 37' 5.

6.9 and 8.0

1836.6	157.7	5.39	ζ	3 n
1848.1	159.7	4.77	Jacob	1
1877.1	158.3	3.98	Cinc.	1
1879.2	156.3	3.25	Hargrave	1
1879.3	156.6	4.40	Melbourne	1
1891.2	154.1	3.46	Sellers	1
1896.0	154.6	3.96	Doberck	2
1897.2	154.8	4.20	See	2

Separately observed on the meridian at Cordoba.

Jacob and others measure a star 36" preceding = C. Z. 7 h. 68, mag. 9.5.

No. 4. β 328. Lal. 13,811. 5.1
7^h 1^m 59^s — 11° 8' 4.

5.3 and 7.0

1875.9	128.4	0.3 ±	Dembowski	4 n
1878.2	127.8	0.52 ±	Cinc.	2
1879.1	117.8	0.48	β	1
1880.4	122.3	0.51 ±	Schiaparelli	4
1887.2	116.1	0.42	"	2
1892.1	118.0	0.51	β	4

A 9.8 mag. star 17 $\frac{1}{2}$ " N.pr. makes with the close pair the old pair Σ 1026 rej.

No. 5. β 574. Lal. 13,821. 8.4
7^h 2^m 15^s — 11° 10' 2.

8.5 and 11.8

1878.0	306.7	1.76	β	1 n
1892.0	311.3	2.26	"	3

Near β 328.

No. 6. Σ 1029. Lal. 13,837. 7.8
7^h 3^m 0^s — 4° 31' 2.

8.3 and 9.0

1833.7	23.4	2.08	Σ	4 n
1865.7	25.8	1.91	Dembowski	2
1878.1	25.2	1.92	Cinc.	2

No. 7. Σ 1031. W.B. 7 h. 22. 8.3
7^h 4^m 0^s — 13° 49' 6.

8.8 and 9.5

1831.2	251.6	3.80	Σ	3 n
1867.5	248.2	3.74	Dembowski	3
1879.5	248.9	3.51	β	3-2
1885.1	247.3	3.68	Cinc.	1

ζ noted a 12th mag. star 12" N., measured by β .

No. 8. Σ 1034. W.B. 7 h. 37. 8.4
7^h 4^m 34^s — 8° 8' 5.

8.9 and 9.4

1830.5	17.6	2.46	Σ	3 n
1868.2	16.8	2.29	Dembowski	3
1878.1	18.7	2.64	β	1

Fixed.

60A

7hrs.

REFERENCE CATALOGUE OF

No. 9. Σ 1043. W.B. 7 h. 140. ^{MAG.} 9.0
 7^h 7^m 32^s — 0° 30'.7.

9.7 and 9.9

1831.9	248.3	2.39	Σ	3 n
1868.5	246.6	2.37	Dembowski	3
1879.2	245.9	2.45	Cinc.	1
1888.1	245.3	2.51	Haverford	1

W. B. 7 h. 138, mag. 9.0, is closely N.pr.

No. 10. Innes 184. Bris. 1505. 8.0
 7^h 7^m 46^s — 60° 24'.8.

8.4 and 9.4

1897.7	180. ±	0.7 ±	Innes	2 n
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Another double star, h 3941, is 12' N.f.

A measure made by Mr Hargrave in 1883 purporting to be of Bris. 1505 is given in the second *Sydney Catalogue of Double Star Measures*. It agrees, however, so well in angle and distance with h 3941, that it has been transferred to that star.

See:—

1897. *Journal Brit. Astr. Assoc.*, vol. vii. p. 457.

No. 11. Hargrave 9. Bris. 1503. 7.5
 7^h 7^m 53^s — 56° 12'.4.

8.0 and 8.7

1883.2	170. ±	1.5 ±	Hargrave	1 n
1894.2	219.8	1. ±	Sellors	1

Considerable difference shown.

Preceded by a 50" pair, each about 8th mag., = Lac. 2680 and Bris. 1510.

No. 12. β 197. Lal. 14,026. 7.9
 7^h 7^m 58^s — 6° 58'.9.

8.1 and 9.6

1874.1	150.6	2. ±	β	1 n
1876.9	147.0	2.28	Dembowski	2
1879.2	149.4	1.87	Cinc.	1
1886.9	144.8	2.21	L ₁ McC.	1
1888.1	147.8	2.17	Haverford	3

No. 13. h . 3941. Lac. 2692. ^{MAG.} 6.9
 7^h 8^m 2^s — 60° 13'.0.

7.1 and 8.5 yellow

1837.1	310.4	0.81	h	3 n
1878.2	293.9	1.36	Russell	1
1880.2	307.2	0.72	Hargrave	1
1883.3	304.9	1.01	"	1
1888.1	301.0	0.8 ±	Pollock	1

Probably unchanged.

The mag. of the chief star has been estimated as follows:—

$$h = 8.7$$

$$\text{Russell} = 9.0$$

$$\text{Pollock} = 7.0$$

The measure of 1883.3 in the second *Sydney Catalogue* is put as being of Bris. 1505, a double star 12' S.pr. See No. 10.

No. 14. β 757. Lac. 2668. 6.3
 7^h 8^m 53^s — 36° 22'.5.

6.5 and 8.1

1881.2	65.8	2.25	Pritchett	1 n
1887.2	67.7	2.57	Pollock	1
1893.2	62.6	2.66	Sellors	2
1897.2	69.2	3.06	See	2

Found in 1879.

Pritchett also measures a star 3^m.8 f. in R.A., same Dec., distance 2".57.

No. 15. Σ 1049. W.B. 7 h. 197. 7.8
 7^h 8^m 54^s — 8° 44'.8.

8.2 and 9.3

1830.5	34.9	3.63	Σ	3 n
1867.7	42.7	3.50	Dembowski	3
1880.1	42.9	3.61	β	1
1886.1	42.8	3.79	Cinc.	1

No. 16. Dunlop 42. γ Volantis. 3.8
 7^h 9^m 36^s — 70° 20'.2.

Bris. 1529 = 5.7

1836.4	301.3	12.8	h	4 n
1879.7	299.8	13.4	Hargrave	2
1888.3	299.7	13.3	Tebbutt	1

Miscalled h 3945 in the first Sydney Observatory list of double stars.

SOUTHERN DOUBLE STARS.

7hrs.

61A

No. 17.	β 575.	Ö.A. 6449.	MAG. 7.5
	7 ^h 10 ^m 15 ^s	— 15° 18'.0.	
	8.2 and 8.3		
1878.2	195.3	0.49 ±	Cinc. 2 n
1878.2	199.2	0.69	β 2
1889.2	199.9	0.70	Haverford 1
1898.3	220.7	0.34	See 1
A 9.8 mag. star 16" N. with the above pair = Σ 1057.			

No. 18.	Hough 344.	Ö.A. 6460.	8.2
	7 ^h 10 ^m 30 ^s	— 20° 51'.1.	
	8.9 and 9.1		
1890.2	359.5	0.86	Hough 3-2 n
The S. star of a small triangle.			

No. 19.	Σ 1056.	Lal. 14,107.	8.0
	7 ^h 10 ^m 31 ^s	— 1° 41'.1.	
	8.4 and 9.4		
1830.5	297.9	3.97	Σ 3 n
1868.4	298.2	3.79	Dembowski 3
1886.1	300.7	3.90	L. McC. 1
1893.1	299.0	3.55	Glazenapp 2

No. 20.	Howe.	W.B. 7 h. 245	9.0
	7 ^h 10 ^m 40 ^s	— 0° 27'.0.	
	9.7 and 9.8		
1879.2	314.7	2.49	Cinc. 1 n
1886.7	313.1	2.66	L. McC. 2
1892.1	314.7	2.78	Haverford 2

No. 21.	Sellers 22.	C. Z. 7 h. 719.	9.5
	7 ^h 11 ^m 18 ^s	— 44° 29'.2.	
	9.8 and 11.0		
1896.2	266.0	1.66	Sellers 3 n
C. Z. 7 h. 723, mag. 9.0, is 15" N.f.			

No. 22.	Lalande.	Lal. 14,200.	MAG. 4.9
	7 ^h 12 ^m 24 ^s	— 23° 8'.2.	Orange.
	Lal. 14,202 = 6.6 blue		
1837.2	67.6	28.21	<i>h</i> 2 n
A fine object.			
Combined mag. in C. P. D. = 6.8.			
A 10.3 mag. star 2' S.			

No. 23.	β 330.	Göttingen 2446.	8.7
	7 ^h 14 ^m 27 ^s	— 0° 43'.4.	
	9.1 and 10.2		
1876.9	218.0	1.28	Dembowski 2 n
1878.1	214.7	1.17	Cinc. 1
1882.2	214.2	1.3 ±	Schiaparelli 3
1886.8	213.5	1.25	L. McC. 1
1888.4	215.6	1.23	Haverford 2

No. 24.	h. 3948.	τ Canis Majoris.	4.6
	7 ^h 14 ^m 34 ^s	— 24° 46'.3.	
	Companion = 9.8		
1835.0	86.0	8. ±	<i>h</i> 1 n
1876.0	89.5	8.91	Cinc. 1
1877.6	89.4	8.68	" 2
1880.2	90.0	7.84	β 2

β sees twenty or more stars in the field—the nearest 14" f. of the 10.9 mag. Also noted by *h* and the Cordoba observers.

Small common p.m.

τ Canis Majoris is the central star of a pretty cluster = H VII. 17.

No. 25.	Innes 7.	Lac. 2740.	7.3
	7 ^h 14 ^m 37 ^s	— 46° 48'.9.	
	7.5 and 9.7, both orange-yellow		

1896.2	214.9	1.34	Sellers 3 n
1897.1	212.6	0.69	See 5

Common p.m. of 0".612 towards 336°.2.

The fourth star of five in a sickle.

Lac. 2710, mag. 5.8, about 3^m pr. and 8' N., has been noted as double (see *Harvard Circular*, No. 18), but was single as viewed with the Cape 7-inch refractor on 1898.0.

No. 26. h. 3949. Lac. 2729. ^{MAG.} 7.3
7^h 14^m 41^s — 30° 36'.9.

7.9 and 8.2

1837.0	74.6	3.20	<i>h</i>	3 n
1848.1	77.6	3.35	Jacob	1
1876.2	76.3	3.37	Cinc.	4
1896.0	76.9	.....	Doberck	2

Separately observed on the meridian at Cordoba.

No. 27. Jacob [4]. C. Z. 7 h. 989. 9.1
7^h 14^m 59^s — 36° 35'.1.

9.8 and 10.0

1846.2	211.5	3.±	Jacob	1 n
1851.2	213.0	2.98	"	2-1
1884.1	208.4	3.18	Cinc.	1
1897.1	209.4	2.86	Lowell	3

The combined mag. 9.1 (from the Cor. D.M.) is about 0.5 too faint.

This neat little pair is near the naked eye pair *v* Puppis (mags. 4.8 and 5.3) N.f. π Argûs, mag. 2.7 orange-red (mag. in C. P. D. = 6.3).

No. 28. Lalande 53. Lal. 14,292. 7.6
7^h 15^m 4^s — 21° 51'.8.

8.3 and 8.4

1837.1	348.3+	3.±	<i>h</i>	1 n
1851.2	346.6	4.04	Jacob	2
1876.2	345.8+	4.06	Cinc.	1
1877.1	347.0	3.92	"	2

Also registered as *h* 3950.

An 8.7 mag. star 10 secs. f. 2' N. is noted as double in the C. P. D.

No. 29. β 331. C. Z. 7 h. 1032. 8.5
7^h 15^m 53^s — 24° 13'.9.

8.9 and 9.8

1877.1	115.6	2.00	Cinc.	1 n
1889.1	114.7	1.93	Haverford	2-1
1894.1	115.4	1.75	Sellers	1

No. 30. λ 76. Lac. 2747. 6.7
7^h 16^m 51^s — 26° 46'.6.

Comes = 14.0

1897.1	216.4	7.95	See	2 n
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No. 31. Sellors 23. C. Z. 7 h. 1186. ^{MAG.} 8.7
7^h 17^m 46^s — 43° 38'.2.

9.0 and 10.1

1896.2	157.0	2.23	Sellers	3 n
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No. 32. Rumker 6. Lac. 2779. 6.8
Yellow.

7^h 17^m 57^s — 52° 7'.7.

Taylor 3019 = 7.0 yellow

1835.0	16.1	10.5	<i>h</i>	2 n
1847.1	16.8	10.0	Jacob	2
1883.3	18.2	9.5	Hargrave	1
1896.0	19.9	9.3	Doberck	2
1897.0	20.3	9.4	See	2

The third measure quoted is taken from the Sydney Observatory lists, wherein the pair is called *h* 3958 erroneously.

A coarse pair about 12' N.

No. 33. h. 3956. Bris. 1576. 8.5
7^h 18^m 6^s — 48° 19'.5.

Companion = 9.3

1836.3	163.9	8.77	<i>h</i>	3 n
1848.1	164.3	6.62	Jacob	1
1881.3	163.5	7.31	Hargrave	1

h 3960, a wide pair, is closely S.f.

Both pairs have had all components observed on the meridian at Cordoba.

No. 34. Hough. Brux. 3080. 8.8
7^h 18^m 18^s — 21° 0'.2.

9.0 and 10.5

1890.1	f.	0.6±	Hough	1 n
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Another double star closely N.f. See No. 36.

No. 35. λ 77. C. Z. 7 h. 1222. 8.5
7^h 18^m 19^s — 36° 26'.2.

8.8 and 10.0

1897.2	302.0	0.40	See	1 n
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In a triangle with C. Z. 7 h. 1212, mag. 9.6, and C. Z. 7 h. 1227, mag. 8.0.

SOUTHERN DOUBLE STARS.

7 hrs.

63A

No. 36. Hough. B.D.—20°, 1893. ^{MAG.} 9.4
7^h 18^m 22^s — 20° 58'.3.

Both = 10.2.

1890.1 40. ± 1.5 ± Hough 1 n
See also No. 34.

No. 37. h 3957. Lac. 2767. ^{MAG.} 7.7
7^h 18^m 40^s — 35° 43'.6.

Cape 1880, 3608 = 8.6

1836.6 196.8 15. ± h 2 n
1877.1 194.9 8.16 Cinc. 1
1881.2 194.5 6.97 Hargrave 2
1896.0 195.3 Doberck 2

No. 38. λ 78. Ö.A. (6740). ^{MAG.} 7.7
Red

7^h 18^m 51^s — 25° 34'.5.

B = 12.8 C = 12.0 D = 12.4

A and B

1897.8 288.4 2.34 See 1 n

A and C

1897.8 13.6 2.98 See 1 n

A and D

1897.8 29.9 6.86 See 1 n
C. P. D. mag. = 8.8.

No. 39. Σ 1085. W.B. 7 h. 515. ^{MAG.} 8.8
7^h 19^m 31^s — 4° 24'.8.

9.0 and 10.7

1830.7 278.3 3.19 Σ 4 n
1867.5 280.3 3.21 Dembowski 3

No. 40. β 199. Lal. 14,480. ^{MAG.} 7.3
7^h 20^m 49^s — 20° 58'.6.

7.7 and 8.7

1870.2 19.4 1.72 Harvard 1 n
1877.2 22.2 1.84 Cinc. 2
1892.1 23.2 1.63 Haverford 1
1893.2 23.2 1.74 Sellors 2
1896.0 24.7 Doberck 3

This pair is also = Harvard 104.

A wide faint pair = h 3964 is to the N., and another wide pair = β 198 (Lal. 14503) is N.f.

No. 41. h 3966. Lac. 2801. ^{MAG.} 7.4
7^h 21^m 15^s — 37° 5'.7.

Cape 1880, 3640 = 7.5

1836.0 140.9 7.03 h 2 n
1851.1 142.6* 7.15 Jacob 2
1893.1 140.0 7.16 Scott 1
1896.0 144.0* 7.06 Doberck 2
1897.2 141.8 6.96 See 2

A 9.5 mag. star = C. Z. 7 h. 1451 is 5' S.f.

No. 42. λ—. Ö.A. 6790. ^{MAG.} 7.7
7^h 21^m 16^s — 27° 59'.3.

8.3 and 8.7

1897.8 290.4 0.64 See 1 n

C. G. A. 9515, mag. 10.2, is closely S.pr.

Prof. See credits the close pair to Cordoba. It would, however, seem to be due to Prof. See himself.

See also No. 44.

No. 43. Ormond Stone. Lal. 14,506. ^{MAG.} 8.0
7^h 21^m 41^s — 18° 9'.7.

Companion = 9.5

1877.0 77.8 4.61 Dembowski 2 n
1877.1 76.7 4.80 Cinc. 2
1885.6 76.1 4.80 „ 2

No. 44. λ 79. Ö.A. 6819. ^{MAG.} 8.2
7^h 22^m 16^s — 27° 57'.7.

8.8 and 9.2

1897.9 296.7 0.36 See 1 n

See also No. 42, which is 1^m pr.

No. 45. β 578. Lal. 14,545. ^{MAG.} 5.6
7^h 22^m 41^s — 17° 39'.8.

Comes = 10.5

1878.2 53.6 1.72 β 1 n
1878.2 50.6 2.51 Dembowski 1
1878.2 52.4 Cinc. 1
1886.2 48.8 2.33 „ 2

No. 46. β 332. Piazz 7 h. 116. ^{MAG.} 5.8
 7^h 23^m 10^s — 11° 21'.2

6.0 yellow, and 7.8

1875.5	166.3	0.80	Dembowski	3 n
1878.2	170.2	0.87	Cinc.	2
1887.2	165.8	0.89	Tarrant	6
1892.0	168.7	0.85	β	3

The chief star of the old 20" pair Σ 1097. There are three more distant stars (20" to 32"), but none shows signs of change.

Also called U Puppis, and considered variable by some observers from 6.0 to 6.8 in a period of fourteen days. It is, however, not included in Chandler's third *Catalogue of Variable Stars*.

No. 47. Σ 1104. Lal. 14,619. ^{MAG.} 6.8
 7^h 24^m 49^s — 14° 47'.1

7.0 and 8.8

1834.9	292.4	2.35	Σ	3 n
1864.5	312.3	2.21	Dembowski	3
1874.2	314.0	2.55	Temple Obsy.	1
1878.4	318.3	2.29	Cinc.	8
1880.2	321.0	2.60	Pritchett	4
1893.2	326.3	2.54	Glaserapp	2
1893.2	328.5	2.24	Lewis	2

Common p.m. of 0".307 towards 221°.4.

A binary system.

No. 48. Dunlop 51. σ Argûs. ^{MAG.} 3.1
 7^h 26^m 3^s — 43° 6'.0
 Yellow

Companion = 7.9 blue

1836.0	75.0	22.5	h	2 n
1847.1	73.0	22.6	Jacob	1
1879.3	74.4	22.1	Hargrave	1
1897.2	73.2	22.4	See	2

Common p.m. of 0".217 towards 326°.2.

C. P. D. mag. = 6.5.

No. 49. λ 80. Lac. 2833. ^{MAG.} 7.8
 7^h 26^m 45^s — 27° 53'.1

8.5 and 8.7

1897.8	86.1	0.25	See	1 n
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Ö.A. 6949, mag. 8.1, is 88" S.f.

No. 50. h. 3974. Bris. 1641. ^{MAG.} 8.3
 7^h 27^m 22^s — 55° 5'.7

8.5 and 10.1

1836.1	241.9	3.±	h	2 n
1872.2	241.6	5.49	Russell	1

Fixed.

There is an error in this observation as printed in the *Mem. R. A. S.*, vol. xlvii.

No. 51. h. 3996. Lac. 3096. ^{MAG.} 7.6
 7^h 27^m 48^s — 84° 16'.8

Comes = 12.0

1836.0	248.4	13.±	h	2 n
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No. 52. Howe 7. Ö.A. 7035. ^{MAG.} 8.6
 7^h 29^m 48^s — 23° 29'.1

9.0 and 10.0

1877.2	203.3	1.86	Cinc.	2 n
1885.1	203.8	1.79	"	1

No. 53. η . N. 19. n Puppis. ^{MAG.} 5.2
 7^h 30^m 5^s — 23° 15'.3

5.9 and 6.1

1846.2	106.8	9.16	Jacob	1 n
1853.2	108.0	8.68	"	2
1868.2	107.4*	9.37	Harvard	1
1876.1	108.4	9.59	Cinc.	4
1885.1	109.6	8.96	"	1
1897.8	108.6	9.37	See	1

Also registered as Dunlop 52 and South 552.

No. 52 is a little S.pr.

No. 54. Cordoba [70]. Lal. 14,834. ^{MAG.} 7.0
 7^h 31^m 3^s — 2° 56'.1

7.4 and 8.3

1879.1	241.6	5.6	C. G. A.	1 n
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The p.m. of the chief star is 0".337 towards 290°.9. Seen in 1898, considerable change shown.

SOUTHERN DOUBLE STARS.

7hrs.

65A

No. 55. Cordoba [71]. Bris. 1669. ^{MAG.} 7.7
7^h 31^m 6^s — 66° 58'.1

Comes = 10.5

1880.2 190.9 5.60 C.G.A. 1 n

No. 56. H. II. 63. Lal. 14,885. 7.5
7^h 32^m 0^s — 14° 15'.7

Lal. 14,884 = 7.7

1831.4 304.7 7.45 Σ 4 n
1851.2 303.5 7.09 Jacob 2
1867.5 305.0 7.40 Dembowski 3
1893.2 304.3 7.03 Glasenapp 2

Also called Σ 1121.

Fixed.

Other measures.

No. 57. Hough 35. Göttingen 2582. 8.8
7^h 32^m 26^s — 0° 45'.9

9.2 and 10.2

1882.2 222.3 0.88 Hough 1 n

No. 58. Argelander [2]. Lal. 14,945. 8.2
7^h 34^m 35^s — 20° 2'.7

Companion = 8.9

1876.2 329.6 3.11 Cinc. 3 n
1876.4 330.6 2.89 Dembowski 3
1882.1 330.6 3.43 Cinc. 2-1
1886.2 331.0 2.80 L. McC. 1
1889.0 331.1 2.84 Haverford 3

Discovered by Argelander on 10th Feb. 1851; also registered as β 201.

No. 59. Triple. *k* Puppis. 3.9
7^h 34^m 44^s — 26° 34'.4

A = 4.6 B = 4.8 C = 13.7

A and B = H. III. 27

1853.2 319.1 9.71 Jacob 2 n
1878.2 318.5 9.94 Cinc. 1
1889.1 318.5 9.98 β 3

Other measures.

Also registered as Dunlop 53.

B and C = β 1061

1889.1 229.3 6.46 β 3 n

Erroneously called κ Argus by β.

No. 60. Innes 285. C. Z. 7 h. 2481. ^{MAG.} 8.8
7^h 35^m 32^s — 48° 26'.5

9.4 and 9.8

1898.3 140. ± 1. ± Innes 1 n
About 4' S. of Lac. 2918, mag. 5.6.

No. 61. λ 84. Lal. 14,980. 6.4
7^h 35^m 50^s — 19° 25'.8

Comes = 11.0

1897.8 287.4 9.27 See 1 n
C. P. D. mag. = 7.7.

No. 62. Innes 160. *d*₂ Puppis. 5.9
7^h 36^m 12^s — 37° 54'.5

6.0 and 8.7

1897.2 155. ± 1.1 ± Innes 3 n
The most northern of a group of three bright stars.

No. 63. Innes 185. Cor. D.M.— 9.5
29°, 4757.
7^h 36^m 42^s — 29° 52'.7

10.0 and 10.5

1897.3 190. ± 2. ± Innes 1 n
Closely S.f. a group of stars, the two brightest of which are Lac. 2908, mag. 7.8, and Ö.A. 7237, mag. 8.1.

No. 64. Washburn 91. Ö.A. 7245. 8.6
7^h 36^m 53^s — 20° 6'.0

8.8 and 11.0

1888.5 214.5 1.88 Washburn 3 n
A 9.0 mag. star 2' S.

No. 65. h. 3997. Lac. 3010. 6.1
7^h 37^m 25^s — 74° 2'.9

6.8 and 6.9 both yellow

1836.6 100.8 1.75 *h* 2 n
1875.7 105.6 2.09 Sydney 2
Separately observed on the meridian at Cordoba.

No. 66. Σ 1133. W.B. 7h. 1084. 8.6
 7^h 37^m 36^s — 3° 47'.2

Comes = 9.8

				MAG.
1831.2	108.3	4.35	Σ	3 n
1866.9	107.7	4.26	Dembowski	4-3
1879.1	108.0	4.08	Cinc.	2

No. 67. h. 4000. Lac. 2982. 7.5
 7^h 40^m 31^s — 58° 25'.9

Comes = 11.2

1836.5	232.6	1.8 ±	<i>h</i>	2 n
1895.2	235.5	1.45	Sellors	3

Also seen at Sydney in 1873 and 1880.

A difficult pair for a reflecting telescope.

Lac. 2979, mag. 6.5, about 3' N., seems to share in the small p.m. of *h* 4000.

No. 68. Hf. IV. 91. 2 Puppis. 6.5
 7^h 40^m 53^s — 14° 26'.8

7.1 and 7.4

1783.1	339.2	[17.4]	Hf	1 n
1829.6	339.2	16.5	Σ	3
1868.7	338.8	16.8	Dembowski	4
1876.1	340.2	17.9	Howe	1

Also known as Σ 1138.

Small common p.m.

No. 69. Dunlop 57. ζ Volantis. 3.8
 Yellow
 7^h 43^m 3^s — 72° 22'.0

Comes = 9.5 blue

1835.9	115.7	19. ±	<i>h</i>	4 n
1876.2	114.8	17.0	Sydney	2

The chief star has a p.m. of 0".014 towards 90°.

Erroneously called *h* 4009 by Mr Russell.

No. 70. Σ 1146. 5 Puppis. 5.4
 7^h 43^m 16^s — 11° 56'.8

5.6 yellow, and 8.2 blue

1827.2	17.4	3.33	Σ	2 n
1832.5	17.3	3.25	"	4
1858.9	17.1	3.34	Morton	1
1878.1	14.9	3.30	Cinc.	1
1887.2	15.4	3.25	Hall	3
1893.2	13.4	3.18	Glasenapp	2

Common p.m. of 0".148 towards 302°.8.

Estimates of the mag. of A. vary from 5.3 to 7.5, and of B. from 7.4 to 9.0.

Other measures.

No. 71. Innes 161. Piazzis 7h. 225. 5.3
 7^h 43^m 53^s — 38° 15'.8

Comes = 10.5

1897.1	90. ±	10. ±	Innes	1 n
1897.2	86.0	11.0	See	1

Also noted at Arequipa, see *Harvard Circular*, No. 18, 29th July 1897.

No. 72. Cape 20. C. Z. 7h. 3229. 8.5
 7^h 44^m 50^s — 44° 17'.7

Comes = 9.5

1898.1	90. ±	2.5 ±	Innes	1 n

Discovered by Mr J. A. J. Peard at the transit circle.

No. 73. Hough 37. Göttingen 2666. 9.0
 7^h 44^m 55^s — 2° 1'.2

9.7 and 9.8

1882.2	177.3	1.50	Hough	1 n
1888.8	175.2	1.60	Haverford	3-2
1889.2	176.6	1.18	Hough	3

No. 74. β 1063. ξ Argûs. 3.4
 7^h 45^m 5^s — 24° 36'.5

Comes = 13.7

1889.1	188.7	4.63	β	3 n
1898.3	223.7	5.44	See	1

ξ Argûs is a red star, and may be a "variable," as the estimates of its mag. vary from 2.7 to 3.8. Its C. P. D. mag. = 6.4; and its p.m. = 0".027 towards 306°.3.

No. 75. λ 87. Lal. 15,304. ^{MAG.} 6.9
 $7^{\text{h}} 45^{\text{m}} 22^{\text{s}}$ — $19^{\circ} 57'.0$.

Comes = 14.8

1897.8 144.5 4.47 See 1 n

No. 76. Innes 186. Ö.A. 7505. 7.4
 $7^{\text{h}} 45^{\text{m}} 27^{\text{s}}$ — $30^{\circ} 18'.3$.

8.0 and 8.3

1897.4 $200. \pm$ $1.2 \pm$ Innes 1 n

The chief star of four forming a diamond in the finder, the most N. component being Ö.A. 7473, mag. 7.5.

No. 77. Harvard 110. Ö.A. 7528. 9.1
 $7^{\text{h}} 46^{\text{m}} 33^{\text{s}}$ — $23^{\circ} 55'.6$.

9.3 and 11.3

1869.1 S.pr. $2. \pm$ Harvard 1 n

Harvard 109, a "suspected" pair, is $55'$ N.pr.

No. 78. β 1195. Lal. 15331. 7.2
 $7^{\text{h}} 46^{\text{m}} 33^{\text{s}}$ — $9^{\circ} 9'.0$.

7.8 and 8.1

1891.00 81.4 0.46 β 3 n

A small common p.m. probable.

No. 79. λ 88. Lac. 3046. 5.6
 $7^{\text{h}} 46^{\text{m}} 58^{\text{s}}$ — $56^{\circ} 9'.5$.

Comes = 13.8

1897.1 185.1 5.76 See 3 n

No. 80. Σ 1154. Lal. 15,342. 6.7
 $7^{\text{h}} 47^{\text{m}} 7^{\text{s}}$ — $2^{\circ} 47'.9$.

6.9 and 9.1

1827.7 357.0 2.26 Σ 4 n

1868.1 356.4 2.04 Dembowski 3

1878.2 352.9 2.41 β 1

A wider pair, Σ 1152, is 69 secs. pr. $2'$ N.

No. 81. β 101. 9 Puppis. ^{MAG.} 5.5
 $7^{\text{h}} 47^{\text{m}} 8^{\text{s}}$ — $13^{\circ} 37'.9$.

6.0 and 6.6

1875.7 289.4 0.46 Dembowski 3 n

1883.1 336.2 $0.3 \pm$ β 1

1892.0 98.7 0.22 " 3

1897.4 291.9 0.66 Doolittle 4

Common p.m. = $0''.36$ towards 180° .

One of the shortest period binaries known.

Prof. See finds:—

$P = 22.0$ years.

$T = 1892.3$

$a = 0''.65$

$e = 0.70$ $i = 77^{\circ}.7$

$\Omega = 95^{\circ}.5$ $\lambda = 75.3$

Papers:—

1873. Burnham, S. W., *Astron. Register*.

1876. Burnham, S. W., *Astron. Register*.

1892. Glasenapp, S., "Orbit," *M. N. R. A. S.*, vol. lii. pp. 546-547.

1894. Glasenapp, S., "Orbit," *M. N. R. A. S.*, vol. liv. pp. 318-319.

No. 82. Cordoba [17]. Bris. 1795. 7.2
 $7^{\text{h}} 47^{\text{m}} 21^{\text{s}}$ — $54^{\circ} 49'.4$.

7.4 and 9.1

1876.2 51.9 4.85 C. G. A. 3 n

1897.1 55.1 3.85 See 2

No. 83. Howe 8. Piazzi 7 h. 250. 5.0
 $7^{\text{h}} 48^{\text{m}} 32^{\text{s}}$ — $34^{\circ} 27'.3$.

5.1 and 8.1

1877.2 292.0 2.64 Cinc. 1 n

1897.0 280.7 3.12 See 3

Common p.m. of $0''.305$ towards $316^{\circ}.2$.

Considerable change shown.

C. P. D. mag. = 6.4.

Registered as a new pair discovered at Arequipa in 1891, in *Harvard Circular*, No. 18.

No. 84. λ 89. δ Puppis. 4.7
 $7^{\text{h}} 49^{\text{m}} 6^{\text{s}}$ — $38^{\circ} 36'.2$.

Comes = 11.2

1897.1 81.5 11.06 See 2 n

68A

7hrs.

REFERENCE CATALOGUE OF

No. 85. Σ 1157. Piazz 7 h. 247. ^{MAG.} 7.2
 7^h 49^m 31^s — 2° 32'.0.

7.9 and 8.0

1831.2	267.2	1.59	Σ	3 n
1857.9	254.3	1.23 ±	Dembowski	3
1868.7	254.4	1.24	"	2
1878.7	250.9	1.24	Cinc.	4
1887.6	247.0	1.28	Tarrant	3
1893.2	246.2	1.16	Maw	3

Other measures.

No. 86. Innes 286. C.P.D.—47°, 1638. 8.6
 7^h 49^m 46^s — 47° 43'.4.

Both = 9.4

1898.3	320. ±	2. ±	Innes	1 n
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The most N. of three stars N.pr. J Puppis, 4.3 mag.

No. 87. h. 4018. Bris. 1816. 7.7
 7^h 50^m 27^s — 59° 21'.2.

Companion = 9.1

1838.1	321.9	6.06	$\frac{1}{2}$	1 n
1880.4	327.3	4.62	Hargrave	1

Separately observed on the meridian at Cordoba.

A 10th mag. star about 1' away.

No. 88. h. 4023. Lac. 3111. 7.5
 7^h 51^m 17^s — 70° 31'.2.

8.1 and 8.4

1836.1	229.6	1. ±	$\frac{1}{2}$	2 n
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No other measure found, but the pair was "seen" by Mr Russell in 1873, who, with $\frac{1}{2}$, calls the chief star = 9.0.

No. 89. λ 91. Piazz 7 h. 274. 6.7
 7^h 52^m 32^s — 43° 34'.7.

7.4 and 7.5

1897.2	302.4	0.39	See	1 n
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Gilliss 642, mag. 7.5, is N.pr., and has a faint comes at 5".4, seen at Cordoba in 1876, and measured by Prof. See.

No. 90. Innes 162. Lac. 3088. ^{MAG.} 7.5
 7^h 52^m 43^s — 52° 38'.3.

7.6 and 11.0

1897.0	190. ±	1. ±	Innes	1 n
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No. 91. β 902. Lal. 15,575. 8.0
 7^h 53^m 19^s — 10° 36'.8.

8.1 and 10.7

1879.2	247.1	1.33	β	1 n
1879.3	245.5	1.16	Cinc.	1
1882.1	248.7	1.68	"	1
1892.2	243.7	1.17	Haverford	2-1

No. 92. Triple. N Puppis. 5.2
 7^h 54^m 4^s — 43° 50'.5.

A and B = 12.6 = Harvard

1897.1	35.8	9.80	See	2 n
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A and C = 13.1 = λ 92

1897.2	87.5	22.9	See	1 n
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No. 93. Innes 26. Lac. 3094. 6.7
 7^h 54^m 22^s — 47° 37'.3.

7.1 and 8.1

1895.3	27.5	0.8 ±	Tebbutt	1 n
1896.2	31.4	1.15	Sellors	3
1897.2	26.8	0.68	See	1

The very few determinations of the position of this star which exist indicate a considerable p.m.

No. 94. Washburn 93. B.D.—
 10°, 2319. 8.8
 7^h 54^m 38^s — 10° 12'.4.

9.2 and 10.2

1888.9	187.4	1.00	Washburn	3 n
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SOUTHERN DOUBLE STARS.

7hrs.

69A

No. 95. Washburn 94. Lal. 15,649. 8.5
7^h 55^m 8^s — 13° 34'.6.

8.6 and 11.0

1888.8	279.3	3.10	Washburn	3 n
1890.2	281.0	1.82	Hough	2

W. B. 7 h. 1585, mag. 8.9, is 27 secs. f.

No. 96. Innes 29. C. Z. 7 h. 4122. 8.0
7^h 55^m 15^s — 60° 19'.7.

8.4 and 9.4

1895.4	N.	1.±	Innes	1 n
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About 5' S. of Lac. 3113, mag. 6.3.
A similar but wider pair is about 3' S.f.

No. 97. Triple. Lac. 3105. 4.5
7^h 55^m 22^s — 48° 58'.4.

A = 4.5 B = 10.4 C = 10.6

A and B = Hargrave

1880.4	69.9	5.32	Hargrave	1 n
1897.1	72.2	6.85	See	3

A and C = *h* 4025

1836.1	48.2	18.±	<i>h</i>	1 n
1897.1	49.9	18.69	See	2

Another star, mag. 9.0, 40"; 39", seems unchanged.
Prof. See measures a star 11" from it, his λ 93.

No. 98. Innes 30. Cape 1880, 4038. 8.0
7^h 55^m 51^s — 47° 24'.6.

8.2 and 10.2

1896.2	347.5	1.83	Sellors	3 n
1897.2	343.4	1.30	See	1

Originally wrongly identified as Bris. 1851, which is S.f.

Also registered as λ 94.

No. 99. β 333. Lal. 15,720. 7.7
7^h 56^m 59^s — 22° 3'.6.

7.9 and 9.6

1877.2	46.6	1.90	Cinc.	1 n
1879.1	45.4	1.44	"	2
1886.2	42.7	1.70	"	1
1893.2	39.4	1.45	Sellors	2
1897.8	45.8	2.02	See	1

Lal. 15,721, mag. 8.4, orange, is 42" N.f.

Prof. See points out that this pair had previously been wrongly identified.

No. 100. Innes 163. C. Z. 7 h. 4294. 8.2
7^h 57^m 29^s — 40° 17'.6.

8.5 and 10.0

1897.1	130.±	0.9±	Innes	1 n
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C. Z. 7 h. 4283, mag. 8.0, orange, is 7 secs. pr. 3' N.

No. 101. β 202. Ö.A. 7850. 7.3
7^h 57^m 49^s — 26° 56'.2.

7.4 and 9.9 blue

1876.1	164.8	8.18	Cinc.	1 n
1877.1	160.8	7.70	"	1
1892.1	160.7	7.77	β	3
1892.2	160.3	7.62	Haverford	3
1897.9	160.8	7.39	See	1

Noted as double at Cordoba.

Prof. See measures also two more distant stars.

A more difficult pair closely S.f.

No. 102. Howe. Ö.A. 7857. 8.5
7^h 57^m 56^s — 26° 58'.5.

8.6 and 11.6

1877.1	320.7	2.04	Cinc.	1 n
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β 202 is in the field N.pr.

70A

7hrs.

REFERENCE CATALOGUE OF

No. 103. Innes 187. C. Z. 7 h. 4335. 9.2^{MAG.}
 7^h 57^m 59^s — 34° 12'.4.
 9.6 and 10.6
 1897.3 N.f. 2" Innes 1 n
 The chief star may have a considerable p.m.
 Another star 46".5 S. = Cor. D. M. 34°, 4230,
 10 mag.
 Another double star 40 secs. f. 5' S.

No. 104. Innes 188. Cor. D. M.—
 34°, 4240. 9.3
 7^h 58^m 39^s — 34° 17'.1.
 9.9 and 10.2
 1897.3 170. ± 2.5 ± Innes 1 n
 A 7.5 mag. star, orange, is 2' N. 23 secs. f.

No. 105. β 903. Lal. 15,768. 8.5^{MAG.}
 7^h 59^m 10^s — 1° 34'.2.
 8.9 and 10.0
 1879.3 30.5 1.43 Cinc. 1 n
 1879.6 33.7 1.47 β 5
 1886.9 28.3 1.71 L. McC. 2-1
 1888.1 32.3 1.69 Haverford 2-1
 1892.1 32.8 1.54 β 3
 Evidently fixed.

No. 106. Innes 8. Lac. 3130. 7.0
 7^h 59^m 14^s — 44° 23'.2.
 7.1 and 10.2
 1896.3 312.7 2.32 Sellors 3 n
 1897.2 311.6 2.03 See 1

SOUTHERN DOUBLE STARS.

8hrs.

71A

No. 1. h. 4041. Lal. 15,859. MAG. 7.8.
8^h 0^m 41^s — 22° 8'.9.

7.9 and 11.0

1837.1 179.3 3." ± h 1 n

No. 2. h. 4045. C. Z. 8 h. 1. MAG. 8.2
8^h 0^m 42^s — 50° 9'.7.

8.5 and 9.8

1835.0 219.8 2.5 ± h 1 n

1895.3 224.3 4.57 Sellors 3

No. 3. Triple. Lac. 3146. MAG. 6.5.
8^h 1^m 53^s — 33° 17'.0.

A = 6.6 orange. B = 9.5 blue. C = 10.7

A and B = h 4046

1837.3 84.6 20.0 ± h (mirror) 1 n

1838.0 88.5 22.3 „ (o.g.) 1

1897.3 88.6 21.9 Innes. 1

A and C = Innes 189

1897.3 70. ± 22. ± Innes 1

B and C

1897.3 0. ± 7. ± Innes 1

Other stars near.

No. 4. Innes 190. Lac. 3164. MAG. 7.7
8^h 2^m 27^s — 54° 42'.3.

Comes = 11.0

1897.3 100. ± 2.5 ± Innes 1 n

Bris. 1893, mag. 8.7, is 28 secs. pr.

No. 5. Innes 164. Lac. 3158. MAG. 7.5
8^h 2^m 44^s — 39° 48'.7.

7.8 and 9.2 both yellow

1897.1 95. ± 0.8 ± Innes 2 n

S.f. ζ Argús, mag. 2.5.

No. 6. λ 95. Lal. 15,930. MAG. 5.8
8^h 2^m 53^s — 20° 15'.9.

Comes = 14.9

1897.8 191.6 13.84 See 1 n

No. 7. Melbourne [2]. Lac. 3175. MAG. 7.4
8^h 3^m 16^s — 60° 6'.1.

7.9 and 8.5

1877.1 345.9 1.91 Melbourne 1 n

1887.2 347.6 1.46 Pollock 1

1893.2 351.6 1.08 Sellors 1

Discovered in 1866.

Some change shown.

No. 8. β 334. Ö.A. 8050. MAG. 7.7
8^h 3^m 50^s — 21° 50'.6.

8.1 and 8.9

1877.1 353.8 2.35 Cinc. 2 n

1880.2 354.2 2.4 ± „ 1

1894.2 352.3 2.55 Sellors 2-1

1897.8 352.5 2.90 See 1

Prof. See points out that β's identification as followed by later observers is erroneous.

No. 9. β 583. Lal. 15,959. MAG. 8.7
8^h 4^m 18^s — 6° 24'.5.

9.3 and 9.7

1878.1 68.5 1.82 β 1 n

1878.2 68.4 1.76 Cinc. 1

1888.1 69.4 1.76 Haverford 2

1892.1 69.5 1.70 β 3

Other measures.

A 7.5 mag. star 56 secs. f. 2' S.

No. 10. Hough 352. Lal. 15,988. MAG. 6.1
8^h 4^m 54^s — 15° 57'.3.

Comes = 12.7

1890.2 185.4 5.26 Hough 2 n

72A

8hrs.

REFERENCE CATALOGUE OF

No. 11. Innes 191. C. Z. 8 h. 319. ^{MAG.} 8.7
8^h 5^m 5^s — 41° 37'.4.

9.2 and 9.7

1897.4 190.° ± 0.9 ± Innes 1 n

No. 12. Ormond Stone. Ö.A. 8124. 8.2
8^h 5^m 30^s — 26° 50'.4.

8.6 and 9.6

1876.1 262.° 3.44 Cinc. 1 n
1879.1 259.2 3.00 „ 1
1885.1 261.7 3.34 „ 1

Both components observed on the meridian at Cordoba.

No. 13. Dunlop 63. Piazz 8 h. 16. 6.6
8^h 6^m 24^s — 42° 20'.7.

7.0 and 8.2

1836.0 80.5 6.02 *h* 2 n
1846.3 82.2 5.94 Jacob 2
1877.3 80.8 5.64 Melbourne 1
1879.3 80.5 5.33 Hargrave 1
1897.1 81.9 5.62 Lowell 3

Formerly called K Puppis.

No. 14. γ Argûs. 1.8
8^h 6^m 27^s — 47° 2'.5.

Bris. 1916 = 4.9

1881.2 219.4 42.5 Tebbutt 3 n

This pair, with Bris. 1918 and another bright star, make one of the most brilliant fields in the heavens.

Other measures.

All relatively fixed.

P.m. = 0".023 towards 243°.9

See:—

1881. Tebbutt, J., "Measures," *Observatory*, vol. iv. pp. 211-2.

No. 15. β 1064. 19 Puppis. ^{MAG.} 4.6
8^h 6^m 35^s — 12° 37'.8.

Comes = 11.1

1889.08 244.9 1.84 β 4 n

A 9.0 mag. star 71" S.pr. makes, with 19 Puppis, the old pair \mathbb{H} . IV. 26.

The p.m. of the chief star is about 0".05, in which the \mathbb{H} star seems to share.

No. 16. Innes 165. C. Z. 8 h. 479. 8.9
8^h 6^m 40^s — 48° 53'.9.

9.6 and 9.7

1897.1 270.° ± 0.5 ± Innes 1 n

Lac. 3195, mag. 7.0, is 45 secs. f., and Bris. 1927, mag. 7.5, is 51 secs. f.

In a coarse cluster.

No. 17. Dunlop 66. ϵ Volantis. 4.5
8^h 7^m 37^s — 68° 19'.4.

Cape 1840, 1003 = 8.0

1835.0 23.2 6.69 *h* 2 n
1872.2 23.1 6.52 Russell 1
1877.2 23.9 6.08 Melbourne 2

The p.m. is very small.

No. 18. Innes 192. Lac. 3254. 7.7
8^h 8^m 42^s — 68° 41'.7.

7.9 and 9.8

1897.7 170.° ± 1.6 ± Innes 2 n

No. 19. β 904. C. G. A. 10,922. 9.1
8^h 8^m 44^s — 5° 28'.3.

Comes = 11.4

1880.2 81.3 3.12 β 4 n
1892.2 80.2 3.18 Haverford 4

In a cluster, and near *h* 2435, which consists of two 9th mag. stars 7" apart.

SOUTHERN DOUBLE STARS.

8 hrs.

73A

No. 20. λ 96. Lac. 3218. MAG. 6.6
 $8^h 9^m 20^s$ — $45^\circ 57'.8$

7.2 and 7.5

1897.2 $281. \pm 0.26 \pm$ See 2 n

No. 21. Innes 193. Cor. D.M.—
 $34^\circ 4501$. 8.1
 $8^h 9^m 57^s$ — $34^\circ 26'.1$

8.5 and 9.3

1897.4 $100. \pm 4. \pm$ Innes 2 n

In the field with a variable star. See *Ast. Nach.*, 3441.

No. 22. λ 97. C.Z. 8 h. 746. 8.8
 $8^h 10^m 6^s$ — $37^\circ 25'.4$

A=8.8 B=12.5 C=13.0

A and B

1897.2 $1.5 \quad 3.14$ See 1 n

A and C

1897.2 $15.5 \quad 16.01$ See 1 n

No. 23. β 454. Ö.A. 8280. 7.5
 $8^h 11^m 0^s$ — $30^\circ 33'.1$

7.8 and 9.4

1892.2 $16.3 \quad 2.41 \quad \beta$ 3 n

1892.3 $16.6 \quad 2.49$ Haverford 2

See note.

No. 24. λ 98. C.G.A. 11,004. 6.8
 $8^h 11^m 9^s$ — $35^\circ 23'.1$

Comes = 10.3

1897.2 $72.8 \quad 4.75$ Lowell 2 n

Independently noted at the Cape shortly after its discovery in Mexico.

Found by Mr Cogshall.

Nos. 23 and 26.—The measures under No. 23 should be transferred to No. 26, β 's identification being erroneous. In No. 26 "Cape 8" should accordingly be replaced by β 454.

No. 25. Innes 166. C.Z. 8 h. 858. MAG. 9.0
 $8^h 11^m 12^s$ — $52^\circ 4'.5$

A=9.7 B=9.9 C=10.8

1897.1 pr. $3''$ and $6''$ Innes 1 n
 In a low power field, with Lac. 3239, mag. 7.2, which is $10'$ N.pr.

No. 26. Cape 8. Lac. 3231. 6.6
 $8^h 11^m 51^s$ — $30^\circ 37'.1$

6.8 orange, and 9.0

1897.3 $15. \pm 3. \pm$ Innes 1 n

A fine pair.
 See note.

No. 27. β 905. Lal. 16,242. 7.7
 $8^h 11^m 54^s$ — $16^\circ 0'.6$

7.8 and 10.3

1879.7 $12.2 \quad 3.75 \quad \beta$ 4 n

1884.6 $13.7 \quad 3.75$ Cinc. 2

1893.2 $12.1 \quad 3.76$ Haverford 1

No. 28. Innes 167. C.Z. 8 h. 939. 8.5
 $8^h 11^m 56^s$ — $62^\circ 11'.1$

9.0 and 10.0

1897.1 $240. \pm 1.4 \pm$ Innes 1 n

A neat pair, brighter than the mag. given, which is from the C. G. A.

C. Z. 8 h. 986, mag. 8.5, is 28 secs. f. $3'$ N.

No. 29. β 102. Lal. 16,234. 7.0
 $8^h 11^m 58^s$ — $8^\circ 42'.3$

7.1 and 9.7

1877.1 $122.2 \quad 3.09$ Cinc. 2 n

1892.1 $120.8 \quad 3.30 \quad \beta$ 3

"No change since 1875." β .
 Lal. 16,228, mag 7.7, is closely S.pr.

44A

8hrs.

REFERENCE CATALOGUE OF

No. 30.	Howe.	Lal. 16,235.	MAG. 8.3
		8 ^h 12 ^m 12 ^s — 2° 54'.0.	
		8.4 and 11.9	
1879.3	249.0	1.49	Cinc. 1 n
A brighter star 10' S.pr.			
No. 31.	β 906.	Lal. 16,259.	MAG. 8.7
		8 ^h 12 ^m 18 ^s — 15° 56'.7.	
		8.8 and 11.6	
1880.0	187.1	3.45	β 4 n
1884.1	188.1	3.27	Cinc. 2-1
Near β 905; both some way pr. 21 Puppis, mag. 6.8.			
No. 32.	Howe 9.	C. Z. 8h.1002.	MAG. 8.7
		8 ^h 13 ^m 17 ^s — 26° 57'.7.	
		9.2 and 9.7	
1877.1	115.5	3.26	Cinc. 1 n
1880.2	113.6*	3.26	" 1
1886.2	117.6	3.23	" 1
No. 33.	Gilliss 91.	C Carinae.	MAG. 5.3
		8 ^h 13 ^m 45 ^s — 62° 36'.3.	
		5.4 and 8.6	
1877.1	62.6	4.09	Melbourne 1 n
1881.7	64.2	3.18	Russell 2
1892.4	61.6	3.67	Sellors 2
Also registered as Russell 82, and again as a new pair by the Harvard Observatory at Arequipa.			
The companion was seen at the Cape in 1875.			
A coarse faint pair $\frac{1}{2}$ 4077 is in the field.			
No. 34.	h. 4073.	Lac. 3258.	MAG. 7.0
		8 ^h 14 ^m 30 ^s — 37° 3'.8.	
		7.4 and 8.0	
1836.0	170. ±	1. ±	$\frac{1}{2}$ 1 n
1878.2	176.9	2.31	Russell 1
1879.3	183.9	1.95	Hargrave 1
1895.3	179.9	1.73	Sellors 3
1897.2	179.2	2.34	See 1
About 45' S.pr. $\frac{1}{2}$ Puppis, mag. 4.7.			

No. 35.	β 907.	B.D.—12°, 2462.	MAG. 8.8
		8 ^h 15 ^m 0 ^s — 12° 31'.0.	
		9.0 and 11.2	
1879.7	57.8	0.82	β 2 n
N.pr. Lal. 16,354, mag. 7.0.			

No. 36.	h. 4084.	C. Z. 8h.1280.	MAG. 9.2
		8 ^h 15 ^m 55 ^s — 58° 51'.9.	
		Both = 10.0	
1836.1	266.1	4. ±	$\frac{1}{2}$ 1 n
1880.3	267.7	2.88	Hargrave 1
1888.4	268.1	3.54	Russell 1
Also registered as Russell 83.			
Lac. 3289, mag. 6.8, is 60" N.pr.			

No. 37.	Innes 9.	Lac. 3329.	MAG. 6.8
		8 ^h 15 ^m 55 ^s — 73° 29'.9.	
		7.3 and 8.0	
1894.9	280. ±	0.9 ±	Innes 2 n
1898.3	310. ±	0.9 ±	" 1
An 11th mag. star 60" ± N.			

No. 38.	Σ 1216.	Lal. 16,375.	MAG. 7.0
		8 ^h 16 ^m 16 ^s — 1° 17'.0.	
		7.5 and 8.0	
1825.2	109.5	0.53	Σ 1 n
1831.2	115.2	0.48	" 4
1851.3	139.4	0.49	O Σ 2
1863.3	151.1	.....	Dembowski 7
1873.3	153.8	.....	" 4
1878.2	158.8	0.54	β 4-3
1880.9	166.7	0.36	Hall 3
1891.2	180.6	0.42	Bigourdan 1
1893.2	183.6	0.35	Lewis 3
1896.2	191.5	0.37	Comstock 1
1897.9	192.7	0.51	Hussey 3

A binary; Gore finds a period of 174.7 years, perihelion 1904.

There is a paper by β on this pair in *Astronomy and Astro-physics*, 1892, vol. i., pp. 662-3, and one by Prof. A. Hall in the *Astr. Journal*, vol. xii. No. 269, 1892.

SOUTHERN DOUBLE STARS.

8 hrs.

75A

No. 39. h. 4085. Lac. 3281. ^{MAG.} 5.3
8^h 17^m 34^s — 36° 9'.9.

Comes = 11.4

1836.0	271.2	4 ±	h	1 n
1895.3	270.0	6.09	Sellors	3

Not seen in 1879 at the Sydney Observatory.

No. 40. h. 4087. C. G. A. 11,225. ^{MAG.} 7.3
8^h 18^m 35^s — 40° 40'.3.

8.0 and 8.1

1837.6	327.0*	0.9 ±	h	2 n
1858.1	315.1	1.45	Jacob	3-2
1879.3	308.9	1.28	Hargrave	1
1887.4	299.7	1.85	Tebbutt	2-1
1896.2	302.9	1.76	Sellors	3
1897.2	303.7	1.62	See	1

The nature of the change shown is doubtful.
Two distant faint *comites* also noted by *h*.

No. 41. Innes 67. B Velorum. ^{MAG.} 4.8
8^h 19^m 27^s — 48° 10'.2.

5.0 and 7.0

1897.3	142. ±	1. ±	Innes	2 n
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The p.m. is very small.
There is a faint star some distance away.

No. 42. h. 4093. Lac. 3324. ^{MAG.} 6.5
8^h 22^m 37^s — 38° 43'.8.

7.1 and 7.4

1847.2	121.5	8.12	Jacob	1 n
1881.3	122.4	7.87	Hargrave	1

Probably fixed.

Two stars, mags. 9.1 and 9.2, are about 9' N.f.

No. 43. h. 4104. A Velorum. ^{MAG.} 5.5
8^h 25^m 55^s — 47° 35'.7.

5.6 and 8.3

1836.5	242.3	4.40	h	3 n
1847.1	241.5	3.84	Jacob	1
1876.1	241.3	3.66	Sydney	5

C. Z. 8 h. 2110, mag. 9.4, is 19" distant.

No. 44. Dunlop 70. Lac. 3366. ^{MAG.} 5.2
8^h 26^m 5^s — 44° 23'.4.

5.3 and 7.9

1835.5	350.3	5.58	h	4 n
1852.4	347.9	4.55	Maclear	2
1875.3	348.3	4.67	Sydney	3
1887.1	348.0	4.51	Tebbutt	1
1893.2	350.0	4.50	Scott	1
1897.1	348.6	4.71	Lowell	4

Other measures.

K's distance seems to be 1" too great.

No. 45. h. 4106. Cape 1880, 4412. ^{MAG.} 9.0
8^h 26^m 36^s — 36° 23'.0.

Comes = 10.5

1835.1	137.7	18. ±	h	1 n
1881.3	143.0	8.00	Hargrave	1

About 6 secs. pr. the orange coloured star Lac. 3364, mag. = 7.0 (C. P. D. = 8.8).

No. 46. Innes 168. Lac. 3376. ^{MAG.} 6.9
8^h 27^m 17^s — 44° 24'.0.

Comes = 10.7

1897.2	82. ±	3. ±	Innes	2 n
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An easy pair to have escaped detection.

Dunlop 70, mag. 5.2, is 72 secs. pr. See No. 44.

No. 47. h. 4107. Lac. 3375. ^{MAG.} 6.6
8^h 27^m 43^s — 38° 43'.6.

6.7 and 9.1

1836.0	327.4	3. ±	h	1
1847.1	327.4	4.60	Jacob	2
1851.1	330.2	4.45	"	3

Another star 32" away.

Lac. 3373, mag. 7.2, is 18 secs. pr.

76A

8hrs.

REFERENCE CATALOGUE OF

No. 48. β 205. Lac. 3377. ^{MAG.} 5.9
 $8^h 28^m 46^s$ — $24^\circ 15'.9$.

6.6 and 6.8

1874.19	$130. \pm$	$0.5 \pm$	β	1 n
1877.11	100.6	1.02	Cinc.	1
1878.53	100.3	0.63	"	3-1
1882.21	96.6	$0.5 \pm$	Schiaparelli	3
1886.17	90.1^*	0.80	Cinc.	2
1890.28	81.9	0.70	β	2
1891.24	77.1	0.63	"	1
1892.19	75.7	0.66	"	2
1893.20	72.6	$0.3 \pm$	Sellers	1
1897.23	64.4^*	0.81	Aitken	3

A binary pair.

C. P. D. mag. = 7.5.

No. 49. Sellors 8. Lac. 3410. 6.4
 $8^h 29^m 18^s$ — $52^\circ 52'.3$.

6.7 and 8.0

1892.3	301.8	0.43	Sellors	3 n
1897.1	297.2	0.59	See	2

Seen whilst sweeping with a 6-inch refractor in 1894, when the angle and distance were estimated $295^\circ, 1''.4$.

No. 50. Innes 195. Lac. 3408. 6.9
 $8^h 30^m 43^s$ — $37^\circ 16'.0$.

7.0 orange, and 9.8 blue

1897.3	$42. \pm$	$2. \pm$	Innes	2 n
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A 9.8 mag. star closely S.f.

No. 51. β 206. Yarnall, 3490. 7.5
 $8^h 31^m 9^s$ — $24^\circ 45'.8$.

7.9 and 8.7

1877.1	281.6	1.94	Cinc.	2 n
1880.3	279.7	1.55	Pritchett	3
1889.1	280.3	1.76	Haverford	3

The f. of two stars $1^m 22^s$ apart.

No. 52. Innes 68. C. Z. 8 h. 2571. ^{MAG.} 8.6
 $8^h 32^m 52^s$ — $30^\circ 28'.9$.

8.8 and 10.3

1898.3	68.2	8.15	See	1 n
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No. 53. β 207. Lal. 17,091. 6.7
 $8^h 34^m 10^s$ — $19^\circ 23'.1$.

6.8 red, and 9.5 blue

1876.1	103.6	4.32	Dembowski	3 n
1877.1	106.0	4.50	Cinc.	3-2
1880.7	102.2	4.18	β	2
1890.9	101.6	4.34	Haverford	4

Other measures.

The chief star has been thought variable.

Combined photo mag. = 7.7 (C. P. D.).

No. 54. β 208. Lal. 17,103. 5.1
 $8^h 34^m 45^s$ — $22^\circ 19'.3$.

5.4 and 6.6

1874.20	30.4	$1.4 \pm$	β	1 n
1877.11	32.0	1.74	Cinc.	1
1878.43	33.9	1.37	"	2
1882.21	40.9	1.21	Schiaparelli	3
1889.15	47.5	1.06	β	2
1892.11	52.3	0.70	"	3
1894.26	47.6	0.57	Comstock	1
1895.32	55.5	$0.6 \pm$	"	1
1896.26	$65. \pm$	.....	"	1
1897.83	74.7	0.39	See	1

Common p.m. of $0''.503$ towards $324^\circ.6$.

A binary system, distance at present decreasing.

See:—

1892. Burnham, S. W., *Astronomy and Astrophysics*, pp. 464-465.

No. 55. h. 4125. Lac. 3475. 5.4
 $8^h 35^m 32^s$ — $62^\circ 30'.1$.

5.5 yellow, and 10.4 blue

1834.2	232.6	$8. \pm$	h	2 n
1872.1	233.7	8.04	Russell	1

C. P. D. mag. = 7.2.

SOUTHERN DOUBLE STARS.

8 hrs.

77A

No. 56. λ 102. Lac. 3460. MAG. 7.5
 $8^h 35^m 37^s$ — $39^\circ 26'.7$

8.1 and 8.7

1897.2 240.9 " 0.44 See r n

No. 57. Harvard. Lac. 3467. MAG. 6.5
 $8^h 35^m 55^s$ — $52^\circ 44'.3$

Noted as double at Arequipa in 1891. See *Harvard Circular*, No. 18.

The nearest star seen here is a 10.5 mag. N.pr. ($300^\circ \pm$) at about 20" distance.

No. 58. Lalande 66. Lal. 17,125. MAG. 7.8
 $8^h 35^m 59^s$ — $11^\circ 48'.7$

8.4 and 8.7

1822.0 300.4 " " Σ 2 n
 1830.9 301.4 4.91 " " 3
 1868.5 301.4 4.94 Dembowski 4
 1883.1 302.5 5.47 Cinc. 1

Also registered as Σ 1260.

No. 59. Cordoba [18]. Piazz 8 h. 148. MAG. 5.3
 $8^h 36^m 39^s$ — $39^\circ 54'.5$

5.4 and 8.1

1894.4 61.2 3.8 Bailey 2 n
 1897.1 60.4 3.97 See 3

Measures from Prof. See.

Noted as double in the U. A. Also registered as Innes 69 in error.

No. 60. Cordoba [19]. C. Z. 8 h. 2961. MAG. 8.0
 $8^h 36^m 46^s$ — $31^\circ 27'.3$

8.2 and 9.9

1880 N.pr. $5 \pm$ C. G. A. 3 n

A similar pair = Yarnall₃ 3655, about 25' S., was also noted at Cordoba, and measured in 1877 at Cincinnati.

No. 61. h. 4128. Lac. 3490. MAG. 6.4
 $8^h 37^m 6^s$ — $59^\circ 57'.8$

6.9 and 7.4

1836.7 221.9 2.51 h 2 n
 1850.0 218.4 2.13 Maclear 1
 1854.0 220.9 2.06 Jacob 3-2
 1873.1 219.6* 2.28 Russell 1
 1882.3 215.2 1.28 Hargrave 1

Other measures.

Hargrave's measure is set against Lac. 3465 in the *Sydney Catalogue*.

No. 62. Hough 355. Lal. 17,186. MAG. 8.4
 $8^h 37^m 55^s$ — $2^\circ 20'.2$

Both = 9.2

1892.7 184.4 0.39 Hough 2 n

No. 63. h. 4130. Lac. 3497. MAG. 7.0
 $8^h 38^m 17^s$ — $57^\circ 11'.3$

7.1 and 9.7

1836.7 226.1 3.5 \pm h 2 n
 1850.0 223.5 4.07 Maclear 1
 1872.7 225.8 4.08 Russell 2
 1897.1 227.2 3.48 See 2

This is probably the same star as h 4142. See original note to Mr Russell's measure.

No. 64. Lalande 67. Piazz 8 h. 160. MAG. 6.8
 $8^h 40^m 18^s$ — $2^\circ 14'.2$

Piazz 8h. 159 = 8.5

1831.0 259.1 4.70 Σ 4 n
 1867.2 259.6 4.52 Dembowski 3
 1879.1 260.5 4.63 Cinc. 2

Also called Σ 1270 and South 580.

Hough 355 is some distance pr. and 6' S. See No. 62.

78A

8 hrs.

REFERENCE CATALOGUE OF

No. 65. Innes 10. δ Argûs. MAG. 2.0
 $8^h 41^m 56^s$ — $54^\circ 20'.5$.

2.1 and 5.2

1894.4	177.4	2.15	Bailey	2 n
1894.9	170.±	2.±	Innes	3
1895.4	160.4	1.±	Tebbutt	4
1896.3	173.5	1.81	Sellors	3
1897.2	178.7	3.01	See	1
1897.2	172.8	1.56	Innes	2-1

The p.m. of δ Argûs is $0''.094$ towards $177^\circ.3$.
 h noted a 9.8 mag. star some distance away, which seems unchanged = h 4136.

Inserted as a double star in *Harvard Circular*, No. 18.

Prof. Bailey's measure is from Prof. See's list.

No. 66. Rumker 9. Lac. 3545. MAG. 6.6
 $8^h 42^m 43^s$ — $58^\circ 21'.5$.

7.1 and 7.5

1836.8	290.1	4.87	h	5 n
1872.2	289.9	4.51	Russell	1
1897.0	290.6	3.91	See	3

In Mr Russell's measure, the star is miscalled h 4140.

Two distant comites, mags. 10 and 11.

No. 67. β 586. Lal. 17,355. MAG. 6.8
 $8^h 42^m 45^s$ — $16^\circ 41'.1$.

6.9 and 9.4

1878.1	53.2	0.75	β	1 n
1878.2	55.6	0.7±	Cinc.	2
1878.3	45.7	0.54	Dembowski	1

No other measures of this fine pair have been found.

The p.m. is very small.

No. 68. Jacob [5]. Bris. 2199. MAG. 7.5
 $8^h 42^m 57^s$ — $42^\circ 12'.0$.

7.7 and 9.5

1856.3	314.9	1.88	Jacob	2 n
1897.1	314.6	1.92	Lowell	4

In a coarse cluster.

There is a wide pair S.f., measured by Jacob in 1856 and the Lowell observers in 1897 = Cape 1880, 4655, mag. 8.3.

No. 69. Innes 70. Lac. 3539. MAG. 7.0
 $8^h 43^m 57^s$ — $38^\circ 34'.4$.

7.2 and 9.2

1897.3	110.±	1.5±	Innes	2 n
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No. 70. β 1069. Lal. 17,416. MAG. 7.5
 $8^h 44^m 39^s$ — $10^\circ 38'.9$.

Comes = 11.5

1889.1	60.8	2.13	β	3 n
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No. 71. Hough 356. O.A. 9023. MAG. 7.9
 $8^h 45^m 0^s$ — $26^\circ 3'.2$.

8.5 and 8.8

1890.3	264.5	0.81	Hough	1 n
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No. 72. Sellors 9. C. Z. 8 h. 3683. MAG. 8.0
 $8^h 45^m 25^s$ — $63^\circ 26'.6$.

8.4 and 9.4

1893.2	2.6	0.96	Sellors	2 n
1895.3	0.6	1.22	"	3

No. 73. h. 4143. O.A. 9052. MAG. 8.5
 $8^h 46^m 20^s$ — $22^\circ 50'.7$.

8.9 and 9.3

1835.2	131.8	1.5±	h	1 n
1877.2	128.0	3.62	Cinc.	1
1884	131.9	3.11	"	1

No. 74. h. 4144. Yarnall, 3817. MAG. 7.0
 $8^h 46^m 28^s$ — $35^\circ 33'.4$.

7.1 and 10.0

1838.0	321.7	2.±	h	2 n
1879.3	313.1	2.17	Hargrave	1
1897.2	316.6	2.08	See	1

A 9.2 mag. star is S.pr.

SOUTHERN DOUBLE STARS.

8hrs.

79A

No. 75. β 587. 15 Hydrae. 5.5
 $8^h 46^m 40^s$ — $6^\circ 48'.1$

5.6 and 7.7

1878.2	160.0	0.45	β	2 n
1878.4	163.6	0.46	Cinc.	3-1
1879.2	157.8	0.47	β	2
1880.2	[152.2]	0.4 ±	Cinc.	1
1892.1	151.9	0.59	β	3
1897.2	143.4	0.93	Aitken	3

Common p.m. of $0''.07$ towards 270° .

Two distant companions make up H. V. 120.

No. 76. β 407. W.B. 8 h. 1159. 8.2
 $8^h 46^m 49^s$ — $6^\circ 24'.2$

Comes = 10.6

1877.8	165.4	6.09	Dembowski	1 n
1879.1	165.4	5.47	Cinc.	1
1879.5	164.5	5.94	β	3

No. 77. Hargrave 19. Lac. 3588. 7.4
 $8^h 46^m 51^s$ — $65^\circ 3'.5$

Comes = 10.4

1882.3	149.4	3.25	Hargrave	1 n
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Also catalogued as Russell 349.

No. 78. Schjellerup₂ 13. Lal. 17,509. 8.4
 $8^h 47^m 2^s$ — $10^\circ 45'.8$

8.9 and 9.6

1867.1	352.4	2.17	Harvard	2 n
1873.7	352.3	2.16	Dembowski	2
1878.2	349.7	2.11	Cinc.	2
1886.1	348.6	2.63	L. McC.	1
1886.2	352.8	2.21	Cinc.	1

No. 79. Harvard. f Velorum. 5.2
 $8^h 47^m 10^s$ — $46^\circ 9'.3$

Comes = 9.6

1894.4	81.2	3.7	Bailey	2 n
1897.1	83.6	3.10	See	4

Discovered independently by Prof. See and the writer in January 1897, within a few days of each other. Prof. See then ascertained that the star had previously been noted as double by the Harvard Observatory in Peru, and communicated the information. See also *Harvard Circular*, No. 18.

Prof. Bailey's measure is from Prof. See's list.

No. 80. h. 4148. Cape 1880, 4705. 8.3
 $8^h 47^m 56^s$ — $53^\circ 44'.3$

8.5 and 10.5

1837.0	106.6	4. ±	h	1 n
1874.1	112.5	6.46	Russell	1
1897.1	110.1	5.50	Lowell	3

A minute pair, h 4145, $5''$ apart, is N.pr.

No. 81. Harvard. Lac. 3609. 5.4
 $8^h 49^m 14^s$ — $66^\circ 25'.2$

Noted as double at Arequipa in 1891. See *Harvard Circular*, No. 18.With the 7-inch Cape refractor an 11th mag. star, at about $20'' \pm$, is seen S.pr. about $230^\circ \pm$.

No. 82. Hargrave 20. C. Z. 8 h. 3974. 8.5
 $8^h 49^m 17^s$ — $57^\circ 59'.3$

8.9 and 9.8

1883.3	272.1	1.67	Hargrave	1 n
1893.2	276.1	1.40	Sellers	1

No. 83. β 24. Lal. 17,586. 7.0
 $8^h 49^m 22^s$ — $8^\circ 22'.9$

7.3 and 8.5

1875.2	171.9	1.03	Dembowski	3 n
1878.2	177.3	1.12	β	1
1878.8	175.0	1.08	Cinc.	3
1886.8	173.5	1.26	L. McC.	1
1888.9	173.8	1.19	Haverford	4
1893.2	177.4	1.06	"	2

About $45'$ S. of 17 Hydrae.

No. 84. Cape 9. Lac. 3593. 6.8
 $8^h 49^m 39^s$ — $51^\circ 45'.0$

7.0 and 9.0

1877.7	78.0	3.85	C. G. A.	4 n
1897.1	81.9	2.93	Lowell	2

Noted at the Cape in 1876.

80A

8hrs

REFERENCE CATALOGUE OF

No. 85. β 103. Lal. 17,611. ^{MAG.} 7.8
 $8^h 50^m 0^s$ — $7^\circ 26'.3$

Comes = 10.8

1875.1	73.9	2.90	Dembowski	2 n
1879.5	73.9	2.86	β	3
1880.8	73.7	2.71	Pritchett	2
1886.2	72.2	2.77	Cinc.	1

Fixed. N.pr. 17 Hydrae. See next star.

No. 86. η . II. 77. 17 Hydrae. ^{MAG.} 6.3
 $8^h 50^m 36^s$ — $7^\circ 35'.3$

6.9 and 7.2

1792.6	360.3	.....	η	2 n
1831.6	358.8	4.33	Σ	3
1848.3	358.5	4.25	Philpott	1
1867.2	358.2	4.16	Dembowski	3
1883.2	359.1	4.18	Cinc.	2
1893.2	359.1	4.30	Haverford	2

Fixed. Small common p.m. of about $0''.02$.
Also recorded as Σ 1295.

No. 87. β 210. Lal. 17,696. ^{MAG.} 7.2
 $8^h 52^m 13^s$ — $17^\circ 3'.0$

7.9 and 8.0

1876.1	183.2	2.81	Cinc.	7 n
1886.8	183.3	2.76	L. McC.	3-2
1893.2	182.6	2.67	Sellors	1

Fixed. Other measures.

No. 88. Hough 358. Lal. 17,733. ^{MAG.} 7.0
 $8^h 53^m 17^s$ — $18^\circ 30'.1$

Comes = 12.0

1892.2	290.4	1.77	Hough	2 n
1898.3	298.5	1.91	See	1

No. 89. Russell 87. H Velorum. ^{MAG.} 4.7
 $8^h 53^m 18^s$ — $52^\circ 20'.3$

4.8 yellow and 7.4 blue

1881.3	240.5	3.47	Russell	1 n
1896.3	340.1	3.33	Innes	1
1897.1	339.6	3.03	See	2

Unless there is a misprint in the first angle, the change is considerable in this fine pair.

In the Harvard list of new pairs found at Arequipa in 1891.

No. 90. Cordoba [20]. Lac. 3615. ^{MAG.} 7.2
 $8^h 53^m 30^s$ — $42^\circ 52'.2$

7.8 and 8.1

1879.2	98.6	2.67	C. G. A.	2 n
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Gilliss 975, mag. 9.5, is $43''$ N.

No. 91. Innes 71. Bris. 2285. ^{MAG.} 7.5
 $8^h 53^m 44^s$ — $49^\circ 17'.7$

7.8 and 9.2

1896.4	N.pr.	$5'' \pm$	Innes	2 n
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The pr. of three stars, mags. 7.5, 7.5, and 7.0 respectively.

No. 92. Hough 359. O.A. 9193. ^{MAG.} 8.6
 $8^h 54^m 8^s$ — $22^\circ 27'.0$

9.1 and 9.8

1893.2	7.9	$0''.70$	Hough	1 n
1898.3	15.3	0.82	See	1

O.A. 9194, mag. 8.5, is $7' S$.

No. 93. Innes 287. Bris. 2310. ^{MAG.} 8.0
 $8^h 55^m 5^s$ — $73^\circ 39'.5$

8.3 and 9.8, both white

1898.3	$255'' \pm$	$2'' \pm$	Innes	2 n
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SOUTHERN DOUBLE STARS.

8hrs.

81A

No. 94. β 409. Lal. 17,812. ^{MAG.} 7.0
 $8^h 55^m 53^s$ — $8^\circ 48'.0$.

Comes = 10.1

1878.3	684.3	9.65	Dembowski	1 n
1879.5	184.7	9.77	β	3
1884.0	185.6	9.94	Engelmann	5

Between two stars, both 7.5 mag.

No. 95. λ 108. Lac. 3646. ^{MAG.} 6.6
 $8^h 56^m 44^s$ — $42^\circ 46'.9$.

Comes = 13.0

1897.2	45.8	2.80	Lowell	2 n
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Found by Mr Cogshall.

No. 96. h. 4165. Lac. 3667. ^{MAG.} 5.4
 $8^h 58^m 38^s$ — $51^\circ 47'.7$.

5.6 and 7.2

1837.2	88.2	1.41	<i>h</i>	2 n
1848.1	85.6	1.5 ±	Jacob	1
1858.1	89.9	1.38	"	2
1887.3	96.5	0.88	Pollock	1
1895.3	96.9	1.04	Sellers	3
1897.1	102.1	1.01	See	4

A fine pair.

Some change.

No. 97. h. 4167. C. Z. 8 h. 4736. ^{MAG.} 8.9
 $8^h 58^m 49^s$ — $65^\circ 57'.4$.

Comes = 12.4

1836.1	25.1	2.5 ±	<i>h</i>	2 n
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α Volantis, mag. 4.1, is S.f.

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No.	Star	Mag.	RA	Dec	Mag.	Notes	Mag.
No. 1.	Sellors 16. Bris. 2339. 9 ^h 1 ^m 58 ^s — 64° 17'.2.	7.5				7.7 and 9.6	
	1895.3 306.9 1.02 Sellors	3 n					
No. 2.	Howe 10. Ö.A. 9348. 9 ^h 2 ^m 7 ^s — 31° 11'.6.	7.7				8.2 and 8.7	
	1877.1 304.6 3.38 Cinc.	2 n					
No. 3.	h. 4178. Lac. 3693. 9 ^h 2 ^m 8 ^s — 57° 27'.2.	6.9				7.0 and 10.4	
	1836.6 164.3 3.± h	2 n					(1897 seen).
No. 4.	Innes 196. Lac. 3687. 9 ^h 2 ^m 26 ^s — 49° 44'.6.	8.5				9.0 and 9.5, both white	
	1897.4 150.± 0.7± Innes	1 n					
No. 5.	λ 109. λ Argûs. 9 ^h 4 ^m 19 ^s — 43° 1'.7.	2.1				Comes = 14.0	
	1897.2 133.7 17.11 See	2 n					The p.m. is 0".058 towards 279°.9. Mag. in C. P. D. = 6.0.
No. 6.	Innes 197. C.Z. 9 h. 331. 9 ^h 4 ^m 55 ^s — 28° 24'.7.	8.3				9.0 and 9.2	
	1898.3 231.2 1.76 See	1 n					
No. 7.	β 410. Piazzì 9 h. 5. 9 ^h 5 ^m 22 ^s — 25° 23'.8.	7.0				7.3 and 8.6	
	1877.1 162.5 1.73 Cinc.	2 n					
	1892.2 161.2 1.67 β	3					
	1892.2 160.9 1.63 Haverford	3					
No. 8.	Cordoba [21]. C.Z. 9 h. 448. 9 ^h 6 ^m 17 ^s — 43° 46'.1.	8.3				8.8 and 9.5	
	1881.0 45.9 2.87 C. G. A.	3 n					
No. 9.	Innes 288. Lac. 3767. 9 ^h 6 ^m 56 ^s — 74° 21'.0.	8.2				8.7 and 9.2	
	1898.3 260.± 0.7± Innes	1 n					
No. 10.	β 336. Lal. 18,173. 9 ^h 7 ^m 6 ^s — 16° 24'.1.	8.3				8.7 and 9.7	
	1876.2 238.3 1.93 Dembowski	2 n					
	1878.2 241.0 1.81 Cinc.	2					
No. 11.	Innes 169. Lac. 3720. 9 ^h 7 ^m 15 ^s — 42° 51'.4.	7.2				7.6 and 8.6	
	1897.1 5.± 0.6± Innes	1 n					Bris. 2373, mag. 7.8, is closely S.f.
No. 12.	λ 110. C.Z. 9 h. 576. 9 ^h 8 ^m 9 ^s — 46° 28'.6.	8.5				9.0 and 9.5	
	1897.1 48.6 0.94 Lowell	3 n					Found by Mr Cogshall. About 20' S.f. Lac. 3727, mag. 6.2.
No. 13.	h. 4188. Lac. 3729. 9 ^h 8 ^m 48 ^s — 43° 12'.1.	6.7				7.1 and 8.1	
	1835.7 286.9 3.07 h	2 n					
	1847.1 284.9 2.89 Jacob	3					
	1850.3 285.6 2.74 "	2					
	1879.4 285.4 2.43 Hargrave	1					
	1897.1 282.5 2.94 Lowell	3					

SOUTHERN DOUBLE STARS.

9hrs.

83A

No.	h.	m.	s.	Lac.	Mag.	Other	Mag.
No. 14.	h. 4190.	Lac. 3742.	7.0				
	9 ^h 8 ^m 49 ^s	— 57° 33'.5.					
	Comes = 11.0						
	1837.0	21.9	7.±	h	1 n		
	1879.4	21.5	7.73	Hargrave	1		
No. 15.	β 908.	B.D.—7°, 2762.	9.1				
	9 ^h 9 ^m 25 ^s	— 7° 52'.8.					
	9.3 and 11.0						
	1880.3	234.6	0.82	β	3 n		
	1892.2	230.7	0.74	"	2		
	1st Munich 3956, mag. 8.9, is 61" N. There is also a 12.5 mag. star in the field.						
No. 16.	Hough 363.	Lal. 18,282.	7.3				
	9 ^h 10 ^m 27 ^s	— 19° 42'.4.					
	7.5 and 9.5						
	1890.3	176.1	1.56	Hough	2 n		
No. 17.	h. 4191.	z Velorum.	5.3				
	9 ^h 10 ^m 41 ^s	— 42° 48'.8.					
	Comes = 11.0						
	1835.6	10.3	4.±	h	2 n		
	1897.1	11.7	5.61	Lowell	4		
	The p.m. is small.						
No. 18.	β 212.	Lal. 18,296.	7.5				
	9 ^h 11 ^m 10 ^s	— 7° 56'.0					
	8.0 and 8.5						
	1874.1	218.5	1.5±	β	1 n		
	1875.7	230.5	1.48	Dembowski	2		
	1878.2	225.8	1.36	Cinc.	1		
	1880.5	228.9	1.26	β	4		
	1885.2	225.6	1.47	Cinc.	1		
	1887.0	224.7	1.49	L. McC.	1		
	1888.6	225.4	1.35	Haverford	3		
	Fixed.						
No. 19.	Innes 11.	Lac. 3758.	6.5				
	9 ^h 11 ^m 37 ^s	— 45° 8'.3.					
	6.9 and 7.7						
	1896.3	273.6	1.21	Sellors	3 n		
	1897.2	271.6	0.75	See	2		
No. 20.	λ 111.	k Velorum.	4.7				
	9 ^h 11 ^m 45 ^s	— 36° 59'.8.					
	Comes = 13.0						
	1897.4	125.7	11.27	See	1 n		
No. 21.	h. 4193.	Lal. 18,330.	7.7				
	9 ^h 11 ^m 49 ^s	— 22° 42'.7.					
	8.0 and 9.3						
	1835.1	126.4	2.±	h	1 n		
	1877.1	117.7	3.18	Cinc.	1		
	1884.8	119.3	3.10	"	2		
	1898.3	118.4	3.27	See	1		
No. 22.	h. 4196.	C.P.D.—51°, 2073.	8.5				
	9 ^h 13 ^m 23 ^s	— 51° 30'.0.					
	9.0 and 9.6, both yellow						
	1837.0	126.5	3.±	h	1 n		
	1882.4	119.1	2.73	Hargrave	1		
	A 9.4 mag. star is closely S.pr.						
No. 23.	H. C. Wilson.	Lal. 18,445.	7.5				
	9 ^h 15 ^m 46 ^s	— 23° 3'.3.					
	7.7 and 9.7						
	1882.1	39.6	1.±	Cinc.	1 n		
	1886.2	36.7	1.38	"	2		
No. 24.	Innes 198.	Lac. 3787.	8.0				
	9 ^h 16 ^m 23 ^s	— 28° 47'.7.					
	8.4 and 9.4						
	1898.3	182.0	0.45	See	1 n		
	Cape, 1880, 4984, mag. 7.2, is 16 secs. pr. 6' N.						

<p>No. 25. h. 4200. Piazzì 9 h. 61. ^{MAG.} 7.3 $9^{\text{h}} 16^{\text{m}} 30^{\text{s}}$ — $31^{\circ} 20'.1$ 7.8 and 8.5 1836.1 72.0 $2'' \pm$ h 1 n 1891.3 71.5 3.17 Sellors 1 Both components were observed on the meridian at Cordoba. The p.m. is small.</p>	<p>No. 31. Innes 72. I Velorum. ^{MAG.} 5.2 $9^{\text{h}} 23^{\text{m}} 3^{\text{s}}$ — $52^{\circ} 56'.7$ B and C 1896.5 $3'' \pm$ Innes 1 n The chief star is $50'' \pm f$, and has no p.m.</p>
<p>No. 26. Innes 170. Gilliss 1063. ^{MAG.} 7.5 $9^{\text{h}} 17^{\text{m}} 4^{\text{s}}$ — $34^{\circ} 55'.9$ 7.7 and 9.8 1897.2 $45. \pm$ $1.2 \pm$ Innes 2 n</p>	<p>No. 32. Innes 199. Lac. 3893. ^{MAG.} 8.5 $9^{\text{h}} 23^{\text{m}} 25^{\text{s}}$ — $69^{\circ} 58'.6$ 8.8 and 10.0 1897.4 $135. \pm$ $2'' \pm$ Innes 1 n Mag. in C. P. D. = 7.4.</p>
<p>No. 27. h. 4206. Lac. 3846. ^{MAG.} 5.4 $9^{\text{h}} 17^{\text{m}} 36^{\text{s}}$ — $74^{\circ} 28'.3$ Comes = 10.8 1835.1 340.8 $5'' \pm$ h 1 n 1894.8 $340. \pm$ $8. \pm$ Innes 2 Another star $40''$ distant. The p.m. is insensible. At one time the writer thought the chief star a close pair. Not confirmed here.</p>	<p>No. 33. β 213. Lal. 18,648. ^{MAG.} 8.0 $9^{\text{h}} 23^{\text{m}} 25^{\text{s}}$ — $7^{\circ} 39'.1$ 8.3 and 9.7 1874.2 185.5 $1.5 \pm$ β 1 n 1875.8 177.2 1.60 Dembowski 2 1879.2 177.8 1.35 Cinc. 1 1880.2 179.3 1.53 β 2 1892.1 179.5 1.62 " 3</p>
<p>No. 28. Harvard 123. Ö.A. 9667. ^{MAG.} 7.7 $9^{\text{h}} 19^{\text{m}} 18^{\text{s}}$ — $23^{\circ} 13'.8$ Comes = 11.0 1868.2 4.1 4.41 Harvard 1 n 1898.3 4.4 4.48 See 1</p>	<p>No. 34. Σ 1357. Lal. 18,650. ^{MAG.} 7.5 $9^{\text{h}} 23^{\text{m}} 27^{\text{s}}$ — $9^{\circ} 33'.0$ Comes = 10.2 1831.2 51.4 7.54 Σ 3 n 1868.2 54.4 7.25 Dembowski 1882.2 52.7 7.77 Cinc.</p>
<p>No. 29. β 590. 29 Hydrae. ^{MAG.} 6.7 $9^{\text{h}} 22^{\text{m}} 21^{\text{s}}$ — $8^{\circ} 47'.4$ Comes = 11.7 1878.2 176.8 10.8 β 2 n 1891.3 176.0 10.9 " 2 The p.m. of the chief star is $0''.068$ towards $268^{\circ}.3$.</p>	<p>No. 35. β 591. W.B. 9 h. 477. ^{MAG.} 7.8 $9^{\text{h}} 24^{\text{m}} 33^{\text{s}}$ — $2^{\circ} 40'.6$ 8.2 and 9.0 1878.1 35.8 0.73 β 2 n 1878.2 31.9 0.73 Dembowski 1 1884.0 39.8 0.67 Engelmann 5 1892.1 35.4 0.72 β 3 Near τ Hydrae, mag. 4.9.</p>
<p>No. 30. h. 4213. Lac. 3866. ^{MAG.} 6.2 $9^{\text{h}} 22^{\text{m}} 58^{\text{s}}$ — $61^{\circ} 31'.2$ Comes = 9.4 1835.7 324.1 $8'' \pm$ h 4 n 1876.8 326.3 8.82 Sydney 2</p>	<p>No. 36. λ 113. Piazzì 9 h. 105. ^{MAG.} 4.7 $9^{\text{h}} 25^{\text{m}} 28^{\text{s}}$ — $26^{\circ} 9'.1$ Comes = 14.8 1897.8 178.1 4.13 See 1 n The mag. is from the Harvard Meridian Photometry. The U. A. gives 6.0, and the C. P. D. 7.0. Piazzì 9 h. 101, mag. 7.2, is closely pr.</p>

No. 37. β 339. Lal. 18,737. ^{MAG.} 8.4
 9^h 26^m 14^s — 15° 18'.0.

8.7 and 10.0

1876.2	215.7	1.28	Dembowski	2 n
1878.5	215.1	1.32	Cinc.	2-1
1885.2	220.2	1.50	"	1
1888.2	219.3	1.31	Haverford	1

No. 38. Jacob [6]. Lac. 3873. 7.0
 9^h 26^m 18^s — 28° 19'.5.

7.4 and 8.2

1858.2	244.6	0.55 ±	Jacob	2 n
1879.1	236.7	0.69	Cinc.	3-1
1889.2	244.8	1.05	β	3
1897.9	245.4*	0.42	See	1

This star is identical with Innes 171.
 See note.

No. 39. Dunlop 78. ξ_1 Antliae. 6.1
 9^h 26^m 29^s — 31° 26'.9.

5.7 and 6.5

1836.3	210.6	8.38	h	4 n
1876.2	211.8	8.43	Cinc.	5
1877.1	211.5	8.25	"	1
1893.2	210.5	8.49	Scott	1

No. 40. Copeland [1]. ψ Argus. 3.5
 9^h 26^m 46^s — 40° 1'.7.

3.7 and 5.7, both yellow

1883.3	45. ±	0.8 ±	Copeland	1 n
1896.4	S.pr.?	.....	Innes	1
1897.1	260. ±	0.7 ±	"	1
1897.1	255.9	0.49	See	4
1897.1	256.9	0.81	Cogshall	1

At the time the observation was made on 1896.4, it was noted, "Very doubtful if even elongated;" whereas in 1897.1 the stars were all but separated.

Common p.m. of 0".236 towards 290°.6.

Measured as a new pair by Prof. See.

A system of the highest interest, and probably of short period.

See note.

No. 38. Misidentification. This pair is Lac. 3833, mag. 6.0; 9^h 22^m 23^s, —28° 21'.2, mags. 6.4 and 7.2.
 No. 40. Cape, 1899.1, 290° ±; direct motion.

No. 41. Innes 31. C. Z. 9 h. 2194. ^{MAG.} 9.2
 9^h 27^m 53^s — 56° 32'.5.

9.6 and 10.6

1894.3 S.f. 2". ± Innes 2 n
 Another comes 11.5 about 20" S.f., and another at 25".
 N.pr. N Velorum, an orange-red star, by about 6'.

No. 42. β 910. Lal. 18,798. 7.0
 9^h 28^m 7^s — 13° 33'.5.

Comes = 10.0

1879.9	304.9	6.84	β	3 n
1892.1	305.9	6.68	"	3
1893.2	305.0	6.33	Haverford	2

No change.

A 9.2 mag. star is a little N.pr.

No. 43. h. 4218. C. Z. 9 h. 2261. 7.7
 9^h 29^m 2^s — 35° 57'.6.

Comes = 10.8

1836.2	29.7	3.5 ±	h	2 n
1879.4	26.9	5.46	Hargrave	1
1898.3	28.5	5.72	See	1

No. 44. Russell 122. C. Z. 9 h. 2281. 8.5
 9^h 29^m 5^s — 55° 33'.7.

8.9 and 9.4

1873.2	94.8	3.20	Russell	1 n
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A coarse faint triple, Russell 121, is in the same field 3' S.

No. 45. Innes 289. Lac. 3957. 8.2.
 9^h 29^m 17^s — 73° 12'.5.

8.4 and 9.9

1898.1	240. ±	0.9 ±	Innes	1 n
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No. 46. Innes 200. Lac. 3924. 7.7
 9^h 29^m 22^s — 60° 47'.5.

7.9 and 9.9

1897.5	355. ±	1. ±	Innes	1 n
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86A,

9 hrs.

REFERENCE CATALOGUE OF

No. 47. h. 4220. Lac. 3917. 5.3
 9^h 30^m 9^s — 48° 33'.7.

5.8 and 6.4

				MAG.
1836.1	202.0	2.99	h	3 n
1846.2	201.5	2.70	Jacob	2
1851.2	203.4	2.47	"	2
1872.2	202.9	.....	Russell	1
1877.3	204.8	2.64	Melbourne	2
1880.8	204.8	1.58	Hargrave	2
1897.1	204.0	2.41	See	3

The p.m. is very small.

No. 48. Russell 123. Lac. 3930. 7.7
 9^h 30^m 18^s — 57° 31'.1.

8.4 and 8.5

				MAG.
1873.2	30.1	2.53	Russell	1 n
1897.1	26.0	1.68	See	2

The f. star of a small triangle.

Also seen at Cordoba.

No. 49. Innes 201. Lac. 3970. 8.2
 9^h 30^m 52^s — 73° 18'.3.

8.4 and 10.2

				MAG.
1897.4	155.±	1.8	Innes	2 n

The f. and brightest of three stars.

H Carinae, mag. 5.5, is 40' N.

No. 45 is N.pr.

No. 50. h. 4224. Lac. 3926. 7.8
 9^h 31^m 44^s — 30° 47'.1.

8.1 and 9.2

				MAG.
1836.1	118.9	4.±	h	1 n
1876.1	116.6	7.33	Cinc.	1

Separately observed on the meridian at Cordoba.

The p.m. of this star may be considerable.

No. 51. Russell 125. Lac. 3950. 6.7
 9^h 32^m 48^s — 48° 18'.1.

6.8 and 9.4

				MAG.
1880.3	165.0	2.77	Russell	2 n
1882.4	170.0	3.06	Hargrave	1
1897.1	166.9	3.12	Lowell	4

The measures for 1880.3 are taken from the Sydney list, which here differs from the list in the *Mem. R. A. S.*, vol. xlvii.

This star appears in the Harvard list of new double stars—Circular, No. 18.

No. 47 is S.pr.

No. 52. λ 115. Lac. 3961. 5.5
 9^h 33^m 52^s — 53° 13'.0.

6.2 and 6.3

				MAG.
1897.2	184.±	0.25	See	2 n

No. 53. Innes 202. Lac. 3959. 7.0
 9^h 34^m 38^s — 39° 9'.6.

Comes = 10.0

				MAG.
1897.3	179.±	1.±	Innes	1 n

Bris. 2587, mag. 7.6, is N.f.

No. 54. Cincinnati. B.D.—16°, 2851. 8.3
 9^h 35^m 18^s — 16° 42'.2.

8.5 and 10.0

				MAG.
1882.1	266.0	3.04	Cinc.	1 n
1884.2	265.3	3.05	"	2

An 8.8 mag. star 5'.8 S.f.

No. 55. Howe 11. C.Z. 9 h. 2728. 8.3
 9^h 35^m 35^s — 32° 28'.0.

Comes = 11.3

				MAG.
1877.1	17.7	5.16	Cinc.	1 n
1885.7	16.3	5.12	"	2

A 9th mag. star 7 secs. pr. 1' S.

Many stars in the field.

No. 56. Innes 203. C. Z. 9 h. 2785. 8.2
 9^h 35^m 49^s — 62° 6'.2.

8.6 and 9.6

1897.4 140.± 0.5± Innes 1 n
 C. Z. 9 h. 2831, mag. 7.5, is 42 secs. f., and both precede the well-known variable star *l* Carinae.

No. 57. β 214. Lal. 19,064. 7.7
 9^h 36^m 48^s — 18° 1'.5.

7.8 and 10.7

1874.2 263.9 2.5± β 1 n
 1875.3 261.0 3.09 Dembowski 2
 1877.1 259.0 2.88 Cinc. 2
 1886.3 261.3 [3.21] L. McC. 1
 An 8.5 mag. star 53 secs. pr.

No. 58. Russell 129. Lac. 4000. 7.4
 9^h 39^m 27^s — 55° 22'.6.

7.9 and 8.5

1873.2 106.5 4.12 Russell 1 n
 Also seen at the Cape in 1875, and at Cordoba in 1876.

No. 59. λ 116. \bar{O} .A. 10,099. 8.6
 9^h 41^m 44^s — 28° 6'.6.

8.7 and 11.4

1897.9 200.3 2.86 See 1 n

No. 60. Hargrave 28. Gilliss 1140. 7.8
 9^h 42^m 12^s — 59° 0'.8.

8.0 orange, and 9.6

1882.4 280.± 2.± Hargrave 1 n
 1897.5 290.± 2.5± Innes 1
 The Dec. given with the first observation is 6' in error.

No. 61. Innes 172. Lac. 4025. 7.7
 9^h 43^m 18^s — 37° 15'.6.

7.9 and 10.0

1897.2 310.± 0.9± Innes 2 n

No. 62. Washburn 99. C. Z. 9 h. 3281. 7.6
 9^h 43^m 22^s — 27° 8'.1.

7.8 and 9.8

1888.9 218.1 1.75 Washburn 3 n

No. 63. Innes 204. Lac. 4054. 7.2
 9^h 43^m 56^s — 69° 39'.3.

7.5 and 8.8

1897.4 120.± 1.± Innes 1 n

No. 64. Innes 205. Lac. (4026). 7.0
 9^h 44^m 13^s — 25° 57'.0.

7.1 yellow, and 10.1 blue

1897.5 20.± 2.± Innes 1 n

No. 65. h. 4249. Lac. 4031. 7.5
 9^h 44^m 29^s — 34° 33'.3.

Both = 8.3

1836.3 125.2 4.93 h 3 n
 1848.1 125.2 4.28 Jacob 1
 1877.1 122.6 4.45 Cinc. 1
 1879.3 126.0 4.03 Hargrave 1
 1881.2 126.5 5.61 Tebbutt 1

Other measures.
 Fixed.

No. 66. h. 4252. ν Argús. 3.0
 9^h 44^m 36^s — 64° 36'.5. Orange

Comes = 7.0 blue

1836.8 126.1 4.90 h 3 n
 1850.1 124.9 5.58 Maclear 1
 1854.1 126.1 4.94 „ 1
 1875.9 124.9 5.04 Russell 2
 1877.4 127.7 4.98 Melbourne 2
 1880.3 125.4 4.94 Tebbutt 1

A very pretty pair, and evidently fixed.
 The p.m. is only 0."027 towards 293°.7.
 C. P. D. mag. = 4.6.

No. 67. Cordoba [22]. Bris. 2697. ^{MAG.} 8.6
 9^h 46^m 18^s — 62° 33'.3.

8.7 and 10.0

1879.3	S.f.	3.±	C. G. A.	3 n
1883.4	117.1	4.23	Hargrave	1

No. 68. Alvan Clark 5. γ Sextantis. 5.3
 9^h 47^m 33^s — 7° 38'.0.

6.0 and 6.3

1854.2	50.6	0.55	Dawes	2 n
1867.1	90.2	.....	Harvard	1
1870.3	22.4	.....	"	2
1886.2	130.4*	0.40	Cinc.	2
1886.3	158.5	0.28	Hall	1
1888.1	133.1	0.4±	Haverford	1
1889.2	125.6	0.54	β	3
1892.2	105.3	0.41	"	4
1896.9	93.6	0.42	Aitken	3
1897.9	91.0	0.39	"	3

Found in 1852 with a 4 $\frac{3}{4}$ -inch refractor.

Binary. Prof. v. Glasenapp finds a period of 93.9 years.

The motion is retrograde.

Small p.m.

Another star measured by β in 1880, about 36" distance, is probably equal to H. N. 49.

See:—

1892. Glasenapp, S. v., "Orbit.," *Astr. Nach.*, No. 3119.

1886. Wilson, H. C., "Motion," *Sidereal Messenger*, vol. v. p. 125.

No. 69. β 215. Lac. 4058. 7.0
 9^h 49^m 35^s — 27° 31'.6.

7.1 and 10.0

1877.1	337.8	1.78	Cinc.	1 n
1884.2	345.2	1.88	"	2
1893.3	341.3	1.52	Sellors	2-1

Two stars, 9.3 and 9.0, are f.

No. 70. β 592. Ö.A. 10,209. 7.2
 9^h 50^m 13^s — 15° 43'.3.

Comes = 12.0

1879.8	191.6	9.86	β	3 n
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Also measured at Cincinnati on 1 n. in 1879.

No. 71. Dunlop 81. Piazzini 9 h. 213. ^{MAG.} 5.8
 9^h 50^m 21^s — 44° 48'.6.

Comes = 9.2

1835.2	239.1	6.15	\hbar	3 n
1847.5	240.5	5.50	Jacob	3
1879.4	235.6	5.01	Hargrave	1
1897.1	238.6	5.55	Lowell	5

The p.m. is very small.

No. 72. β 216. Lac. 4074. 6.1
 9^h 52^m 15^s — 26° 4'.5.

Comes = 10.5

1877.2	162.4	3.03	Cinc.	1 n
1879.3	162.3	2.52	"	1

Seen in 1897.

No. 73. Rumker 12. Lac. 4102. 6.7
 9^h 53^m 1^s — 68° 42'.9.

7.0 and 8.2

1834.6	210.0	12.±	\hbar	2 n
1879.4	213.2	8.78	Hargrave	1

Erroneously called \hbar 4269 in the Sydney Observatory list.

No. 74. Innes 290. Cape 1880, 5446. 9.2
 9^h 58^m 45^s — 59° 35'.7.

9.8 and 10.2

1898.3	290.±	1.±	Innes	1 n
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Bris. 2802, mag. 8.2, is 16 secs. pr. and 2' S.
 In a cluster.

No. 75. Innes 291. Lac. 4154. 7.2
 9^h 59^m 20^s — 70° 14'.8.

7.4 and 9.5

1898.3	340.±	1.5±	Innes	1 n
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The p.m. is very small.

No. 76. Innes 292. Lac. 4128. 7.3
 9^h 59^m 46^s — 27° 53'.6.

8.0 and 8.1

1898.3	230.±	0.8±	Innes	1 n
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The scanty material available indicates a small p.m. in R.A.

In a low power field with another double star.

SOUTHERN DOUBLE STARS.

10 hrs.

89A

No. 1. Hargrave 47. Lac. 4153. ^{MAG.} 6.7
10^h 0^m 29^s — 61° 24'.0.

7.0 and 8.4

1883.4 351.2 0.63 Hargrave 1 n
1893.3 351.7 0.88 Sellors 1

Lac. 4148, mag. 6.9, orange, is S.pr.

No. 2. Innes 293. Lac. 4134. ^{MAG.} 6.9
10^h 0^m 40^s — 27° 42'.7. **Yellow**

7.3 and 8.3

1898.3 320.± 0.5± Innes 1 n

The p.m. is very small. The f. and slightly fainter of two stars.

Another and easier pair is S.pr.

No. 3. h. 4283. Lac. 4147. ^{MAG.} 7.8
10^h 0^m 43^s — 51° 18'.8.

Cape 1880, 5471 = 8.6

1836.2 181.0 7.26 h 2 n
1848.1 181.2 8.29 Jacob 1
1872.2 178.2 8.16 Russell 2

Both components white.

No. 4. h. 4284. Lac. 4146. ^{MAG.} 7.4
10^h 1^m 5^s — 45° 24'.6. **Yellow**

C. G. A. 13,769 = 8.8

1837.1 73.2 10.± h 1 n
1897.1 78.0 6.93 See 1

No. 5. Hough 371. Lac. 4143. ^{MAG.} 6.8
10^h 1^m 17^s — 30° 24'.3.

Comes = 12.3

1891.8 40.6 6.38 Hough 2 n
1898.3 43.4 6.23 See 1

No. 6. Harvard 125. W.B. 9 h. 1272. ^{MAG.} 8.4
10^h 1^m 49^s — 1° 14'.3.

9.1 and 9.2

1880.7 171.8* 1.94 β 2 n
1888.2 171.5 2.01 Haverford 3

Discovered in 1868 but not measured.

No. 7. H. C. Wilson. C. Z. 10 h. 52. ^{MAG.} 8.0
10^h 1^m 55^s — 28° 9'.8.

8.7 and 8.8

1882.2 217.2 1.44 Cinc. 1 n
1885.2 217.1 1.00 „ 1

No. 8. β 217. Bonn 9 h. 146. ^{MAG.} 7.3
10^h 2^m 13^s — 24° 13'.6.

7.9 and 8.2

1868.2 276.0 1.66 Harvard 1 n
1876.1 274.6 1.90 Cinc. 4
1882.2 274.6 2.03 „ 4-2
1889.2 277.2* 1.58 Haverford 2-1
1893.3 279.8 1.76 Sellors 2

Noted as a double star at Cordoba, also = Harvard 126.

No. 9. Innes 173. Lac. (4158). ^{MAG.} 5.2
10^h 2^m 14^s — 46° 52'.9.

5.4 and 7.0 both yellow

1897.1 45.± 0.6± Innes 1 n

There are too few meridian observations to give a p.m.

No. 10. β 218. Lal. 19,765. ^{MAG.} 7.2
10^h 2^m 38^s — 19° 13'.3.

7.9 and 8.0

1875.3 122.6 0.99 Dembowski 4 n
1877.1 120.5 0.97 Cinc. 2
1888.1 120.1 0.91 Haverford 2
1892.1 124.4 0.91 β 3

Other measures.

“The pr. star of a small equilateral triangle.”—β.

β 911 is 1^m f. 2' S.

No. 11. β 911. Lal. 19,780. ^{MAG.} 7.2
10^h 3^m 38^s — 19° 15'.4.

Comes = 10.8

1880.2 311.5 4.75 β 2 n
1892.1 313.4 4.77 „ 3

Common p.m. of 0".364 towards 195°.8.

There is a third star = C. P. D.—19°, 45'15, mag. 9.6, 50" away, which does not share in the p.m.

M

90A

10 hrs.

REFERENCE CATALOGUE OF

- No. 12. β 790. W.B. 10 h. 26. ^{MAG.} 8.8
 $10^{\text{h}} 5^{\text{m}} 4^{\text{s}}$ — $12^{\circ} 23'.1$
 9.1 and 10.5
 1881.4 69.7 2.17 β 3 n
 1888.7 70.0 2.18 Washburn 4-3
 1889.0 67.2 2.13 Haverford 4-3
 A 5.3 mag. star is 10 secs. f. 4' N.
- No. 13. Hough 44. 1st Munich 4995. 8.6
 $10^{\text{h}} 6^{\text{m}} 28^{\text{s}}$ — $5^{\circ} 41'.0$
 Both 9.4
 1884.3 10.9 0.41 Hough 2-1 n
- No. 14. Innes 13. Lac. 4203. 6.4
 $10^{\text{h}} 7^{\text{m}} 2^{\text{s}}$ — $68^{\circ} 11'.5$
 7.1 and 7.2, both white
 1896.3 330. \pm 1. \pm Innes 3 n
 A 10.5 star is $30'' \pm$ N.f., and with Lac. 4203,
 makes the old pair h 4295.
- No. 15. Σ 1416. Lal. 19,868. 8.0
 $10^{\text{h}} 7^{\text{m}} 27^{\text{s}}$ — $15^{\circ} 35'.5$
 8.4 and 9.4
 1827.7 275.8 11.3 Σ 2 n
 1868.0 276.9 11.3 Dembowski 4
 1880.9 276.2 11.6 β 3
 The chief star has been suspected of variability,
 6.7 to 9.0, period about 50 years.
- No. 16. Sellors 17. Lac. 4225. 7.7
 $10^{\text{h}} 10^{\text{m}} 1^{\text{s}}$ — $64^{\circ} 40'.3$
Comes = 12.3
 1895.4 338.5 3.15 Sellors 3 n
- No. 17. Howe 13. C. Z. 10 h. 686. 8.3
 $10^{\text{h}} 10^{\text{m}} 17^{\text{s}}$ — $36^{\circ} 9'.2$
 8.8 and 9.3
 1877.3 300.8 2.95 Cinc. 1 n
 1885.2 306.6 3.36 ,, 1
 Also noted as a double star at Cordoba.
 A fainter and wider pair, Howe 12, is 4" pr. a
 little N.
- No. 18. h. 4310. Lac. 4297. ^{MAG.} 7.3
 $10^{\text{h}} 10^{\text{m}} 21^{\text{s}}$ — $83^{\circ} 35'.8$
 7.8 and 8.3, both yellow
 1837.2 279.2 3. \pm h 1 n
 1871.2 273.8 3.90 Russell 1
 1881.4 270.4 2.99 Hargrave 1
 Some change shewn.
- No. 19. Washburn 100. B.D.—17°. 8.9
 3100.
 $10^{\text{h}} 10^{\text{m}} 55^{\text{s}}$ — $17^{\circ} 55'.4$
 9.2 and 10.5
 1888.9 199.6 1.43 Washburn 3 n
- No. 20. Washburn 101. Lal. 19,986. 6.6
 $10^{\text{h}} 12^{\text{m}} 1^{\text{s}}$ — $20^{\circ} 10'.2$
 6.7 and 9.8
 1888.7 113.8 1.49 Washburn 2 n
 1898.3 115.0 1.42 See 1
- No. 21. Russell 139. Lac. 4248. 7.2
 $10^{\text{h}} 12^{\text{m}} 20^{\text{s}}$ — $66^{\circ} 47'.3$
 7.4 and 9.2, both yellow
 1880.5 331.7 2.75 Russell 1 n
 C. P. D. mag. = 8.5.
 No material for a determination of p.m.
 C. Z. 10 h. 864, mag. 8.7, is somewhat S.pr.
- No. 22. Innes 206. Lal. 20,048. 8.5
 $10^{\text{h}} 14^{\text{m}} 23^{\text{s}}$ — $22^{\circ} 39'.7$
 9.0 and 9.5
 1897.4 320. \pm 0.9 \pm Innes 1 n
 Lal. 20,040, mag. 7.5, is 16 secs. pr.
- No. 23. Innes 207. C. Z. 10 h. 989. 8.5
 $10^{\text{h}} 14^{\text{m}} 27^{\text{s}}$ — $32^{\circ} 42'.8$
 9.0 and 9.5
 1897.4 330. \pm 2. \pm Innes 2 n
 The N.f. and brightest star of a small triangle.

SOUTHERN DOUBLE STARS.

10hrs.

91A

No. 24. Washburn 102. Porter
1870. 9.0
10^h 15^m 11^s — 20° 50'.5.

9.4 and 10.4

1888.9 173.3 1.34 Washburn 3 n

No. 25. Russell 140. Bris. 2946. 7.6
10^h 15^m 21^s — 55° 31'.2.

8.0 and 9.0

1877.3 279.7 4.46 C. G. A. 5 n
1881.5 277.1 2.88 Russell 1
1897.1 282.7 3.19 See 3

No. 26. Washburn 103. 1st
Munich 5180. 8.0
10^h 15^m 45^s — 15° 50'.8.

8.5 and 9.2

1888.6 336.9 1.58 Washburn 3 n

No. 27. h. 4306. Lac. 4268. 6.3
10^h 15^m 59^s — 64° 10'.5.

Both = 7.1, yellow

1836.7 139.3 1.34 h 3 n
1873.2 137.8 2.88 Russell 1
1886.2 137.8 2.19 Tebbutt 2

No. 28. Schjellerup, 16. W.B.
10 h. 242. 7.7
10^h 16^m 46^s — 9° 16'.1.

8.2 and 8.7

1867.1 187.9 0.9 ± Harvard 1 n
1872.8 185.1 1.81 Dunér 2
1875.2 180.5 1.76 Dembowski 4
1878.2 179.6 1.66 Cinc. 2
1888.2 177.8 1.86 Haverford 3-2

Found in 1863.

Also registered as β 25.

Some change.

No. 29. β 219. U.A. 214 Hydrae. 6.7
10^h 16^m 52^s — 22° 1'.5.

6.9 and 8.6

1876.1 188.6 2.33 Cinc. 3 n
1892.2 188.1 2.14 Haverford 4
1892.3 186.4 2.07 β 3

A wide pair, h 4303, is about 4' S.pr.

No. 30. Russell 141. Lac. 4280. 7.7
10^h 17^m 11^s — 66° 39'.9.

8.1 and 9.1

1880.3 37.1 2.93 Russell 1 n

The co-ordinates published with the above measure are considerably in error.

No. 31. Rumker 13. J Velorum. 5.0
10^h 17^m 11^s — 55° 32'.4.

Comes = 9.0

1836.9 103.5 7.04 h 2 n
1848.1 103.4 7.26 Jacob 1
1887.2 102.9 6.97 Pollock 1
1897.1 105.2 7.20 See 2

Also known as T Velorum.

The p.m. is insensible.

Another star, 9.0 mag., Gilliss 1242, is 37" S.pr.

No. 32. β 912. W.B. 10 h. 253. 8.7
10^h 17^m 25^s — 13° 10'.3.

Comes = 12.0

1879.2 106.3 0.95 β 2 n
1880.2 101.4 1. ± Cinc. 1

No. 33. h. 4311. Lal. 20,158. 6.8
10^h 18^m 24^s — 12° 52'.2.

Comes = 10.4

1836.2 122.3 4. ± h 1 n
1868.8 126.6 3.69 Harvard 2-1
1877.7 126.8 3.98 Cinc. 2
1886.1 126.0 3.92 L. McC. 2

92A

10 hrs.

REFERENCE CATALOGUE OF

No. 34. Washburn 105. Ö.A. 10,588. 8.8
 $10^{\text{h}} 18^{\text{m}} 58^{\text{s}}$ — $19^{\circ} 24'.6$.

9.2 and 10.2

1888.9 116.6 0.91 Washburn 3 n

No. 35. Cordoba [23]. C. Z. 10 h. 1352. 7.8
 $10^{\text{h}} 19^{\text{m}} 8^{\text{s}}$ — $65^{\circ} 11'.2$.

8.0 and 10.0

1897. $170. \pm 4. \pm$ Innes 1 n
 See also rejected stars, Russell 142.

No. 36. Innes 208. Bris. 2987. 7.5
 $10^{\text{h}} 19^{\text{m}} 34^{\text{s}}$ — $43^{\circ} 44'.2$.

7.7 and 9.9, both white

1897.3 $30. \pm 1. \pm$ Innes 1 n

No. 37. Innes 209. C. Z. 10 h. 1393. 7.5
 $10^{\text{h}} 20^{\text{m}} 2^{\text{s}}$ — $38^{\circ} 4'.3$.

8.1 and 8.5

1897.4 $140. \pm 1. \pm$ Innes 1 n
 Followed at 57 secs. $5\frac{1}{2}'$ S. by C. Z. 10 h. 1467,
 mag. 9.4, and C. Z. 10 h. 1475, mag. 8.7.

No. 38. Innes 210. C. Z. 10 h. 1612. 7.7
 $10^{\text{h}} 23^{\text{m}} 24^{\text{s}}$ — $38^{\circ} 11'.5$.

7.8 and 10.3

1897.4 $250. \pm 1. \pm$ Innes 1 n
 C. Z. 10 h. 1613, mag. 9.0, is closely N.f.

No. 39. Innes 73. Lac. 4315. 7.2
 $10^{\text{h}} 24^{\text{m}} 52^{\text{s}}$ — $48^{\circ} 28'.6$.

Comes = 10.0

1896.5 S.pr. $3. \pm$ Innes 1 n
 1897.2 218.0 5.27 See 1
 Another comes, 10.5 mag., is 20' N.f.
 Cape 1880, 5741, mag. 7.8, is 8 secs. f. 3' N.

No. 40. H. N. 50. δ Antliae. 5.8
 $10^{\text{h}} 24^{\text{m}} 59^{\text{s}}$ — $30^{\circ} 5'.7$.

Comes = 9.2

1787.2 $230. \pm$ H 1 n
 1856.2 226.7 10.9 Jacob 3
 1877.1 226.7 10.7 Howe 1
 1890.2 226.0 10.7 Washburn 1
 1897.3 226.2 11.3 See 2

The p.m. is very small.

Also registered as h 4321.

Other measures.

No. 41. Russell 149. C. Z. 10 h. 1819. 8.6
 $10^{\text{h}} 25^{\text{m}} 43^{\text{s}}$ — $66^{\circ} 11'.1$.

9.2 red, and 10.0

1880.2 127.6 3.77 C. G. A. 3 n
 1880.3 134.4 4.20 Russell 1
 1883.3 137.0 3.21 Hargrave 1

The Dec. given in the *Sydney Catalogue* is
 erroneous.

No. 42. Σ 1441. Bradley 1462. 6.4
 $10^{\text{h}} 25^{\text{m}} 58^{\text{s}}$ — $7^{\circ} 7'.4$.

Comes = 9.9

1830.1 169.3 2.59 Σ 7 n
 1858.3 168.0 3.13 Morton 1
 1867.2 166.4 2.77 Dembowski 3
 1878.8 167.7 2.41 Cinc. 2

Common p.m. of about $0''.08$.

No. 43. β 1073. Lal. 20,428. 7.2
 $10^{\text{h}} 27^{\text{m}} 27^{\text{s}}$ — $5^{\circ} 33'.5$.

Comes = 11.7

1880.3 46.9 3.02 β 3 n

<p>No. 44. h. 4329. Lac. 4336. ^{MAG.} 5.1 White 10^h 27^m 28^s — 53° 12'.4 Cape 1880, 5768 = 7.9 red.</p> <table border="0"> <tr><td>1837.1</td><td>17.4</td><td>17.5</td><td>h</td><td>2 n</td></tr> <tr><td>1881.5</td><td>71.7</td><td>23.4</td><td>Hargrave</td><td>1</td></tr> </table> <p>The chief star was formerly called Y Velorum. The change is due to the p.m. of the chief star, viz., 0".44 towards 297°.5. See:— 1895. Innes, R. T. A. "Proper Motion," <i>M. N. R. A. S.</i>, vol. lvi. p. 72.</p>	1837.1	17.4	17.5	h	2 n	1881.5	71.7	23.4	Hargrave	1	<p>No. 49. Cape 10. Lac. 4338. ^{MAG.} 7.7 10^h 27^m 50^s — 51° 43'.0 8.1 and 8.9</p> <table border="0"> <tr><td>1881.4</td><td>346.8</td><td>1".87</td><td>Russell</td><td>1 n</td></tr> <tr><td>1891.3</td><td>349.0</td><td>2. ±</td><td>Sellors</td><td>1</td></tr> <tr><td>1897.2</td><td>343.0</td><td>1.93</td><td>See</td><td>2</td></tr> </table> <p>Discovered independently as Russell 150. Found at the Cape in 1876, see <i>Cape Meridian Observations</i> published in 1879.</p>	1881.4	346.8	1".87	Russell	1 n	1891.3	349.0	2. ±	Sellors	1	1897.2	343.0	1.93	See	2
1837.1	17.4	17.5	h	2 n																						
1881.5	71.7	23.4	Hargrave	1																						
1881.4	346.8	1".87	Russell	1 n																						
1891.3	349.0	2. ±	Sellors	1																						
1897.2	343.0	1.93	See	2																						
<p>No. 45. Innes 174. C. Z. 10 h. 1936. 8.4 10^h 27^m 34^s — 61° 3'.8 8.8 and 9.7</p> <table border="0"> <tr><td>1897.1</td><td>70. ±</td><td>0.7 ±</td><td>Innes</td><td>1 n</td></tr> </table> <p>Closely S.pr., a coarse double star.</p>	1897.1	70. ±	0.7 ±	Innes	1 n	<p>No. 50. Russell 151. 1st Melb. 526. 8.0 10^h 28^m 12^s — 68° 23'.0 8.2 and 9.9</p> <table border="0"> <tr><td>1880.4</td><td>191.7</td><td>3".47</td><td>Russell</td><td>1 n</td></tr> </table> <p>Both stars observed on the meridian at Cordoba in 1879.</p>	1880.4	191.7	3".47	Russell	1 n															
1897.1	70. ±	0.7 ±	Innes	1 n																						
1880.4	191.7	3".47	Russell	1 n																						
<p>No. 46. Σ 1445. Göttingen 3475. 8.4 10^h 27^m 36^s — 0° 21'.0 8.6 and 10.7</p> <table border="0"> <tr><td>1827.6</td><td>167.4</td><td>2.42</td><td>Σ</td><td>3 n</td></tr> <tr><td>1864.9</td><td>159.4</td><td>2.95</td><td>Dembowski</td><td>3</td></tr> <tr><td>1880.1</td><td>161.7</td><td>2.81</td><td>β</td><td>3</td></tr> <tr><td>1880.5</td><td>162.0</td><td>2.58</td><td>Pritchett</td><td>4</td></tr> </table> <p>The first angle seems 10° too large.</p>	1827.6	167.4	2.42	Σ	3 n	1864.9	159.4	2.95	Dembowski	3	1880.1	161.7	2.81	β	3	1880.5	162.0	2.58	Pritchett	4	<p>No. 51. Innes 32. C. P. D.—61°, 1702. 9.0 10^h 28^m 15^s — 61° 16'.8 Comes = 11.0</p> <table border="0"> <tr><td>1895.3</td><td>N.</td><td>2". ±</td><td>Innes</td><td>1 n</td></tr> </table> <p>About 8' S.pr. <i>p</i> Carinae, mag. 3.6.</p>	1895.3	N.	2". ±	Innes	1 n
1827.6	167.4	2.42	Σ	3 n																						
1864.9	159.4	2.95	Dembowski	3																						
1880.1	161.7	2.81	β	3																						
1880.5	162.0	2.58	Pritchett	4																						
1895.3	N.	2". ±	Innes	1 n																						
<p>No. 47. Innes 33. C.P.D.—60°, 1950. 9.3 10^h 27^m 41^s — 61° 2'.8 Comes = 10.4</p> <table border="0"> <tr><td>1895.3</td><td>S.f.</td><td>3". ±</td><td>Innes</td><td>1 n</td></tr> </table> <p>N.f. C. Z. 10 h. 1927, mag. 8.0, and C. Z. 10 h. 1936, mag. 8.4, the latter double.</p>	1895.3	S.f.	3". ±	Innes	1 n	<p>No. 52. Washburn 106. Gilliss 1281. 7.5 10^h 29^m 22^s — 54° 51'.9 8.2 and 8.4, both bluish</p> <table border="0"> <tr><td>1892.3</td><td>247.5</td><td>1".17</td><td>Sellors</td><td>1 n</td></tr> </table> <p>Lac. 4350, yellow, mag. 7.1, is about 26" S. Several faint stars pr.</p>	1892.3	247.5	1".17	Sellors	1 n															
1895.3	S.f.	3". ±	Innes	1 n																						
1892.3	247.5	1".17	Sellors	1 n																						
<p>No. 48. Piazzzi. s Velorum. 5.8 10^h 27^m 41^s — 44° 33'.1 6.4 and 6.7</p> <table border="0"> <tr><td>1836.6</td><td>217.8</td><td>13.8</td><td>h</td><td>4 n</td></tr> <tr><td>1882.9</td><td>218.5</td><td>13.1</td><td>Tebbutt</td><td>3</td></tr> <tr><td>1897.1</td><td>217.9</td><td>13.6</td><td>See</td><td>2</td></tr> </table> <p>The p.m. is very small. Also called Dunlop 88.</p>	1836.6	217.8	13.8	h	4 n	1882.9	218.5	13.1	Tebbutt	3	1897.1	217.9	13.6	See	2	<p>No. 53. Washburn 107. B.D.—17°, 3186. 9.4 10^h 30^m 39^s — 17° 25'.1 9.9 and 10.4</p> <table border="0"> <tr><td>1888.9</td><td>309.0</td><td>1".60</td><td>Washburn</td><td>3 n</td></tr> </table> <p>About 39' N. and a little pr., a 6.6 mag. star.</p>	1888.9	309.0	1".60	Washburn	3 n					
1836.6	217.8	13.8	h	4 n																						
1882.9	218.5	13.1	Tebbutt	3																						
1897.1	217.9	13.6	See	2																						
1888.9	309.0	1".60	Washburn	3 n																						
<p>No. 54. Cordoba [24]. Bris. 3093. 7.4 10^h 31^m 15^s — 57° 9'.6 Comes = 10.2</p> <table border="0"> <tr><td>1878</td><td>S.pr.</td><td>6".</td><td>C.G.A.</td><td>2 n</td></tr> </table>	1878	S.pr.	6".	C.G.A.	2 n																					
1878	S.pr.	6".	C.G.A.	2 n																						

94A

10 hrs.

REFERENCE CATALOGUE OF

No. 55. β 411. Lac. 4360. MAG. 6.1
 $10^{\text{h}} 31^{\text{m}} 21^{\text{s}}$ — $26^{\circ} 9'.3$.

6.3 and 7.9

1877.3	295.0	1.36	Cinc.	1 n
1879.3	294.2	1.31	"	1
1892.3	290.6	1.29	Haverford	4
1892.3	288.3	1.08	β	3
1893.3	287.7	1.00	Sellors	2
1898.2	279.9	0.87	See	1

Angle and distance decreasing.

No. 56. β 1075. Bradley 1474. MAG. 6.3
 $10^{\text{h}} 31^{\text{m}} 24^{\text{s}}$ — $15^{\circ} 49'.6$.

Comes = 13.2

1889.1 277.1 3.03 β 3 n
 The chief star has also been called ϕ_2 or ϕ_3 Hydrae.

No. 57. Innes 74. Bris. 3103. MAG. 8.5
 $10^{\text{h}} 31^{\text{m}} 33^{\text{s}}$ — $63^{\circ} 36'.7$.

8.7 and 10.3

1896.3 S.pr. 2.± Innes 1 n
 With Lac. 4376, mag. 8.0, about $30''$ S.pr., this makes up the old pair Dunlop 93.

No. 58. Innes 175. Cape 1880, 5821. MAG. 7.7
 $10^{\text{h}} 32^{\text{m}} 5^{\text{s}}$ — $47^{\circ} 19'.9$.

Comes = 10.5

1897.1 160.± 2.± Innes 1 n
 Cape 1880, 5824, mag. 7.8, is closely S.f.

No. 59. λ 119. ρ Velorum. MAG. 4.0
 $10^{\text{h}} 33^{\text{m}} 6^{\text{s}}$ — $47^{\circ} 42'.4$.

4.5 and 5.0, both yellow

1897.06	268.9	0.47	See	3 n
1897.08	261.4	0.66	Cogshall	1

This fine system has a common p.m. of $0''.177$ towards $262^{\circ}.9$.

C. P. D. mag. = 5.7.

No. 60. Cordoba. C. Z. 10 h. 2403. MAG. 9.0
 $10^{\text{h}} 34^{\text{m}} 10^{\text{s}}$ — $64^{\circ} 51'.2$.

Both = 9.8

1899.2 4 Innes 1 n

Cordoba has also noted another small pair in this field. It is $20'$ N.f. = C. Z. 10 h. 2569, and has been registered as Innes 75 in error.

No. 61. Washburn 108. Ö.A. 10,785. MAG. 8.4
 $10^{\text{h}} 34^{\text{m}} 16^{\text{s}}$ — $17^{\circ} 3'.3$.

8.8 and 9.8

1888.6	21.5	1.04	Washburn	3 n
1892.8	24.7	0.68	Hough	2

Also registered as Hough 373.

Ö.A. 10,784, mag. 9.1, is $49''$ S.pr.

No. 62. Dunlop 94. ι_2 Carinae. MAG. 4.7
 Yellow

 $10^{\text{h}} 34^{\text{m}} 57^{\text{s}}$ — $58^{\circ} 39'.7$.*Comes* = 7.5 blue

1836.7	21.4	15.2	<i>h</i>	2 n
1851.3	20.5	15.0	Jacob	2
1871.4	20.0	14.7	Russell	2
1897.1	19.0	15.2	See	2

The p.m. of the chief star is $0''.02$ towards 180° .Lac. 4401, mag. 6.8, is $22'$ N.f. and has a *comes* 9th mag. $19''$ away, first noted by Gilliss, but also registered as Russell 153. On the Cape Photo Plates another but very much fainter *comes* is seen in the opposite direction.

No. 63. *h*. 4339. Anon. MAG. 10.7
 $10^{\text{h}} 35^{\text{m}} 14^{\text{s}}$ — $12^{\circ} 52'.8$.

Both = 11.5

1830.4 89.3 3.± *h* 1 nIncluded on account of proximity to 1st Munich 5602, an 8.6 mag star ($30''$ S.pr.).

No. 64. Russell 152. Lac. 4409. ^{MAG.} 7.5
 $10^{\text{h}} 35^{\text{m}} 22^{\text{s}}$ — $63^{\circ} 58'.6$.

7.9 and 9.0

1874.3 6.8 3.02 Russell 1 n
h 4343, two 10th mag. stars 3" apart, is near this pair.

No. 65. Harvard 128. Lal. 20,639 9.0
 $10^{\text{h}} 35^{\text{m}} 59^{\text{s}}$ — $12^{\circ} 34'.3$.

9.3 and 10.6

1869.7 257.4 4.03 Harvard 2 n
 Lal. 20,640, mag. 8.0, is closely S.f.

No. 66. Cordoba [25]. C. Z. 10 h. 2704. 8.5
 $10^{\text{h}} 38^{\text{m}} 10^{\text{s}}$ — $44^{\circ} 44'.2$.

9.0 and 9.5

1898.2 230. ± 2. ± Innes 1 n
 The brightest of a small group.

No. 67. Washburn 109. Ö.A. 10,830. 9.1
 $10^{\text{h}} 38^{\text{m}} 19^{\text{s}}$ — $20^{\circ} 30'.1$.

9.8 and 9.9

1888.9 141.8 1.86 Washburn 3 n
 1898.3 141.7 2.40 See 1

No. 68. Russell 154. C. Z. 10 h. 2821. 9.0
 $10^{\text{h}} 39^{\text{m}} 42^{\text{s}}$ — $63^{\circ} 39'.7$.

9.6 and 9.9

1880.4 305.6 2.82 Russell 2 n

No. 69. h. 4356. Lac. 4449. 7.2
 $10^{\text{h}} 40^{\text{m}} 5^{\text{s}}$ — $59^{\circ} 1'.4$.

7.4 yellow, and 10.4 bluish

1836.7 148.6 2.3 ± *h* 3 n
 1879.4 145.5 2.19 Hargrave 1
 1897.2 149.1 2.83 See 3

Separately observed on the meridian at Cordoba.

In the cluster of stars in the great nebula around η Argûs.

Measures of many wide or faint pairs in this neighbourhood will be found in *h*'s Cape Observations, and more recently Prof. T. J. J. See has measured eighteen objects—see *Monthly Notices R. A. S.*, vol. lvii. No. 7, May 1897.

All the pairs in this region are relatively fixed.

No. 70. h. 4360. Taylor 4852. ^{MAG.} 8.3
 $10^{\text{h}} 40^{\text{m}} 17^{\text{s}}$ — $59^{\circ} 3'.1$.

9.0 and 9.1

1835.7 117.2 2.24 3 n
 1871.2 118.2 1.95 Russell 1
 1879.4 114.0 1.58 Hargrave 1
 1897.2 119.0 1.78 See 3

Bris. 3190, mag. 8.4, is 14" f.

On some of the plates taken at this Observatory the three stars can be clearly distinguished.

No. 71. β 914. Lal. 20,750. 8.0
 $10^{\text{h}} 40^{\text{m}} 45^{\text{s}}$ — $10^{\circ} 20'.4$.

Comes = 12.0

1880.3 338.6 1.30 β 2 n

No. 72. Washburn 110. Ö.A. 10,860. 8.8
 $10^{\text{h}} 40^{\text{m}} 59^{\text{s}}$ — $19^{\circ} 10'.9$.

9.2 and 10.2

1888.3 274.6 2.05 Washburn 3 n
 Ö.A. 10,863, mag. 8.4, is closely N.f., and Lal. 20,776, mag. 7.0, is S.f.

No. 73. Σ 1470. Lal. 20,756. 8.5
 $10^{\text{h}} 41^{\text{m}} 10^{\text{s}}$ — $5^{\circ} 14'.1$.

9.1 and 9.4

1833.0 6.2 1.38 Σ 4 n
 1868.0 6.2 1.18 Dembowski 4-2
 1884.2 10.9 1.19 Cinc. 1
 1893.3 15.1 1.37 Glasenapp 2-1

The angle is increasing.

Other measures.

No. 74. Russell 155. μ Argûs. ^{MAG.} 2.8
Yellow
10^h 42^m 28^s — 48° 53'.5.

Comes = 7.3 green

1880.3	54.6	2.81	Russell	1 n
1889.3	57.7	2.48	Pollock	3
1891.3	54.6	2.5 ±	Sellors	1
1897.1	62.8	2.15	Lowell	4

A most beautiful pair and not too difficult for moderate telescopes, the counterpart of ϵ Bootis, and like most highly coloured pairs, practically fixed.

Common p.m. of $\sigma'.074$ towards 135°.9.

Thought to be a new pair when first measured by Prof. Sec.

No. 75. β 595. B.D.—14°, 3190. 8.5
10^h 43^m 8^s — 14° 25'.9.

8.7 and 10.5

1878.7	16.2	2.16	β	2 n
1880.3	18.1	1.95	Pritchett	2
1885.0	13.0	1.95	Cinc.	4-3

Near Lal. 20,804, mag. 7.2. H. II. 7.4 = Σ 1474, a coarse triple star, is about 18' S.pr.

No. 76. Σ 1476. 40 Sextantis. 6.7
10^h 44^m 13^s — 3° 29'.7.

7.1 and 8.1

1831.0	351.9	2.27	h	1 n
1832.6	353.7	1.89	Σ	3
1859.2	356.8	1.88	Morton	2
1868.8	357.4	1.94	Dembowski	4
1871.3	358.1	2.27	O Σ	1
1875.3	359.1	2.57	Temple Obs.	2
1886.3	1.2	1.93	Cinc.	1
1888.7	359.3	2.29	Haverford	4
1893.3	1.6	2.02	Glaserapp	2-1
1893.4	6.6	1.98	Lewis	1

Small common p.m.

Slow increase in angle.

Other measures.

No. 77. Innes 294. δ_1 Chameleontis. ^{MAG.} 5.5
10^h 44^m 19^s — 79° 56'.4.

6.2 and 6.4, both yellow

1898.1	240. ±	0.6 ±	Innes	2 n
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δ_2 Chameleontis, mag. 4.6, white, is 5' S.f.
The p.m. of δ_1 is
R.A. = -0°.02 Dec. = -0°.04.

No. 78. h . 4373. Cor. D.M.—40°, 6313. 8.9
10^h 44^m 22^s — 40° 54'.8.

8.6 and 9.1

1835.2	226.1	25. ±	h	1 n
1879.4	337.0	12.66	Hargrave	1
1882.3	339.1	10.44	,,	1
1892.5	.....	6.01	Tebbutt	1

Rectilinear motion.

Noted as double in the C. P. D.

No. 79. Russell 161. Lac. 4493. 6.7
10^h 45^m 27^s — 58° 47'.7.

7.1 and 8.1, both yellow

1874.2	256.0	0.50	Russell	1 n
1877.2	259.4	0.78	,,	2
1881.2	260.3	1.17	,,	2
1891.4	254.7	0.91	Sellors	1

In the Proceedings of the Royal Society of New South Wales for 1880 some of the above measures are given, but they differ somewhat from the above figures.

Bris. 3241, mag. 8.5, is N.f.

No. 80. β 111. B.D.—8°, 3023. 9.0
10^h 46^m 10^s — 8° 33'.9.

9.7 and 9.9

1875.2	3.3	3.32	Dembowski	3 n
1880.7	6.3	3.59	β	2
1881.3	6.2	3.51	Pritchett	1
1886.3	3.3	3.54	L. McC.	1
1888.2	5.4	3.51	Haverford	5

SOUTHERN DOUBLE STARS.

10 hrs.

97A

No. 81. λ 125. C. Z. 10 h. 3370. ^{MAG.} 10.0
 $10^{\text{h}} 47^{\text{m}} 18^{\text{s}}$ — $44^{\circ} 33'.4$

10.7 and 10.8

1897.2	198.8	1.80	See	1 n
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No. 82. Hargrave 53. C. Z. 10 h.
 3447. ^{MAG.} 8.0

 $10^{\text{h}} 48^{\text{m}} 21^{\text{s}}$ — $58^{\circ} 12'.9$

8.2 and 10.2

1880.3	217.5	3.78	C. G. A.	4 n
1883.4	216.8	4.06	Hargrave	1
1897.2	218.1	3.59	See	1

No. 83. h. 4383. Lac. 4531. ^{MAG.} 6.1
 $10^{\text{h}} 50^{\text{m}} 25^{\text{s}}$ — $70^{\circ} 11'.3$

6.5 and 7.3

1837.2	285.8	1.42	h	1 n
1872.3	277.4	1.42	Russell	2
1877.3	281.7	1.70	Melbourne	1
1879.4	283.1	1.15	Hargrave	1
1892.4	281.2	1.21	Sellors	2

The p.m. is very small.

No. 84. Innes 306. C. Z. 10 h. 3650. ^{MAG.} 9.0
 $10^{\text{h}} 51^{\text{m}} 27^{\text{s}}$ — $47^{\circ} 2'.5$

9.5 and 10.0

1898.4	100.±	0.9±	Innes	1 n
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Combined mag. in C. P. D. = 8.1 is probably more correct.

No. 85. Hargrave 54. Gilliss P.Z.
 7456. ^{MAG.} 8.8

 $10^{\text{h}} 52^{\text{m}} 16^{\text{s}}$ — $72^{\circ} 56'.6$

Both = 9.6

1883.4	282.3	1.52	Hargrave	1 n
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[Note added 1899.3]. This should be C. Z. 10 h. 3559, mag. 9.0. R. A. = $10^{\text{h}} 49^{\text{m}} 36^{\text{s}}$. Dec. = $-73^{\circ} 2'.2$.

The components are 9.5 and 10.0 mag.

No. 86. Howe 14. C. Z. 10 h. 3781. ^{MAG.} 8.5
 $10^{\text{h}} 53^{\text{m}} 10^{\text{s}}$ — $35^{\circ} 6'.4$

Comes = 9.9

1876.3	160.±	6.±	Howe	1 n
1897.4	150.1	9.30	See	1

The pr. star of a triangle.

No. 87. h. 4393. Lac. 4548. ^{MAG.} 6.8
 $10^{\text{h}} 53^{\text{m}} 49^{\text{s}}$ — $68^{\circ} 30'.2$

7.0 and 9.1

1835.3	131.0	7.10	h	1 n
1879.4	130.8	8.30	Hargrave	2

Separately observed at Cordoba.

No. 88. Innes 211. Piazzini 10 h. 208. ^{MAG.} 5.8
 $10^{\text{h}} 54^{\text{m}} 30^{\text{s}}$ — $33^{\circ} 12'.0$

5.9 and 9.2

1897.3	177.±	1.5±	Innes	2 n
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The p.m. is very small.

A 10.5 mag. is S.f.

No. 89. Σ 1500. Lal. 21,116. ^{MAG.} 7.3
 $10^{\text{h}} 54^{\text{m}} 56^{\text{s}}$ — $2^{\circ} 56'.2$

7.8 and 8.4

1825.2	330.9	1.06	Σ	2 n
1832.1	321.5	0.97	"	4
1856.3	318.4	1.05	Secchi	3
1871.3	317.3	1.53	O Σ	1
1895.3	313.6	1.53	Comstock	2

Many other measures.

Angle decreasing, but the change has become very slow, only about 7° since 1840.

No. 90. Russell 164. Lac. 4556. ^{MAG.} 7.0
 $10^{\text{h}} 55^{\text{m}} 13^{\text{s}}$ — $60^{\circ} 47'.1$

Comes = 11.2 white

1873.3	82.2	4.52	Russell	1 n
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N

98A

10 hrs.

REFERENCE CATALOGUE OF

No. 91. λ 126. Lac. 4551. ^{MAG.} 8.0.
 $10^{\text{h}} 55^{\text{m}} 38^{\text{s}}$ — $42^{\circ} 51'.2$.

8.4 and 9.1

1897.2 170.3 0.72 See 2 n

No. 92. H. I. 77. Lal. 21,178. 8.0
 $10^{\text{h}} 57^{\text{m}} 8^{\text{s}}$ — $15^{\circ} 9'.2$.

8.7 and 8.9, both white

1783.2 7.6 H 1 n
 1876.1 16.2 2.92 Cinc. 2
 1877.3 13.9 2.94 Schiaparelli 1
 1888.5 16.5 2.91 Haverford 3

There are other observations, but one observation a century would probably suffice for many pairs of this class.

No. 93. Innes 212. Lac. 4605. ^{MAG.} 7.0
 $10^{\text{h}} 58^{\text{m}} 5^{\text{s}}$ — $81^{\circ} 1'.3$.

7.7 and 7.8

1897.8 $330. \pm$ $0.75 \pm$ Innes 2 n

No. 94. Howe 15. Lac. 4570. 7.3
 $10^{\text{h}} 58^{\text{m}} 27^{\text{s}}$ — $26^{\circ} 58'.7$.

7.5 and 8.9

1877.1 330.8 2.51 Cinc. 2 n
 1885.3 335.2 2.39 " 1
 1889.2 332.0 2.15 Haverford 1

SOUTHERN DOUBLE STARS.

11hrs.

99A

No. 1. Innes 176. C.P.D.—46°, 5097. 9.0
 11^h 1^m 6^s — 46° 52'.6.

9.1 and 11.0

1897.1 270.° ± 2." ± Innes 1 n

Lac. 4590, mag. 6.8, is 8 secs. f. 2' S.

In the C. P. D., the combined mag. of the double star is 9.6.

No. 2. h. 4409. Piazzzi 10 h. 248. 5.4
 Yellowish

11^h 2^m 39^s — 42° 5'.9.

Comes = 9.1

1837.3	278.0	1.40	h	2 n
1853.4	276.4	2.24	Jacob	8-2
1879.5	272.7	1.80	Hargrave	1
1897.1	270.0	1.94	See	6

No. 3. Innes 295. C.P.D.—60°, 2556. 8.6
 11^h 4^m 22^s — 61° 0'.2.

9.0 and 10.0

1898.1 190.° ± 0.9 ± Innes 1 n

A faint star closely pr.

Bris. 3423, mag. 8.0,* is in the field.

No. 4. Innes 213. Piazzzi 11 h. 3. 8.0
 11^h 5^m 47^s — 32° 1'.3.

8.2 and 9.7

1897.4 135.° ± 1." ± Innes 1 n

No. 5. β 220. Lal. 21,445. 6.2
 11^h 7^m 33^s — 17° 57'.3.

6.7 and 7.2

1874.3	147.7	0.5 ±	β	2 n
1875.3	143.6	0.58	Dembowski	4-2
1877.3	150.8	0.68	Cinc.	1
1878.2	140.0	0.65 ±	"	1
1880.2	143.8*	0.87	"	1
1880.3	151.1	0.68	Pritchett	1
1882.4	144.2	0.6 ±	Schiaparelli	2
1884.1	149.1	0.45	Engelmann	5
1887.3	140.3	0.58	Schiaparelli	3
1889.1	136.1	0.71	Haverford	4-2
1893.4	140.3	0.66	"	2

The angle is probably decreasing.

* Mag. from *C. Zone Catalogue*, the C. G. A. gives 9.5, which is too faint.

No. 6. h. 4414. γ Carinae. 4.7
 11^h 8^m 18^s — 59° 46'.4.

Comes = 10.0

1834.2	279.6	12." ±	h	1 n
1889.3	275.3	21.7	Pollock	2

No. 7. Innes 231. Lac. 4664. 7.3
 11^h 8^m 22^s — 70° 40'.4.

Comes = 10.0

1897.5 350.° ± 2." ± Innes 1 n

No. 8. Russell 165. C.Z. 11 h. 518. 8.0
 11^h 8^m 27^s — 46° 30'.7.

Both = 8.8

1880.3	59.5	3.15	Russell	1 n
1891.3	59.0	2.40	Sellers	1
1897.1	61.7	3.28	See	2

No. 9. β 916. Lal. 21,488. 8.0
 11^h 9^m 4^s — 14° 53'.4.

8.4 and 9.2

1879.1	360.° ±	0.7 ±	β	1 n
1879.3	357.9	0.7 ±	Cinc.	1
1884.8	362.2	0.65 ±	"	2
1888.4	357.7	0.64 ±	Haverford	3
1889.2	360.2	0.88	β	3

Seen by Pritchett independently in 1880.

No. 10. λ 128. Lac. 4667. 6.9
 11^h 10^m 24^s — 38° 55'.9.

Both = 7.7

1897.4 208.1 0.52 See 1 n

No. 11. h. 4421. Lac. 4675. 6.8
 11^h 11^m 16^s — 47° 22'.5.

Comes = 10.0

1835.2 69.4 12." ± h 1 n

Seen at the Sydney Observatory in 1879.

100A

11 hrs.

REFERENCE CATALOGUE OF

No. 12. h. 4423. Lac. 4678. ^{MAG.} 6.4
 11^h 11^m 49^s — 45° 20'.2.

7.0 and 7.3

1836.4	269.2	1.28	<i>h</i>	3 n
1850.3	275.8	1.73	Jacob	2-1
1853.9	274.1	1.97	"	3
1877.4	273.9	2.10	Melbourne	1
1879.9	274.0	1.95	Sydney	2
1889.3	275.0	2.16	Pollock	2

Distance increasing?

C. P. D. mag. = 7.7.

Prof See has measured a star at 60°, 33".

No. 13. β 600. Lal. 21,540. 6.0
 11^h 11^m 54^s — 6° 35'.4.

Comes = 12.4

1878.2	226.4	1.25	β	1 n
1892.2	216.0	1.23	"	2

A 9.2 mag. star 1' S.f. makes, with the chief star, the old pair μ . N. 26, of which the distance is perhaps decreasing:—

1823	67".
1879	61".

No. 14. Russell 163. Lac. 4696. 7.1
 11^h 13^m 24^s — 58° 39'.7.

7.7 and 8.0

1879.3	55.2	1.80	Russell	1 n
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The above place, which differs very considerably from that given by Mr Russell (see *Proc. Roy. Soc. of N.S.W.*, 1884), depends upon an identification made here in 1898.

The double star is apparently unchanged.

No. 15. Russell 168. C. Z. 11 h. 1161. 8.2
 11^h 17^m 43^s — 42° 24'.6.

8.9 and 9.2

1871.4	305.6*	3.20	Russell	1 n
1891.3	309.5*	4. ±	Sellors	1
1897.2	309.4	2.63	See	2

Preceding C. Z. 11 h. 1180, mag. 7.8, yellow.

Seen at Cordoba.

No. 16. λ 129. Lac. 4727. ^{MAG.} 7.1
 11^h 17^m 55^s — 52° 49'.3.

Comes = 11.6

1897.1	4.1	6.76	See	2 n
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No. 17. λ 130. C. Z. 11 h. 1195. 8.5
 11^h 18^m 11^s — 35° 50'.8.

Both = 9.3

1897.4	28.0	0.20	See	1 n
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No. 18. β 26. Lal. 21,697. 8.2
 11^h 18^m 43^s — 9° 52'.4.

8.4 and 10.4

1875.5	70.4	2.80	Dembowski	4 n
1879.3	66.7	2.66	Cinc.	2
1886.3	66.2	2.91	L. McC.	1
1888.7	68.7	2.86	Haverford	2

About 30' N.pr. ϵ Crateris, mag. 5.0.

No. 19. h. 4432. Lac. 4737. 5.4
 11^h 19^m 2^s — 64° 24'.3.

5.6 and 7.4, both yellow

1836.0	288.5	2.37	<i>h</i>	1 n
1872.3	293.3	2.84	Russell	2
1877.4	292.4	2.34	Melbourne	1
1888.3	298.6	2.23	Tebbutt	1
1889.3	296.6	2.34	Pollock	4-3
1890.4	291.8	2.62	Sellors	1

Probably fixed.

The p.m. is very small.

No. 20. Cape 21. C.P.D.—47°, 5008. 9.1
 11^h 19^m 31^s — 47° 25'.4.

Comes = 9.6

1898.3	270. ±	4. ±	Innes	1 n
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Discovered by Mr R. T. Pett at the transit circle.

SOUTHERN DOUBLE STARS.

11 hrs.

101A

No. 21. h. 840. γ Crateris. MAG. 4.2
 11^h 19^m 53^s — 17° 8'.1.

Comes = 10.5

1829.±	105.±	3.±	<i>h</i>	1 n
1877.2	98.3	5.14	Cinc.	4

Common p.m. of 0".133 towards 283°.2.

No. 22. Brisbane. Bris. 3574. MAG. 7.8
 Red

11^h 20^m 21^s — 61° 6'.1.

8.3 and 8.9

1834.2	292.2	4.±	<i>h</i>	1 n
1838.1	296.7	6.38	"	2
1851.3	304.8	4.71	Jacob	2
1854.0	303.7	4.47	"	2
1857.2	308.8	4.37	"	3-1
1879.0	329.6	4.32	C. G. A.	4
1883.4	337.9	2.41	Hargrave	1
1896.4	10.1	2.26	Sellors	3

The R. A. given by Mr Hargrave is 5^m in error.

Probably a case of rectilinear motion, but the observations do not agree very well. Assuming a p.m. in one of the stars of about 0".1, the minimum distance of about 2" would have occurred in 1895.

No. 23. Russell 171. C.P.D.—46°, 5361. MAG. 7.9

11^h 20^m 56^s — 46° 56'.2.

8.0 and 11.0

1880.3	350.9	2.72	Russell	1 n
1894.4	344.9	2.37	Sellors	1

No. 24. Innes 76. Cor. D.M.—30°, 9211. MAG. 9.5

11^h 22^m 23^s — 30° 11'.3.

10.0 and 10.5

1896.3	N.f.	3.±	Innes	1 n
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No. 25. Hargrave 65. Bris. 3589. MAG. 8.8
 11^h 23^m 1^s — 63° 4'.0.

Both = 9.6

1882.9	261.0	4.98	Hargrave	2 n
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No. 26. Dunlop 109. Piazz 11 h. 81. MAG. 5.4
 11^h 23^m 46^s — 42° 7'.4.

5.5 and 8.4, both yellow

1835.3	166.9	12.9	<i>h</i>	2 n
1875.4	167.3	13.3	Sydney	2
1897.2	167.7	13.5	See	3

h suspected that the chief star was double; not confirmed at the Sydney Observatory, where the star is called *h* 4439 erroneously.

The p.m. is inconsiderable.

No. 27. β 601. B.D.—16°, 3258. MAG. 8.8
 11^h 24^m 8^s — 16° 46'.7.

9.2 and 10.2

1878.8	229.6	0.77	β	2 n
1879.7	224.6	0.87	Cinc.	4
1886.2	217.9	.....	L. McC.	1
1886.3	219.9	1.04	Cinc.	1
1888.6	223.2	0.75±	Haverford	2

This pair is 28" N.pr. the 8.8 mag. star B.D. — 16°, 3259, and constitutes with it the old pair β . IV. 112.

No. 28. Jacob [7]. Lac. 4757. MAG. 5.7
 11^h 24^m 40^s — 23° 54'.8.

Comes = 8.0

1847.3	76.8	8.06	Jacob	2 n
1868.2	78.5	8.33	Harvard	1
1876.1	78.8	8.81	Cinc.	1
1880.0	78.5	8.38	"	3

Equal to Harvard 129.

No. 29. h. 4445. α_1 Centauri. MAG. 4.9
 11^h 27^m 8^s — 58° 53'.4.

Comes = 10.5

1834.7	128.0	18.±	<i>h</i>	2 n
1896.8	S.f.	10.±	Innes	2

Registered as a new pair = Innes 77 in error.

α_2 Centauri, mag. 5.3, is 5' S.f., and shares in the small p.m. of α_1 .

C. P. D. mags:— α_1 = 7.2; α_2 = 6.4.

102A

11 hrs.

REFERENCE CATALOGUE OF

No. 30. H. III. 96. N Hydrae. 5.0
 11^h 27^m 19^s — 28° 42'.9.

5.7 and 5.9

1834.5	209.9*	6".±	<i>h</i>	1 n
1857.3	211.7	8.82	Morton	2
1878.6	210.1	8.88	Cinc.	2
1893.3	210.4	8.58	Glasenapp	2
1897.1	209.8	8.88	See	2

Stationary with a common p.m. of 0".182 towards 8°.3.

Also called Dunlop 111.

Other measures.

No. 31. Innes 78. Piazzii 11 h. 105. 5.6
 11^h 28^m 45^s — 40° 2'.1.

6.3 and 6.4, both yellowish

1896.8	91.±	1.1±	Innes	2 n
1897.2	92.6*	1.08	See	1

The duplicity of this star was apparently noted at Arequipa in 1891, as it appears in the list of double stars published in *Harvard Circular*, No. 18, July 1897.

Piazzii 11 h. 101, an orange-coloured star, mag. 6.2, C. P. D. mag. = 7.7, is 49 sec. pr., 9' N.

No. 32. h. 4455. Bradley 1587. 5.9
 Yellow
 11^h 31^m 37^s — 33° 0'.9.

6.0 and 9.0

1836.9	244.9	3.98	<i>h</i>	3 n
1891.3	242.6	3.03	Sellors	1
1893.3	244.4	3.34	Glasenapp	2
1897.4	243.7	3.80	See	4

Also registered as *h* 4463.

Fixed with a common p.m. of 0".188 towards 69°.7.

The *comes* is called "Crimson" in the G.C.A., but when observed here in 1897 it was blue, the chief star being yellow.

C.P.D. combined mag. = 7.0.

Prof. See measures a faint star at 48" f.

No. 33. β 456. Lal. 22,020. 9.0
 11^h 31^m 45^s — 11° 47'.6.

9.6 and 9.9

1877.3	248.2*	0.65	Hall	2 n
1878.2	257.0	0.65±	Cinc.	1
1880.2	255.2	0.7±	,,	1
1892.4	274.2	0.46	β	3
1894.8	274.2	0.26	Washburn	2

Some considerable change and interesting on account of the faintness of the stars.

No. 34. Gilliss 165. Cape 1880, 6464. 7.7
 11^h 31^m 54^s — 60° 20'.5.

8.0 and 9.2

1883.4	4.3	1.67	Hargrave	1 n
1893.4	7.8	1.60	Sellors	1

Also catalogued as Hargrave 69 and Washburn 112.

No. 35. Russell 173. C. Z. 11 h. 2204. 9.0
 11^h 32^m 38^s — 46° 23'.2.

9.4 and 10.4

1881.5	149.8	2.82	Russell	1 n
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No. 36. Σ 1560. Piazzii 11 h. 126. 6.7
 11^h 33^m 18^s — 1° 53'.0.

Comes = 10.3

1831.6	280.6	5.09	Σ	3 n
1879.0	280.5	5.10	Cinc.	3
1880.2	280.1	5.04	β	2

"Unchanged," β.

No. 37. h. 4462. Gilliss P.Z. 8001. 8.7
 11^h 34^m 0^s — 82° 31'.0.

9.1 and 9.8

1836.9	258.7	6".±	<i>h</i>	1 n
1880.4	257.7	4.38	Russell	1

Also registered as Russell 174.

SOUTHERN DOUBLE STARS.

11hrs.

103A

No. 38. h. 4460. Lac. 4832. ^{MAG.} 7.5
 11^h 34^m 25^s — 57° 11'.1.

7.8 and 9.0, both white

1834.9	178.4	10. ±	h	3 n
1876.9	176.6	8.6	Sydney	2
1878.8	181.4	9.8	C.G.A.	3

No. 39. Howe 16. C. Z. 11 h. 2341. 7.5
 11^h 34^m 33^s — 36° 52'.6.

8.2 and 8.3

1879.3	102.8	3.60	Cinc.	1 n
1885.3	102.5	3.32	"	1

Also noted as double at Cordoba.

No. 40. Innes 307. C. Z. 11 h. 2354. 8.5
 11^h 34^m 44^s — 51° 7'.9.

9.2 and 9.3

1898.4	210. ±	0.8 ±	Innes	1 n
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No. 41. β 1078. Lal. 22,102. 6.2
 11^h 34^m 47^s — 13° 54'.8.

Comes = 12.1

1889.3	49.8	8.22	β	3 n
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No. 42. Innes 34. Lac. 4843. 5.1
 11^h 34^m 51^s — 64° 50'.6.

Comes = 11.3

1895.3	340. ±	12. ±	Innes	1 n
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C. P. D. mag. = 6.4.
 Another comes = 10.8 mag. 210°, 15".

No. 43. Innes 232. Lac. 4835. 7.2
 11^h 34^m 59^s — 32° 53'.7.

7.4 and 9.4

1897.6	170. ±	2.5 ±	Innes	1 n
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No. 44. Cape 11. Lac. 4848. ^{MAG.} 7.5
 11^h 35^m 54^s — 62° 0'.8.

8.0 and 8.5

1888.3	219.8	2.78	Pollock	4-3 n
1897.1	214.6	2.93	See	2

Also independently noted as double at Cordoba.

No. 45. Innes 308. C. Z. 11 h. 2470. 8.5
 11^h 36^m 26^s — 49° 38'.9.

9.2 and 9.4

1898.4	140. ±	1. ±	Innes	1 n
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The line bisecting both stars points very nearly to
 Lac. 4854, mag. 8.0, which is 6^s.2 pr., 33" N.

No. 46. h. 4465. Bradley 1597. 5.0
 Red

11^h 36^m 44^s — 31° 56'.6.

Comes = 10.2

1834.3	315. ±	7. ±	h	1 n
1897.4	346.1	26.74	See	1

Combined mag. in the C.P.D. = 7.0.

The chief star has a small p.m.

There are two 8.7 mag. stars in the field, one about
 4' S.f., the other (Piazzi, 11 h. 143) is about 60" N.f.

No. 47. Russell 177. C.P.D.—46°,
 5493. 8.5

11^h 40^m 39^s — 46° 40'.2.

9.0 yellow and 9.7

1880.3	157.6	3.69	Russell	1 n
1882.4	154.0	3.51	Hargrave	1

Discovered a second time at the same observatory,
 and registered as Hargrave 70.

No. 48. Russell 180. C. Z. 11 h. 2817. 9.0
 11^h 41^m 48^s — 52° 36'.4.

9.5 and 10.0

1873.3	180.7	2.65	Russell	1 n
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104A

11 hrs.

REFERENCE CATALOGUE OF

No. 49. λ 135. Lac. 4890. 6.8
 $11^h 42^m 16^s$ — $29^\circ 43'.4$

Both = 7.6

1897.4 $185^\circ \pm$ $0.2 \pm$ See 1 n

No. 50. h. 4475. C. Z. 11 h. 2947. 8.7
 $11^h 43^m 48^s$ — $61^\circ 0'.7$

9.2 yellow, and 9.7 blue

1835.2 305.4^* $2. \pm$ h 1 n

1880.4 $310. \pm$ $3.5 \pm$ Russell 1

1882.5 326.7 5.14 Hargrave 1

Also registered as Russell 181.

The change shewn is very probably due to p.m. in one of the stars.

No. 51. Gilliss 169. Lac. 4919. 7.8
 $11^h 46^m 55^s$ — $64^\circ 2'.4$

8.2 and 9.1

1883.3 230.6 3.53 Hargrave 1 n

1888.7 229.9 3.21 Sydney 3

Also registered as Hargrave 71.

No. 52. Harvard. Lac. 4920. 5.1
 $11^h 46^m 58^s$ — $64^\circ 39'.0$

5.3 and 7.8

1898.1 $170^\circ \pm$ $1.5 \pm$ Innes 1 n

No. 53. λ 137. O.P.D.— 43° , 5582. 8.4
 $11^h 47^m 0^s$ — $43^\circ 24'.1$

8.8 and 9.7

1897.2 347.6 1.22 See 1 n

No. 54. λ 138. C. Z. 11 h. 3192. 8.5
 $11^h 47^m 43^s$ — $48^\circ 6'.5$

8.6 and 11.6

1897.1 173.4 2.20 See 2 n

No. 55. h. 4478. β Hydrae. 4.5
 $11^h 47^m 51^s$ — $33^\circ 21'.1$

5.1 and 5.5

1834.5 338.3 1.87 h 2 n

1836.7 340.4 2.21 „ 2

1838.1 342.2 1.86 „ 1

1847.4 340.2 2.42 Jacob 2

1851.0 341.7 2.07 „ 3

1856.3 341.6 1.75 Secchi 1

1858.1 342.5 1.80 Jacob 3

1877.1 344.6 1.98 Cinc. 1

1878.0 337.9 1.95 Schiaparelli 3-2

1880.2 345.1 1.88 Cinc. 2

1889.4 349.6 1.53 β 3

1897.4 350.1 1.84 See 1

A fine pair in very slow motion.

No. 56. λ 139. C. Z. 11 h. 3295. 8.5
 $11^h 49^m 10^s$ — $37^\circ 2'.6$

Comes = 12.0

1897.4 38.2 0.88 See 1 n

No. 57. Howè 17. Lac. 4932. 6.9
 $11^h 49^m 25^s$ — $37^\circ 11'.7$

7.0 and 9.5

1876.3 $270. \pm$ $1.2 \pm$ Howe 1 n

1897.4 277.5 1.74 See 2

Common p.m. of $0''.284$ towards $280^\circ.6$.

Registered as a new pair, Innes 214, in error.

No. 58. h. 4480. C. Z. 11 h. 3323. 9.0
 $11^h 49^m 36^s$ — $54^\circ 7'.0$

Comes = 12.0

1835.3 185.6 $3. \pm$ h 1 n

The companion was not found when looked for by Mr Russell on one night in 1872. Seen here 1899.2, mags. 9.0 and 9.7; also seen at Cordoba.

SOUTHERN DOUBLE STARS.

11 hrs.

105A

No. 59. Innes 79. C. Z. 11 h. 3331. 7.8
 11^h 49^m 46^s — 41° 50'.2.

Both = 8.6

1896.5 0.8 ± Innes 1 n
 C. Z. 11 h. 3342, mag. 8.3, is 12 secs. f. 3' N.

No. 60. Washburn 114. Lac. 4936. 7.0
 11^h 49^m 57^s — 55° 32'.0.

7.5 and 8.0

1882 230. ± 2. ± Washburn 1 n
 1887.4 206.6 1.82 Pollock 3-2
 1895.4 202.6 1.77 Sellors 3
 1897.1 198.5 2.14 See 2

The change shown seems considerable.

No. 61. Innes 80. C. Z. 11 h. 3367. 7.5
 11^h 50^m 20^s — 41° 20'.8.

Both = 2.3

1896.5 N.pr. 2. ± Innes 1 n

No. 62. λ 140. Lac. 4943. 6.6
 11^h 51^m 42^s — 46° 31'.0.

6.8 and 8.8

1897.1 198.5 0.96 See 2 n

No 63. h. 4481. Lal. 22,513. 7.2
 11^h 52^m 12^s — 21° 58'.8.

7.8 blue, and 8.1 white

1836.3 198.3 3. ± h 1 n
 1876.0 196.1 3.51 Cinc. 2
 1885.2 196.7 3.21 „ 2
 1893.3 197.8 3.32 Glasenapp 2
 1897.3 198.0 3.28 Scott 2

Fixed.

Other measures.

No. 64. h. 4484. Lac. 4957. 6.9
 11^h 53^m 16^s — 40° 23'.5.

Comes = 11.0

1838.1 300.6 1.5 ± h 1 n
 1891.4 304.4 2.5 ± Sellors 1
 1897.1 309.6 3.41 See 1

Also registered as λ 141.

C. P. D. mag. = 7.9.

No. 65. Sellors 24. C. Z. 11 h. 3569. 8.7
 11^h 53^m 24^s — 47° 17'.7.

9.4 and 9.5

1896.3 177.4 1.87 Sellors 3 n
 Lac. 4958, mag. 6.9, is S.pr.

No. 66. h. 4486. ε Chameleontis. 5.1
 11^h 54^m 39^s — 77° 39'.9.

5.6 and 6.3

1836.1 178.3 1.62 h 2 n
 1872.4 179.0 1.47 Russell 1
 1874.3 180.2 1.88 „ 1
 1890.4 186.5 2.06 Sellors 1

A fine pair in very slow motion.

Common p.m. = 0".055 towards 255°.3.

On 1872.2 Mr Russell estimated the mags. of the two stars as 6.0 and 10.0 respectively.

No. 67. β 1079. Lal. 22,586. 6.2
 11^h 55^m 35^s — 21° 16'.8. Reddish

Comes = 13.3

1889.3 147.9 11.7 β 3 n
 Combined C. P. D. mag. = 7.0.

No. 68. β 457. Ö.A. 11,836. 8.2
 11^h 56^m 16^s — 20° 58'.4.

8.4 and 10.4

1877.4 84.3 0.89 Hall 2 n
 1884.3 85.7 1.05 Cinc. 1
 1886.3 81.3 1.18 L. McC. 1

0

106A

11 hrs.

REFERENCE CATALOGUE OF

No. 69. Innes 215. Lac. 4979. ^{MAG.} 6.9
 11^h 56^m 41^s — 34° 5'.6.

7.1 and 9.1

1897.3 250. ± 0.85 ± Innes 2 n
 1897.4 237.4 0.86 See 1

Also registered as λ 142.

No. 70. h. 4490. Lac. 4991. 5.9
 11^h 57^m 20^s — 85° 4'.5.

6.0 yellow, and 9.0 blue

1837.2 143.2 25. ± $\frac{1}{2}$ 2 n
 1871.4 144.1 25.7 Russell 1
 1879.4 145.5 25.1 Hargrave 1

The *comes* is Cape 1840, 1534.

The p.m. of the chief star is about 0".06 towards 260°.

No. 71. Σ 1593. W.B. 11 h. 959. 8.0
 11^h 58^m 25^s — 1° 53'.4.

8.7 and 8.8

1829.3 18.2 1.43 Σ 3 n
 1856.4 26.6 1.08 Secchi 1

1866.6 18.3* 1.33 Dembowski 3-2
 1880.3 18.7 1.34 Cinc. 1
 1880.4 23.6 1.49 Pritchett 4
 1885.3 15.8 1.86 L. McC. 1
 1893.3 20.1* 1.14 Glasenapp 4-1

Probably fixed.

There is a 13th mag. *comes* 53" N.

Other measures.

No. 72. λ 143. Lac. 4993. ^{MAG.} 6.9
 11^h 58^m 33^s — 38° 27'.0.

7.5 and 7.9

1897.2 225.4 0.72 See 1 n

No. 73. Washburn 115. Bris. 3895. 8.3
 11^h 58^m 39^s — 57° 11'.1.

8.7 and 9.7

1882 240. ± 1.5 ± Washburn 1 n

SOUTHERN DOUBLE STARS.

12hrs.

107A

No. 1. h. 4495. Taylor 5548. ^{MAG.} 6.8
 12^h 0^m 57^s — 32° 23'.9.
Comes = 9.9

1836.2	313.8	6.21	<i>h</i>	1 n
1852.2	315.7	6.84	Jacob	2
1877.1	315.7	6.69	Cinc.	1
1889.2	314.2	6.60	Haverford	2
1893.4	317.1	6.31	Glasenapp	1
1897.4	314.8	6.92	See	1

This star may be equal to Lac. 5015, Lac. 5022,
 or Bris. 3918.
 Prof. See measures a 13th mag. star 26" N.f.

No. 2. h. 4498. Lac. 5020. 5.9
 12^h 1^m 12^s — 65° 9'.1.
 6.1 orange, and 8.1 blue

1835.3	59.9	15.±	<i>h</i>	1 n
1871.3	60.1	8.88	Russell	1
1878.4	55.7	9.05	C. G. A.	3

C. P. D. mag. = 7.1.

No. 3. Harvard. η Crucis. 4.3
 12^h 1^m 40^s — 64° 3'.3.
 Two *comites* within 30". See *Harvard Circular*,
 No. 18.
 A 10th mag. star at 30" \pm has been measured as *h*
 4501. As seen with the 7-inch Cape Refractor, there
 is a suspicion of duplicity about the chief star.

No. 4. λ —, δ Centauri. 2.8
 12^h 3^m 10^s — 50° 9'.9.
Comes = 13.8

1897	120.±	6.±	See	n
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"Needs Confirmation."
 The p.m. is 0".057 towards 248°.3.
 Not in Prof. See's later lists.

No. 5. β 412. Lal. 22,722. 7.8
 12^h 3^m 13^s — 18° 1'.2.
 8.2 and 8.9

1877.8	163.0	2.16	Dembowski	2 n
1878.3	165.7	2.52	Cinc.	2
1886.3	160.2	1.77	L. McC.	1

No. 6. Hargrave 74. C.G.A. 16,592. ^{MAG.} 7.5
 12^h 4^m 8^s — 63° 15'.8.
 7.7 red, and 9.0

1883.5	165.4	1.54	Hargrave	1 n
1894.4	165.5	2.00	Sellers	1

The middle and brightest of three stars nearly in
 a line.
 Noted as double in the C. P. D.

No. 7. Σ 1604. Lal. 22,798. 7.0
 12^h 4^m 18^s — 11° 17'.7.
 7.3 and 8.6

1832.0	93.3	12.0	Σ	3 n
1869.8	91.6	11.4	Dunér	2
1892.4	91.5	10.7	β	3

Common p.m. of 0".327 towards 121°.3 by which
 this pair is passing Lal. 22,803, mag. 9.0.
 See:—
 1892. Burnham, S. W., *Astronomy and Astro-
 physics*, pp. 870-872.

No. 8. Innes 216. Bris. 3942. 7.5
 12^h 4^m 34^s — 51° 13'.6.
 7.7 and 9.2

1897.3	40.±	1.±	Innes	1 n
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Near Russell 192 and δ Centauri.

No. 9. Jacob [8]. Piazzini 12 h. 247. 6.4
 12^h 4^m 52^s — 34° 8'.8.
 6.4 and 8.8

1848.0	21.5	3.17	Jacob	1 n
1877.1	18.3	2.72	Cinc.	1
1885.2	20.8	3.25	"	2
1887.4	20.8	3.07	Pollock	2
1891.3	20.3	2.47	Sellers	1

Noted as double at Melbourne, and also registered
 as Howe 18.
 At Arequipa two *comes* within 30" are noted. See
Harvard Circular, No. 18.

108A

12hrs.

REFERENCE CATALOGUE OF

No. 10. Russell 191. C. Z. 12 h. 248. 9.0
 12^h 5^m 20^s — 60° 25'.0.

Comes = 10.0

1873.3	212.3	4.33	Russell	1 n
1880.4	209.6	3.87	"	1
1889.3	212.6	3.24	Pollock	2

In the *Proc. of the Roy. Soc. of N.S.W.* the angle for 1880.4 is given as 210°.6.

The companion was also noted at Cordoba.

No. 11. λ 145. Lac. 5045. 6.4
 12^h 5^m 22^s — 37° 18'.8.

6.6 and 8.6

1897.4	49.1	0.7 ±	See	1 n
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No. 12. λ 146. Bris. 3946. 7.4
 12^h 5^m 26^s — 36° 16'.7.

Comes = 12.2

1897.4	58.1	0.66	See	1 n
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No. 13. Russell 192. Bris. 3950. 8.0
 12^h 6^m 1^s — 51° 39'.7.

8.3 and 10.3

1895.4	98.9	2.92	Sellors	3 n
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Noted as double at Cordoba in 1875, and also registered as Innes 14.

A somewhat similar pair 12^m f.

No. 14. Lalande 94. Lal. 22,863. 7.3
 12^h 6^m 15^s — 16° 14'.0.

Comes = 9.0

1877.7	280.7	6.88	Cinc.	3-2 n
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Also registered as South 634.

No. 15. h. 4505. Piazz12 h. 5. 7.9
 12^h 6^m 32^s — 30° 2'.7.

Comes = 9.9

1834.9	270.8	12. ±	h	2 n
1882.3	270.7	12. ±	Cinc.	1

No. 16. h. 4506. C. Z. 12 h. 329. 8.5
 12^h 6^m 32^s — 23° 24'.4.

Comes = 10.7

1836.3	15.8	4. ±	h	1 n
1882.3	355.2	3.5	Cinc.	1

The change shown is probably due to p.m. of the chief star.

No. 17. h. 4507. C. P. D.—44°,
 5879-80. 8.1
 12^h 7^m 39^s — 44° 20'.2.

8.5 and 9.3

1836.0	228.1	20. ±	h	3 n
1888.3	223.0	16.5	Tebbutt	2

The C. P. D. mags. are 8.8 and 9.0.

Other measures.

In the first *Sydney Catalogue* Mr Hargrave gives what purports to be a measure of this star—1879.4, 180°.4 or 179°.2, 12''.9—but in a later catalogue the measure is credited to another star here omitted as too wide. This error led Mr Russell to consider h 4507 an "instance of change, real or supposed."

No. 18. Howe 19. Lac. 5066. 6.5
 12^h 8^m 25^s — 33° 14'.2.

6.6 and 9.1

1876.3	175. ±	1.2	Howe	1 n
1897.3	175. ±	1.1 ±	Innes	1
1897.4	167.0	1.08	See	1

In 1891 two *comites* within 30" were noted at Arequipa. See *Harvard Circular*, No. 18.

Also registered as Innes 217.

No. 19. Rumker 14. D Centauri. 5.4
 12^h 8^m 49^s — 45° 10'.1.

5.6 and 7.2, both orange-yellow

1837.2	248.7	4. ±	h	1 n
1875.8	245.2	3.17	Sydney	2
1891.3	243.4	2.90	Sellors	1
1897.1	241.7	3.11	See	4

A pretty pair showing some change.

C. P. D. mag. = 7.5.

SOUTHERN DOUBLE STARS.

12 hrs.

109A

No. 20. λ 147. C. Z. 12 h. 490. ^{MAG.} 7.5
 $12^{\text{h}} 8^{\text{m}} 54^{\text{s}}$ — $36^{\circ} 10'.3$.

8.2 and 8.3

1897.4 20.5 0.19 See 1 n
 Prof. See also measures a 13th mag. star 31" N.pr.

No. 21. Innes 81. C. Z. 12 h. 548. 9.0
 $12^{\text{h}} 9^{\text{m}} 46^{\text{s}}$ — $29^{\circ} 12'.7$.

9.4 and 10.4

1896.4 N. 1.5 ± Innes 1 n

No. 22. Sellors 10. C. Z. 12 h. 551. 7.5
 $12^{\text{h}} 9^{\text{m}} 48^{\text{s}}$ — $35^{\circ} 39'.8$.

7.8 and 8.9

1891.4 244.1 1.5 ± Sellors 1 n
 1895.5 244.9 2.01 " 3
 1897.4 245.6 1.99 See 2

No. 23. Lalande 96. Lal. 22,955 + 6. 7.4
 $12^{\text{h}} 10^{\text{m}} 0^{\text{s}}$ — $6^{\circ} 42'.0$.

8.0 and 8.3

1829.7 287.6 7.79 Σ 4 n
 1878.2 282.3 7.65 Cinc. 1
 1890.4 281.5 6.94 Glasenapp 2

Common p.m. of 0".317 towards $260^{\circ}.9$.
 Also registered as Σ 1619.

No. 24. β 920. Lal. 22,971. 6.8.
 $12^{\text{h}} 10^{\text{m}} 36^{\text{s}}$ — $22^{\circ} 47'.8$.

7.1 and 8.3

1879.4 232.4 0.77 β 1 n
 1880.4 232.4 0.92 Pritchett 2
 1892.2 252.4 0.79 β 3
 1892.3 250.5 0.81 Haverford 5-3
 1896.5 244.0 0.84 Aitken 1
 1897.3 253.7 0.94 " 3
 1898.4 247.9 1.09 See 1

The measures are very discordant.

No. 25. Russell 193. Lac. 5088. ^{MAG.} 6.5
 $12^{\text{h}} 12^{\text{m}} 34^{\text{s}}$ — $35^{\circ} 32'.3$.

7.2 and 7.4

1881.5 168.6 0.83 Russell 1 n
 1891.4 166.6 0.79 Sellors 1
 1895.5 166.6 1.02 " 3
 1897.4 168.0 1.07 See 3

A 10th mag. star about 4' S.pr. and an 8.6 mag. star a little further off N.f.

No. 26. β 921. Lal. 23,027. 7.0
 $12^{\text{h}} 12^{\text{m}} 44^{\text{s}}$ — $23^{\circ} 27'.5$.

Comes = 11.0

1879.4 218.9 2.99 β 2 n
 1881.3 218.1 3.18 " 3
 1892.2 217.3 3.20 " 3
 1892.3 218.5 2.95 Haverford 4-3

No. 27. Harvard. F Centauri. 5.0
 $12^{\text{h}} 13^{\text{m}} 40^{\text{s}}$ — $54^{\circ} 35'.2$.

In the *Harvard Circular*, No. 18, this star is noted as having a companion within 30".

1898. Nil. Cape 7-inch refractor.

C. P. D. mag. = 7.1.

No. 28. β 605. Bradley 1649. 6.5
 $12^{\text{h}} 15^{\text{m}} 0^{\text{s}}$ — $21^{\circ} 37'.2$.

6.7 and 8.8

1870.3 138.0 1.5 ± Harvard 1 n
 1878.2 136.3 1.01 Cinc. 2
 1878.2 144.2 1.26 β 2
 1882.4 141.7 0.5 ± Schiaparelli 2
 1889.0 137.0 0.8 ± Haverford 1
 1891.3 143.8 1.03 β 2

No certain change.

Common p.m. of 0".108 towards $259^{\circ}.3$, which is much the same as that of the next star in the same field.

Equal to Harvard 131.

110A

12 hrs.

REFERENCE CATALOGUE OF

<p>No. 29. β 1245. ζ Corvi. MAG. 5.5 $12^{\text{h}} 15^{\text{m}} 22^{\text{s}}$ — $21^{\circ} 39'.6$. <i>Comes</i> = 13.6 1891.3 42.3 4.81 β 3 n The p.m. of the chief star is $0''.130$ towards $254^{\circ}.4$, in which the <i>comes</i> shares. This was thought to be a close pair at Harvard. See their No. 132.</p>	<p>No. 35. h. 4518. Lac. 5138. MAG. 6.6 $12^{\text{h}} 19^{\text{m}} 27^{\text{s}}$ — $40^{\circ} 49'.6$. 6.7 yellow and 9.0 blue 1834.4 211.1 $10. \pm$ h 2 n 1889.3 207.5 10.2 Pollock 2 1897.1 208.7 9.9 See 2 Both stars have been observed on the meridian at Cordoba.</p>
<p>No. 30. λ 149. C. Z. 12 h. 911. 9.5 $12^{\text{h}} 15^{\text{m}} 57^{\text{s}}$ — $44^{\circ} 49'.8$. 10.2 and 10.3 1897.4 305.7 0.59 See 1 n</p>	<p>No. 36. Innes 35. C. Z. 12 h. 1148. 8.5 $12^{\text{h}} 19^{\text{m}} 48^{\text{s}}$ — $76^{\circ} 19'.8$. 9.1 and 9.4 1895.3 S.pr. $2. \pm$ Innes 1 n</p>
<p>No. 31. Harvard. ζ_2 Muscae. 5.3 $12^{\text{h}} 16^{\text{m}} 34^{\text{s}}$ — $66^{\circ} 58'.0$. A <i>comes</i> within $30''$ has been noted at Arequipa. See <i>Harvard Circular</i>, No. 18. Cape. 1898. Nil. 7-inch refractor.</p>	<p>No. 37. λ 151. x_2 Centauri. 5.8 $12^{\text{h}} 20^{\text{m}} 6^{\text{s}}$ — $34^{\circ} 37'.9$. 6.5 and 6.7 1897.5 41.4 0.22 See 2 n</p>
<p>No. 32. Washburn 12. B.D.—1°, 2656. 9.5 $12^{\text{h}} 16^{\text{m}} 45^{\text{s}}$ — $2^{\circ} 3'.9$. 9.9 and 10.7 1881.3 93.3 1.13 Washburn 3 n 1888.8 94.2 1.13 " 2</p>	<p>No. 38. λ 152. Ö.A. 12,149. 8.5 $12^{\text{h}} 20^{\text{m}} 9^{\text{s}}$ — $30^{\circ} 34'.6$. <i>Comes</i> = 12.0 1897.4 87.1 2.35 See 1 n C. Z. 12 h. 1173, mag. 9.4, is closely N.pr.</p>
<p>No. 33. Howe 21. Yarnall, 5250. 7.6 $12^{\text{h}} 17^{\text{m}} 23^{\text{s}}$ — $33^{\circ} 0'.3$. 8.0 and 9.0 1876.3 $270. \pm$ $2. \pm$ Howe 1 n</p>	<p>No. 39. β 606. Lal. 23,250. 7.0 $12^{\text{h}} 20^{\text{m}} 50^{\text{s}}$ — $14^{\circ} 23'.6$. 7.2 and 8.7 1878.3 100.5 1.43 β 1 n 1891.3 99.1 1.25 " 3</p>
<p>No. 34. Russell 198. C. Z. 12 h. 1033. 8.1 $12^{\text{h}} 17^{\text{m}} 59^{\text{s}}$ — $51^{\circ} 37'.7$. Yellow 8.6 and 9.3 1880.4 50.9 2.63 Russell 1 n 1895.4 51.7 2.95 Sellors 3 Noted as "dpl. II" at Cordoba in 1874.</p>	<p>No. 40. β 922. Lal. 23,254. 8.0 $12^{\text{h}} 21^{\text{m}} 0^{\text{s}}$ — $3^{\circ} 55'.7$. 8.5 and 9.2 1891.3 165.3 0.74 β 3 n Found in 1880, angle $160^{\circ} \pm$.</p>

SOUTHERN DOUBLE STARS.

12hrs.

111A

No. 41. α Crucis. MAG. 1.0
 $12^{\text{h}} 21^{\text{m}} 2^{\text{s}}$ — $62^{\circ} 32'.6$.

1.6 and 2.0

1826.5	114.4	5.29	Dunlop	1 n
1835.3	120.6	5.65	<i>h</i>	17
1846.7	119.9	5.73	Jacob	3-4
1858.0	117.7	4.77	"	2
1861.2	118.5	4.98	Powell	8-7
1873.3	119.1	5.38	Russell	6
1879.4	117.4	4.75	Hargrave	1
1880.2	120.7	4.93	Tebbutt	2
1892.5	118.3	4.75	"	2
1895.3	117.8	4.90	"	2-1
1897.1	115.9	4.96	See	1

Discovered in 1685 by La Feuillée.

Several faint stars are in the field, and have been measured by *h*.Lac. 5147, mag. 6.8, is $90''$ S.pr., and has been measured at different epochs, but shows no signs of change; it would therefore seem to share in the small p.m. of α Crucis, viz. :— $0''.045$ towards $242^{\circ}.4$.

Altogether a very fine object, but relatively fixed.

The group is called *h* 4521 in error by Mr Russell.

No. 42. λ 154. G Centauri. MAG. 5.1
 $12^{\text{h}} 21^{\text{m}} 8^{\text{s}}$ — $50^{\circ} 53'.8$.

Comes = 13.0

1897.1	285.5	23.5	See	2 n
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No. 43. Washburn 13. W.B. 12 h. 300. 8.8
 $12^{\text{h}} 21^{\text{m}} 21^{\text{s}}$ — $1^{\circ} 20'.0$.

9.4 and 9.7

1881.3	153.2	1.40	Washburn	3 n
1888.3	154.5	1.28	Haverford	2
1888.4	152.0	1.50	Washburn	4-3

No. 44. Cordoba [26]. C. Z. 12 h. 1281. 8.1
 $12^{\text{h}} 21^{\text{m}} 57^{\text{s}}$ — $33^{\circ} 34'.6$.

Comes = 10.2

1897.4	20.1	3.52	See	1 n
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No. 45. Cape 12. Lac. 5161. MAG. 7.0
 $12^{\text{h}} 22^{\text{m}} 41^{\text{s}}$ — $61^{\circ} 12'.4$.

7.5 and 8.0 both yellow

1880.4	270.5	2.43	Russell	1 n
1887.4	268.7	1.22	Pollock	2
1891.4	264.0	1.74	Sellers	2

In motion?

Also registered as Russell 201. First seen at Cordoba, but the first notification of duplicity was made by the Cape Observatory in 1877.

Lac. 5163, mag. 7.0, is S.f.

No. 46. Russell 200. C. Z. 12 h. 1330. 9.2
 $12^{\text{h}} 22^{\text{m}} 49^{\text{s}}$ — $60^{\circ} 20'.3$.

9.6 and 10.6

1880.4	134.9	2.99	Russell	1 n
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No. 47. Harvard. Lac. [5169]. MAG. 6.2
 $12^{\text{h}} 23^{\text{m}} 7^{\text{s}}$ — $55^{\circ} 50'.8$.

The Harvard observers at Arequipa have noted a comes within $30''$. See *Harvard Circular*, No. 18.

No. 48. Innes 36. Lac. 5165. 7.7
 $12^{\text{h}} 23^{\text{m}} 19^{\text{s}}$ — $61^{\circ} 19'.0$.

Comes = 11.0

1895.2	$330^{\circ} \pm$	$7'' \pm$	Innes	1 n
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No. 49. Innes 218. Yarnall, 5202. 7.3
 $12^{\text{h}} 23^{\text{m}} 34^{\text{s}}$ — $37^{\circ} 24'.8$.

7.5 and 9.5

1897.4	$240^{\circ} \pm$	$2'' \pm$	Innes	2 n
Yarnall, 5203, mag. 8.9, is 3 secs. f. and 3' S.				

112A

12 hrs.

REFERENCE CATALOGUE OF

No. 50. H. IV. 105. δ Corvi. ^{MAG.} 3.1
Yellow
12^h 24^m 41^s — 15° 57'.5.

Companion = 8.4 purple

1784.5	215.8	23.50	H	2-1 n
1848.0	213.5	24.29	Jacob	1
1866.7	214.0	24.34	Dembowski	3
1880.4	214.0	24.43	Cinc.	1

Common p.m. of $0''.212$ towards $254^\circ.7$.
It will be remarked that other stars in this constellation have somewhat similar proper motions.
Also called South and β 145.

No. 51. β 28. Piazzii 12 h. 104. 6.5
12^h 24^m 56^s — 12° 50'.3.

6.6 and 9.7

1875.3	353.7	1.95	Dembowski	4-5 n
1877.3	356.8	2.10	Cinc.	2
1880.4	356.3	2.01	Pritchett	2
1885.3	1.1	2.16	L. McC.	1
1889.2	2.4	2.±	Haverford	2
1891.3	8.6	1.81	β	3

Common p.m. of $0''.297$ towards $260^\circ.3$.

No. 52. Innes 309. Lac. 5177. 7.7
12^h 25^m 54^s — 77° 38'.5.

Comes = 10.5

1898.4	330.±	4.±	Innes	1 n
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No. 53. Innes 82. Bris. 4084. 7.9.
12^h 25^m 57^s — 40° 57'.1.

8.3 and 9.3

1896.5	N.pr.	1.±	Innes	2 n
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Lac. 5173, mag. 6.6, is 82 secs. pr. 14' S.

No. 54. Innes 219. C. Z. 12 h. 1525. 8.5
12^h 26^m 17^s — 55° 34'.1.

9.0 and 9.5

1897.4	50.±	1.8±	Innes	1 n
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Bris. 4090, mag. 7.0, red, is 20 secs. f. 1' S.

No. 55. Leavenworth. Radcliffe 7.0
1890, 3261.
12^h 28^m 56^s — 17° 38'.5.

7.2 and 9.4

1886.3	31.8	1.39	L. McC.	2 n
1888.2	32.6	1.40	Haverford	2-1

No. 56. λ 156. C. Z. 12 h. 1789. 8.5
12^h 30^m 46^s — 35° 16'.4.

9.0 and 9.5

1897.4	123.4	0.51	See	2 n
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The f. star of two of the 8.5 mag.

No. 57. λ 157. Lac. 5216. 6.9
12^h 31^m 16^s — 49° 47'.0.

Comes = 12.3

1897.1	121.3	7.66	See	2 n
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No. 58. Washburn 116. Lac. 5223. 7.3
12^h 32^m 31^s — 55° 22'.8.

7.5 and 9.3

1889.3	193.1	2.00	Pollock	4-3 n
1894.4	194.0	1.21	Sellers	1
1897.1	193.4	1.86	Lowell	2

Found during an expedition to Caroline Island.

No. 59. Innes 296. Lac. 5221. 6.7
12^h 32^m 49^s — 74° 49'.2.

6.9 and 8.8

1898.2	270.±	1.9±	Innes	1 n
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No. 60. λ 158. Bris. 4130. 8.0
12^h 33^m 17^s — 38° 50'.5.

8.2 and 10.2

1897.1	191.6	0.99	Cogshall	1 n
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Found by Mr Cogshall.

SOUTHERN DOUBLE STARS.

12 hrs.

113A

No. 61. γ Centauri. 2.4
 12^h 36^m 0^s — 48° 24'.6

Both = 3.2

1852.60	22.9	0.3 ±	Maclear	3 n
1876.64	0.3	1.37	Melbourne	1
1879.44	4.1	1.76	"	2

A celebrated binary system.

From all the observations to 1895.3 (excluding, however, the above, which it is believed are now published for the first time), Prof. See finds the following orbit:—

P = 88 years	T = 1848
a = 1".023	e = 0.8
i = 62°.15	Ω = 4°.6
λ = 194.3	

Motion:—Retrograde,

and furnishes an ephemeris, from which the following has been extracted:—

1898.4	355.2	1.72
1900.4	354.4	1.70

Common p.m. of 0".217 towards 264°.7.

Prof. See also measures a star 29".8 distant, mag. 13.6 = λ 159.

No. 62. β 607. Schj. 4572. 9.2
 12^h 36^m 2^s — 0° 54'.3

Comes = 10.5

1867.4	320.0	1.40	Harvard	1 n
1878.2	313.8	1.04	Cinc.	1
1878.7	315.9	1.15	β	6
1880.3	314.5	1.08	Cinc.	2
1889.3	316.3	1.20	β	3

Also registered as Harvard 134.

 γ Virginis is 35 secs. f.

No. 63. Lalande. Lal. 23,676 + 5. 5.3
 12^h 36^m 4^s — 12° 28'.0

6.0 and 6.1

1828.7	298.9	5.44	Σ	3 n
1856.5	302.4	5.78	Secchi	4
1879.2	304.4	5.73	Cinc.	2
1887.4	304.0*	5.63	Hall	3
1890.4	304.7	4.97	Glaserapp	2
1893.3	304.9	5.60	Maw	3

Common p.m. of 0".177 towards 353°.5.

Also registered as H. N. 38 and Σ 1669.

A 9.8 mag. star 1".7 pr.

No. 64. γ Virginis. 2.8
 12^h 36^m 36^s — 0° 54'.0

Both = 3.6 yellow

A celebrated binary system, with a large literature.

Here it is sufficient to refer the reader for all particulars to Prof. See's orbit and discussion in vol. i. of his *Evolution of the Stellar Systems*.

He gives the following orbit:—

P = 194 years	T = 1836.5
a = 3".989	e = 0.8974
i = 31°.0	Ω = 50°.4
λ = 270°.0	

Motion:—Retrograde.

The maximum distance some 6".5 will be attained about 1934.

β has measured a faint star, 14.5 mag., distant 53".1. The p.m. of γ Virginis will soon disclose, if this is physically connected with the system, a conclusion denied *a priori* on the law of gravitation by Prof. See.

See also:—

1896. Doberck, W. "Orbit," *Astr. Nachr.*, No. 3364.

No. 65. h. 4544. C. Z. 12 h. 2195. 9.0
 12^h 38^m 39^s — 78° 54'.8

Comes = 13.0

1837.2	300.7	2.2 ±	h	1 n
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No. 66. Cordoba [27]. Bris. 4174. 8.3
 12^h 39^m 21^s — 61° 40'.2

8.5 reddish and 10.0

1897.6	4"	±	Innes	1 n
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Noted as double in the C. G. A.

No. 67. h. 4547. ι Crucis. 4.7
 12^h 39^m 45^s — 60° 25'.9

4.8 yellow and 7.8 blue

1834.2	51.5	21.5 ±	h	2 n
1882.5	37.6	23.3	Hargrave	1
1896.6	36.8	20.5	Innes	1

The change in angle seems considerable, unless we take h 's angle as 90° - 51°.5 = 38°.5.

C. P. D. mag. = 7.6.

114A

12hrs.

REFERENCE CATALOGUE OF

No. 68.	Russell 207.	β Muscæ.		MAG.
	12 ^h 40 ^m 9 ^s	— 67° 33'.6.		3.3
		3.9 and 4.2		
1880.3	317.3	0.54	Russell	1 n
1886.5	322.9	0.79	"	2-1
1886.6	325.8	0.5 ±	Pollock	1
1887.6	326.5	0.89	"	7-3
1888.3	329.3	1.26	Tebbutt	2
1891.4	333.1	0.86	Sellers	5-2
1892.4	331.8	0.65	"	4-2
1892.5	335.8	1.33	Tebbutt	7-2
1893.5	335.0	0.88	Sellers	2
1895.3	337.3	1.41	Tebbutt	6-2
1895.4	336.3	1.16	Sellers	3

The p.m. of this fine pair is 0".058 towards 256°.0.

No. 69.	λ 160.	Cor. D.M.—38° 7978.		9.3
	12 ^h 40 ^m 59 ^s	— 38° 54'.0.		
		9.5 and 11.0		
1897.4	175.6	1.55	See	1 n

The brightest of a small group.
Identified as Cor. D.M.—38°.7979 by Prof. See.

No. 70.	Ormond Stone.	C. P. D.—		10.0
	21°, 5441.			
	12 ^h 41 ^m 11 ^s	— 21° 53'.5.		
		10.2 and 12.2		
1879.4	272.4	1.5 ±	Cinc.	1 n

The combined mag. is from the C. P. D.

No. 71.	Russell 208.	C. P. D.—55°,		9.3
	5223.			
	12 ^h 41 ^m 19 ^s	— 55° 13'.8.		
		9.8 and 10.3		
1880.5	5.9	3.64	Russell	2 n

No. 72.	Harvard.	Lac. 5278.		6.3
	12 ^h 41 ^m 22 ^s	— 32° 46'.1.		

Noted as double at Arequipa.
See *Harvard Circular*, No. 18.
The closest companion seen with the 7-in. Cape refractor is 2' distant.

No. 73.	Russell 209.	C. P. D.—55°,		MAG.
	5235.			8.0
	12 ^h 42 ^m 51 ^s	— 55° 32'.1.		
		8.5 and 9.0 both light yellow		
1880.4	193.2	1.58	Russell	1 n

C. P. D. mag. = 9.4.

No. 74.	Hargrave 77.	Lac. 5280.		7.6
	12 ^h 42 ^m 57 ^s	— 65° 2'.8.		
		7.9 and 9.3		
1883.4	8.0	7.71	Hargrave	1 n

Noted as double at Cordoba in 1876.
Two faint pairs, Hargrave 78 and 79, are about 20' N.

No. 75.	Harvard.	ι Octantis.		6.3
	12 ^h 44 ^m 26 ^s	— 84° 34'.8.		

In *Harvard Circular*, No. 18, this star is noted as having a companion within 30". Nothing seen with the 7-in. Cape refractor.

No. 76.	λ 164.	C. Z. 12 h. 2686.		8.5
	12 ^h 46 ^m 19 ^s	— 32° 48'.0.		
		Comes = 14.4		
1897.4	189.7	2.46	See	2 n

Prof. See also measures a 14.8 mag. star 43" S.f.
C. Z. 12 h. 2685, mag. 8.6, is 7' S.

No. 77.	Harvard.	Lac. 5303.		5.8
	12 ^h 47 ^m 24 ^s	— 59° 47'.1.		

Noted as double within 30" at Arequipa.
In the κ Crucis cluster.
No trace of duplicity as seen with the 7-in. Merz refractor at the Cape. Many stars about.

No. 78.	Innes 297.	C. P. D.—51°, 5601.		8.3
	12 ^h 48 ^m 12 ^s	— 51° 43'.9.		
		8.7 and 9.7		
1898 3	260. ±	2. ±	Innes	1 n

SOUTHERN DOUBLE STARS.

12 hrs.

115A

No. 79. Ormond Stone. Ö.A. 12,501. 7.5
 12^h 48^m 30^s — 28° 45'.9.

7.6 and 10.1

1867.4	31.6	3.01	Harvard	1 n
1876.2	31.3	3.76	Cinc.	1
1877.3	31.7	2.99	"	2
1881.3	31.5	2.99	β	3

Also registered as Harvard 135.

No. 80. Dunlop 126. μ Crucis. 4.0.
 12^h 48^m 43^s — 56° 38'.1.

4.3 and 5.4

1835.8	18.1	42. ±	h	2 n
1846.3	17.2	35.7	Jacob	3-2
1879.5	17.4	34.3	Hargrave	1

Erroneously called h 4555 in the *Sydney Catalogue*.A 10th mag. star at 45" was noted by Innes in 1895.Two comites within 30" are said to have been seen at Arequipa in 1891. See *Harvard Circular*, No. 18.

No. 81. h. 4556. Yarnall, 5478+9. 7.1
 12^h 48^m 53^s — 27° 25'.0.

7.5 and 8.5

1851.8	82.4	5.72	Jacob	4 n
1854.0	83.4	5.78	"	2
1877.2	83.0	5.97	Cinc.	2
1890.4	83.4	6.02	Glazenapp	2
1897.4	81.5	6.52	See	1

No. 82. Harvard. Lac. 5321. 5.6
 12^h 50^m 4^s — 56° 17'.6.

A comes within 30" has been noted at Arequipa.

See *Harvard Circular*, No. 18.

1898. Nil. 7-in. at Cape.

No. 83. Innes 83. Bris. 4251. 7.0
 12^h 50^m 59^s — 47° 8'.7.

7.6 and 8.0

1896.5	pr.	0.8 ±	Innes	2 n
1897.2	261°.3	0.44	See	1

No. 84. H. II. 42. W.B. 12 h. 831+2. 7.2
 12^h 51^m 5^s — 4° 19'.4.

7.4 and 9.1

1792.7	143.4	.....	H	2 n
1832.5	149.8	5.85	Σ	6
1840.3	146.5	6.25	OΣ	2
1858.3	148.3	5.69	Morton	3
1866.6	147.5	5.94	Dembowski	3
1880.3	149.5	6.05	β	1
1890.4	147.0	5.83	Glazenapp	2

Probably fixed.

Also called Σ 1690.

No. 85. O.Σ. 256. Lal. 24,098. 6.7
 12^h 51^m 19^s — 0° 24'.6.

7.3 and 7.7 variable?

1842.4	231.5*	0.62	OΣ	1 n
1861.3	240.8	0.67	"	1
1867.4	242.1	0.50	Dembowski	3
1875.4	244.1	0.71	Schiaparelli	4
1877.4	242.2	0.72	Cinc.	1
1887.4	251.5	0.56	Hall	3
1892.4	267.5	0.39	Lewis	2
1894.4	253.8*	0.52	Washburn	2
1895.4	253.9*	0.58	"	3

In slow motion.

Other measures.

No. 86. Ormond Stone. Lal. 24,129. 8.0
 12^h 52^m 35^s — 12° 35'.8.

8.5 and 9.0

1879.4	66.2	1.47	Cinc.	1 n
1880.3	65.1	2.03	"	3
1885.3	66.6	1.93	"	1
1888.2	67.1	1.91	Haverford	2
1893.4	65.8	1.98	"	2

Probably fixed.

No. 87. Cordoba [28]. C. Z. 12 h. 3034. 8.0
 12^h 52^m 47^s — 70° 5'.6.

8.2 and 9.8

1880.4	286.0	5.08	C. G. A.	3 n
1889.3	269.5	4.12	Pollock	4

The first measure, which is derived from meridian observations, cannot be taken as indicating change.

116A

12hrs.

REFERENCE CATALOGUE OF

No. 88. β 926. Lal. 24,147. ^{MAG.} 9.0
 12^h 53^m 16^s — 5° 30' 4."

9.1 and 12.0

1880.3	270.4	2.06	β	4-3 n
1892.2	274.8	2.24	"	3
1892.3	269.9	2.23	Haverford	3

No. 89. Cape 13. Lac. 5352. ^{MAG.} 7.1
 12^h 54^m 32^s — 48° 3' 9."

7.3 and 9.7

1876.4	62.9	6.81	C. G. A.	3 n
1889.4	67.3	5.03	Pollock	2

See the note to No. 87. *h* 4562, a faint pair, is near this position.

No. 90. A. G. Clark 5. 46 Virginis. ^{MAG.} 6.1
 12^h 55^m 27^s — 2° 49' 9."

6.1 and 9.8

1876.4	158.9	1.32	Hall	3 n
1877.6	149.5	1.25	Dembowski	5
1878.3	151.5	1.48	β	2
1878.6	147.2	1.23	Cinc.	5-4
1879.1	151.5	1.44	β	4
1880.4	150.5	1.27	Cinc.	3-2
1885.4	152.7	1.39	Hall	3

The p.m. is about 0".08.

A 12.2 mag. star has been observed at 34" distance.

No. 91. *h*. 4563. Piazz 12 h. 239. ^{MAG.} 7.3
 12^h 55^m 34^s — 33° 5' 0."

7.6 and 8.9

1837.4	236.8	6.55	<i>h</i>	2 n
1851.3	237.7	6.11	Jacob	3
1881.5	239.2	5.83	Russell	1
1897.4	235.7	6.72	See	2

Also registered as Russell 210.

No. 92. λ 168. Cor. D.M.—38°, 8203. ^{MAG.} 7.5
 12^h 58^m 2^s — 38° 25' 7."

Both = 8.3

1897.4	183.1	0.25	See	1 n
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No. 93. β 928. Lal. 24,274. ^{MAG.} 8.2
 12^h 58^m 12^s — 5° 53' 7."

8.6 and 9.7

1880.3	313.2	1.83	β	3 n
1888.7	312.5	1.98	Haverford	2
1892.3	312.8	2.01	β	3
1893.4	313.8	2.01	Haverford	2

Noted as double at the Radcliffe Observatory in 1892.

β 927, 8.8 and 10.2; $4\frac{1}{2}''$ apart is 37^s pr. 6' S.

No. 94. β 341. Lal. 24,275. ^{MAG.} 5.6
 12^h 58^m 24^s — 20° 2' 8."

6.1 and 6.6 yellowish

1876.3	136.4	0.78	Dembowski	2 n
1876.4	133.8	0.85	Cinc.	2
1877.8	139.0	0.98	"	5-2
1878.4	136.0	0.92	Dembowski	1
1881.4	133.0*	0.6 ±	Schiaparelli	3
1881.5	133.4	0.71	β	3
1884.3	137.1	0.96	Cinc.	1
1894.5	130.5	0.3 ±	Sellers	2
1896.5	127.9*	0.78	Lick	2

The measures of this fine pair are very discordant, the angle is probably decreasing slowly.

No. 95. β 929. 48 Virginis. ^{MAG.} 6.6
 12^h 58^m 45^s — 3° 7' 5."

7.3 and 7.5

1879.4	229.4	0.48	β	3 n
1879.9	231.3	0.6 ±	Cinc.	2
1881.5	226.3	0.48	β	3
1885.9	222.3	0.38	Engelmann	6
1888.3	220.1	0.64	Haverford	2
1891.3	221.2	0.50	β	3
1897.3	220.8	0.67	Aitken	3

Small common p.m. of about 0".09.

SOUTHERN DOUBLE STARS.

12hrs.

117A

No. 96. Cordoba [29]. C. Z. 12 h. 3410 ^{MAG.} 8.0
 12^h 59^m 18^s — 46° 1'.6.

8.5 and 9.0

1883.6	97.9	4.13	Hargrave	I n
1891.4	96.6	4.32	Sellers	I

Independently discovered as Hargrave 81.

No. 97. β 798. Lal. 24,307. ^{MAG.} 8.2
 12^h 59^m 45^s — 17° 8'.3.

8.8 and 9.2

1881.4	174.3	0.54	β	5 n
1892.4	172.6	0.44	"	2

The R.A. and D., which differ from β , are those of the star named with which β identifies the pair.

No. 1. h. 4566. Lac. 5369. ^{MAG.} 6.6
13^h 0^m 18^s — 77° 54'.6.

Comes = 14.0

1835.4	221.9	15.±	<i>h</i>	1 n
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No. 2. h. 4567. *f* Centauri. ^{MAG.} 4.9
13^h 0^m 29^s — 47° 55'.6.

Comes = 10.8

1836.0	84.2	12.±	<i>h</i>	3 n
1858.1	75.6	10.6	Jacob	2
1871.4	50.±	18.±	Russell	1
1899.2	90.±	20.±	Innes	1

Russell:—"Small star only seen in glimpses."

No. 3. Dunlop 128. ξ_2 Centauri. 4.4
13^h 1^m 4^s — 49° 22'.2. **Yellow**

C. Z. 12 h. 3521 = 9.5 blue

1836.5	100.3	26.0	<i>h</i>	2 n
1858.1	99.7	24.8	Jacob	2
1874	97.6	23.9	C. Z. C.	1

The p.m. of the chief star is 0".056 towards 263°.4; hence, from the above measures, the p.m. of the companion must be twice as great in the same direction.

No. 4. Russell 213. Lac. 5392. ^{MAG.} 6.7
13^h 1^m 14^s — 59° 19'.5.

Both = 7.5 orange yellow

1874.3	27.1	0.33	Russell	1 n
1880.4	22.5	0.66	"	2
1888.3	26.1	0.7±	Tebbutt	1
1891.4	25.3	0.72	Sellers	1

A fine pair, but evidently fixed.

No. 5. Dunlop 129. θ Muscæ. ^{MAG.} 5.6
13^h 1^m 40^s — 64° 46'.3.

5.8 and 8.1 both white

1836.4	187.5	6.38	<i>h</i>	1 n
1872.4	182.7	5.35	Russell	1
1879.5	185.3	5.03	Hargrave	1
1890.4	184.7	5.08	Sellers	3

Erroneously indexed as *h* 4568 by Mr Russell.

No. 6. Washburn 118. ϵ . Z. 13 h. 32. ^{MAG.} 8.5
13^h 1^m 58^s — 52° 10'.3.

Both = 9.3

1894.5	205.9	1.36	Sellers	1 n
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No. 7. h. 4569. Lac. 5401. ^{MAG.} 7.8
13^h 1^m 58^s — 56° 9'.0.

8.0 and 10.0

1835.8	241.9	5.±	<i>h</i>	2 n
1873.4	239.6	4.75	Russell	1
1878.7	241.7	5.38	C. G. A.	5
1890.4	242.2	5.00	Sellers	1

Fixed.

No. 8. Washburn 174. Lal. 24,366. ^{MAG.} 7.8
13^h 2^m 30^s — 17° 27'.9.

Comes = 11.8

1888.4	182.6	3.27	Washburn	1 n
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No. 9. \mathbb{H} . III. 50. θ Virginis. ^{MAG.} 4.4
13^h 4^m 46^s — 5° 0'.4.

Comes = 8.9

1783.0	339.3	\mathbb{H}	1 n
1802.3	341.2	"	1
1830.3	344.0	7.07	Σ	3
1854.4	342.7	7.21	Morton	2
1880.3	344.6	7.17	β	2
1890.4	343.3	7.12	Glazenapp	2

Virtually fixed with a common p.m. of 0".074 towards 240°.0.

Also called Σ 1724.

Dembowski has measured a 10th mag. star 7.1" N.pr., first measured by \mathbb{H} in 1782, who made the distance 64".

No. 10. Harvard. Lac. 5409. ^{MAG.} 6.4
13^h 4^m 57^s — 69° 25'.6.

At Arequipa a *comes* has been noted within 30". See *Harvard Circular*, No. 18.

A very distant *comes* only seen with the 7-in. refractor.

SOUTHERN DOUBLE STARS.

13hrs.

119A.

No. 11. Cordoba [72]. C. Z. 13 h. 220. ^{MAG.} 8.0
 13^h 5^m 22^s — 46° 45'.4.

8.5 and 9.0

1898.4 260.± 3.± Innes 1 n

No. 12. β 609. W.B. 13 h. 27. 7.6
 13^h 5^m 30^s — 4° 24'.4.

Comes = 11.2

1878.3 356.1 0.89 β 1 n
 1879.4 354.9 0.9± Cinc. 1
 1889.3 352.1 0.89 β 2

No. 13. Innes 310. Gilliss P. Z. 9131. 8.7
 13^h 5^m 48^s — 76° 55'.6.

9.2 and 9.7

1898.4 38.± 1.6± Innes 2 n

No. 14. Harvard. Lac. 5418. 4.7
 13^h 6^m 3^s — 59° 23'.3.

Both = 5.5

1897.1 96.3 0.34 See 2 n
 Common p.m. of 0".082 towards 248°.6.
 Found independently by Prof. See = λ 170.

No. 15. Howe 22. Lac. 5440. 8.0
 13^h 7^m 29^s — 28° 34'.2.

8.2 and 10.0

1877.4 292.1 2.75 Cinc. 2 n
 1885.3 296.8 2.80 ,, 1
 1897.5 289.4 2.89 See 1

Separately observed on the meridian at Cordoba.
 Prof. See also measures a 13th mag. star 38" pr.

No. 16. β 221. Lal. 24,532. ^{MAG.} 7.9
 13^h 7^m 57^s — 14° 55'.8.

8.2 and 9.7

1874.3 49.4 1.5± β 1 n
 1875.3 48.6 1.68 Dembowski 3
 1879.4 47.7 1.49 Cinc. 2
 1886.3 43.5 1.62 L. McC. 1
 1896.5 45.6 1.34 Aitken 3

About 43' N. of 53 Virginis, mag. 5.1.

No. 17. H. II. 45. 54 Virginis. 6.2
 13^h 8^m 6^s — 18° 17'.6.

6.7 and 7.4

1792.7 34.2 6.± H 2 n
 1867.3 35.5 5.17 Dembowski 3
 1876.4 33.7 5.43 Cinc. 2
 1890.4 33.4 5.39 Glasenapp 2
 1896.4 34.4 5.20 Scott 3

Common p.m. of 0".084 towards 266°.6.

See also No. 20 = β 342 S.f., which has very nearly the same angle and distance.

No. 18. Melbourne [3]. Lac. 5434. 7.0
 13^h 8^m 15^s — 63° 3'.1.

7.1 and 9.6

1883.5 34.9 1.43 Hargrave 1 n
 1894.5 35.8 1.03 Sellors 1

Also registered as Washburn 119 and Hargrave 83,
 but first seen at Melbourne in 1867. See their
 volume of *Observations* published in 1869.

No. 19. λ 171. C. Z. 13 h. 475. 7.1
 13^h 9^m 19^s — 34° 6'.1.

Both = 7.9

1897.4 301.7 0.41 See 1 n

120A

13^{hrs.}

REFERENCE CATALOGUE OF

No. 20. β 342. $\ddot{O}.A.$ 12,741. ^{MAG.} 8.2
 13^h 9^m 53^s — 18° 23'.4.

8.7 and 9.2

1876.3	36.3	3.90	Dembowski	2 n
1877.1	35.0	3.90	Cinc.	1
1880.4	33.8	3.96	"	4
1882.3	35.2	4.29	"	1
1888.3	34.2	3.80	Haverford	2
1893.4	33.0	4.84	"	2

See also No. 17.

The similarity of both angle and distance of these two pairs has led to some confusion, the one pair having been measured for the other on several occasions.

No. 21. $h.$ 4576. $Lac.$ 5453. ^{MAG.} 7.5
 13^h 9^m 56^s — 56° 32'.0.

7.6 yellow and 10.4 blue

1837.3	128.6	6. ±	h	1 n
1872.4	130.1	5.91	Russell	2
1880.4	129.3	5.17	"	1
1890.4	127.1	5.79	Sellors	1

Mr Russell in his measure of 1880 distinctly states that the star measured is not h 4576, and registers it as Russell 216. There is, however, only one pair here at present.

No. 22. $Innes$ 233. $Lac.$ 5462. ^{MAG.} 7.2
 13^h 11^m 2^s — 40° 45'.3.

7.3 and 9.5

1897.4	113.5	3.08	See	2 n
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Noted independently as λ 173; Prof. See calling the companion 13.8 mag.

C. Z. 13 h. 581, mag. 9.5, is about 44" N.f.

No. 23. λ 174. $Lac.$ 5467. ^{MAG.} 7.4
 13^h 11^m 21^s — 30° 3'.8.

Both = 8.2

1897.4	1.1	0.16 ±	See	1 n
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No. 24. β 222. $Lal.$ 24,636. ^{MAG.} 7.8
 13^h 12^m 0^s — 21° 0'.6.

8.2 and 9.2

1867.4	12.1	1.46 ±	Harvard	1 n
1877.1	11.2	1.76	Cinc.	1
1894.4	14.7	1.50	Sellors	2
1896.5	14.8	1.51	Aitken	3

Also registered as Harvard 136.

No. 25. $h.$ 4579. $Bris.$ 4411. ^{MAG.} 8.0
 13^h 14^m 49^s — 63° 31'.4.

8.5 and 9.0 both white

1835.3	98.0	2.80	h	2 n
1875.5	96.5	4.36	Sydney	2
1880.5	99.2	4.12	"	2

Both stars have been observed on the meridian at Cordoba.

No. 26. $Harvard.$ J Centauri. ^{MAG.} 4.6
 13^h 16^m 10^s — 60° 27'.8.

At Arequipa two *comites* within 30" have been observed. See *Harvard Circular*, No. 18.

No *comes* seen here with the 7-in. refractor.

$Lac.$ 5490, mag. 6.5, is closely N.pr., and with J Centauri has been measured as Dunlop 133.

No. 27. $Sellors$ 18. $Lac.$ 5505. ^{MAG.} 6.6
 13^h 16^m 55^s — 47° 25'.2.

7.0 and 7.9

1895.4	224.0	0.77	Sellors	3 n
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Another *comes*, 8.5 mag., is 38" N.f.
 $Lac.$ 5512, mag. 7.0, is 1^m. f. 3' N.

No. 28. β 1084. $W.B.$ 13 h. 235. ^{MAG.} 8.2
 13^h 17^m 1^s — 4° 8'.0.

Comes = 13.3

1889.3	89.8	2.69	β	3 n
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SOUTHERN DOUBLE STARS.

13 hrs.

121A

No. 29. h. 4580. Lac. 5507. ^{MAG.} 6.6
 13^h 17^m 4^s — 48° 2'.4.

Both = 7.4

1836.2	10.2	0.7 ±	h	1 n
1895.5	Single	.....	Sellors	3
1897.3	"	.....	Innes	1

Probably in motion.

$\frac{1}{2}$ had "no doubt" of its duplicity, and the equality of magnitude should make it a fairly easy pair.

No. 30. Σ 1738. W.B. 13 h. 247. ^{MAG.} 7.5
 13^h 17^m 55^s — 14° 24'.0.

8.2 and 8.3

1879.2	282.9	4.09	Cinc.	1 n
1890.4	282.5	3.98	Glazenapp	2

Fixed.

No. 31. β 610. Lal. 24,812. ^{MAG.} 7.0
 13^h 18^m 32^s — 20° 24'.1.

Comes = 11.2

1878.2	18.3	4.02	β	1 n
1878.4	17.4	3.77	Dembowski	1
1892.2	20.3	3.69	β	3
1892.4	18.5	3.82	Haverford	3

Also registered as Harvard 137.

No. 32. Cordoba [30]. Lac. 5521. ^{MAG.} 7.0
 13^h 19^m 6^s — 51° 19'.2.

7.4 and 8.5

1875.5	4. ±	2.7 ±	C. G. A.	1 n
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No. 33. Innes 220. Lac. 5524. ^{MAG.} 7.7
 13^h 19^m 9^s — 34° 6'.8.

7.9 and 9.4

1897.4	5. ±	0.7 ±	Innes	1 n
1897.5	18.4*	0.21	See	1

No. 34. β 460. W.B. 13 h. 273. ^{MAG.} 7.8
 13^h 19^m 44^s — 15° 6'.6.

8.0 and 10.3

1877.4	35.2	2.07	Dembowski	1 n
1888.9	33.8	2.09	β	4
1892.4	34.8	2.26	Haverford	3

Fixed.

No. 35. h. 4587. C. G. A. 18,270+1. ^{MAG.} 7.5
 13^h 20^m 33^s — 42° 31'.7.

8.0 and 8.5

1837.3	90.0	3. ±	h	1 n
1881.5	85.4	4.96	Hargrave	1
1897.4	87.5*	5.47	See	1

Separately observed on the meridian at Cordoba.

No. 36. Ormond Stone. O.A. 12,867. ^{MAG.} 8.1
 13^h 20^m 48^s — 22° 43'.1.

8.7 and 9.0

1879.8	354.5	1.55	Cinc.	2 n
1886.3	355.1	1.85	L. McC.	1

No. 37. h. 4586. Lac. 5528. ^{MAG.} 7.4
 13^h 21^m 20^s — 67° 21'.0.

7.6 and 9.4

1837.4	149.4	3.67	h	1 n
1872.9	148.9	3.87	Russell	2
1879.4	142.9	3.76	C. G. A.	3

No. 38. Russell 217. C. Z. 13 h. 1197. ^{MAG.} 8.2
 13^h 21^m 37^s — 57° 35'.0.

Both = 9.0

1874.4	170.0	4.17	Russell	1 n
1880.4	170.9	3.38	"	1

In the *Proc. of the Roy. Soc. of N.S.W.* the distance for 1874 is given = 3".99.

Also noted as "dpl. I." at Cordoba.

Q

122A

13 hrs.

REFERENCE CATALOGUE OF

No. 39. β 1107. \ddot{O} .A. 12,884. 8.2
 13^h 21^m 42^s — 21° 50'.6.

Both = 9.0

1889.4	133.8	1.17	β	5 n
1897.4	132.4	1.05	Aitken	3

No. 40. Russell 218. Lac. 5550. 7.0
 13^h 22^m 13^s — 43° 15'.0.

7.3 and 8.5

1881.5	167.1	3.84	Russell	1 n
1889.3	170.8	2.39	Pollock	3

No. 41. λ 179. d Centauri. 4.0
 13^h 25^m 15^s — 38° 53'.5.

4.6 and 4.9

1897.2	104.8	0.19	See	3 n
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A very close pair.

Common p.m. of 0".050 towards 254°.8.

No. 42. Innes 298. Bris. 4490. 7.2
 13^h 25^m 14^s — 68° 43'.0.

7.5 and 9.0

1898.3	220. \pm	0.8 \pm	Innes	1 n
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The brightest of a small group of stars.

No. 43. Russell 220. C. Z. 13 h. 1434. 9.0
 13^h 25^m 25^s — 57° 55'.4.

9.7 and 9.9

1878.3	210. \pm	1. \pm	Russell	1 n
1898.3	220. \pm	0.9 \pm	Innes	1

Russell:—"Middle of a remarkable string of stars."

The magnitudes of the components were not given by Mr Russell, and his co-ordinates were considerably in error.

No. 44. λ 180. Lac. 5570. 7.0
 13^h 25^m 29^s — 41° 56'.9.

7.1 and 9.6

1897.2	230.5	3.90	See	1 n
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Noted independently at the Cape within a few days of its discovery by Prof. See.

No. 45. Hargrave 86. Lac. 5564. 7.5
 13^h 25^m 49^s — 61° 49'.7.

8.0 and 8.5

1883.5	242.1	1.71	Hargrave	1 n
1889.3	238.7	1.57	Pollock	2

No. 46. λ 181. C. Z. 13 h. 1589. 8.0
 13^h 27^m 58^s — 37° 44'.6.

8.6 and 8.9

1897.4	102.0	0.43	See	1 n
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Prof. See also measures a 12.5 mag. star 28" N.f.
 C. Z. 13 h. 1591, mag. 8.7, is 2'.5 S.

No. 47. λ 182. C. Z. 13 h. 1625. 8.3
 13^h 28^m 32^s — 41° 53'.4.

8.5 and 10.0

1897.2	160.6	1.36	See	1 n
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C. Z. 13 h. 1638, mag. 7.3, is 14 secs. f. 7' N.
 Independently seen at the Cape a few days after its
 discovery in America.

No. 48. β 114. W.B. 13 h. 438. 7.0
 13^h 29^m 3^s — 8° 6'.3.

7.6 and 8.0, both white

1875.3	137.1	1.49	Dembowski	4 n
1879.3	135.6	1.47	Cinc.	3
1885.3	135.4	1.60	L. McC.	1
1893.4	140.7	1.41	Haverford	2

Many other measures.

Change doubtful.

"The S.f. star of a pair in the finder" :— β

No. 49. β 932. Piazzini 13 h. 126. 5.7
 13^h 29^m 21^s — 12° 42'.1.

6.2 and 6.7

1879.4	81.2	0.47	β	4 n
1881.4	84.9	0.51	"	3
1884.4	83.8	0.34	Hall	3

A faint star (12.4 mag.) is also noted by β 24" S.f.
 The close pair is called Y Virginis in the U. A., and
 was considered variable by Schmidt, Gould, and other
 observers. It is, however, dismissed from Chandler's
Third Catalogue of Variable Stars.

SOUTHERN DOUBLE STARS.

13hrs.

123A

No. 50. Harvard. Lac. 5589. ^{MAG.} 6.5
 13^h 30^m 25^s — 61° 10'.6

Two *comites* within 30" have been noted at Arequipa. See *Harvard Circular*, No. 18.

One distant *comes* seen here with the 7-inch refractor.

No. 51. h. 4596. Lac. 5588. 7.7
 13^h 30^m 26^s — 64° 25'.5

Both = 8.5

1835.3	94.5	" ±	h	1 n
1879.5	107.1	1.15	Russell	1
1894.5	101.7	0.96	Sellers	1

Although *h* gave a correct synonym (Bris. 4540) for this star, the declination was misprinted. The error evidently escaped Mr Russell's notice, as, after an unsuccessful search for *h*'s star, this pair was registered as Russell 222.

No. 52. Innes 221. Yarnall, 5603. 7.2
 13^h 31^m 6^s — 31° 53'.5

7.4 and 8.9

1897.4	185. ±	0.6 ±	Innes	1 n
1898.3	178.2	0.37	See	1

No. 53. H. N. 69. Piazzini 13 h. 135. 5.6
 13^h 31^m 16^s — 25° 59'.1

6.0 and 7.0

1835.3	193.1	8. ±	h	2 n
1857.3	192.9	10.17	Secchi	1
1876.2	191.4	10.74	Cinc.	1
1880.3	192.3	10.15	"	4

No change.

Also called Dunlop 138 and South 651.

No. 54. λ 183. C. Z. 13 h. 1841. 8.0
 13^h 31^m 58^s — 31° 51'.0

Both = 8.8

1897.4	262. ±	0.25	See	1 n
Another close pair pr.				

No. 55. λ 184. Lac. 5615. ^{MAG.} 7.2
 13^h 32^m 4^s — 34° 33'.3

7.4 and 8.9

1897.3	310.9	0.99	See	2 n
Closely f. Lac. 5613, mag. 7.0, and a 9.7 mag. star.				

Noted independently at the Cape in 1897.

No. 56. β 611. Lal. 25,159. 8.8
 13^h 32^m 20^s — 14° 13'.2

8.9 and 11.2

1878.4	259.4	4.63	β	2 n
1880.4	263.1	4.58	Cinc.	1
1884.3	263.0	2.50	"	2

The last distance looks like a misprint for 4".50.
 Discovered independently as a new pair by Prof. O. Stone.

No. 57. H. I. 80. 81 Virginis. 7.0
 13^h 32^m 21^s — 7° 21'.7

7.7 and 7.8

1782.1	48.8	[1.75]	H	1 n
1802.3	42.8	.....	"	1
1830.3	39.0	2.69	Σ	4
1854.6	42.1	2.63	Maclear	1
1856.4	43.8	2.78	Morton	2
1868.2	42.3	2.63	Dembowski	4
1880.4	41.2	2.93	Cinc.	2
1882.4	43.3	2.66	Pritchett	2
1891.9	42.4	2.97	Glazenapp	4

Fixed.

Common p.m. of about 0".05.

Also called Σ 1763.

No. 58. Cape 14. C. Z. 13 h. 1865. 8.5
 13^h 32^m 25^s — 41° 52'.6

8.9 and 9.9

1897.4	290. ±	3. ±	Innes	1 n
Discovered at the Transit Circle by Mr W. H. Cox.				

124A

13 hrs.

REFERENCE CATALOGUE OF

No. 59. λ 186. Piazzini 13 h. 143. MAG. 7.0
 $13^{\text{h}} 32^{\text{m}} 46^{\text{s}}$ — $29^{\circ} 19'.8$.

Both = 7.8.

1897.5	196.8	0.20	See	1 n
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No. 60. h. 4600. C. Z. 13 h. 1902. MAG. 7.8
 $13^{\text{h}} 33^{\text{m}} 5^{\text{s}}$ — $48^{\circ} 29'.3$.

Comes = 9.3

1836.3	119.1	15. ±	h	1 n
1880.6	143.8	16.6	Hargrave	1
1882.5	118.7	16.4	"	1

The measure of 1880 which indicated change is evidently erroneous.

No. 61. h. 4598. Lac. 5592. MAG. 7.0
 $13^{\text{h}} 33^{\text{m}} 9^{\text{s}}$ — $74^{\circ} 36'.5$.

Comes = 12.0

1835.3	42.4	15. ±	h	1 n
1871.5	45.4	12.6	Russell	1

The magnitude of the chief star has been estimated as follows:—

Lacaille	7.0
h	5.0
Gilliss	7.8
Russell	6.0 yellow
U. A.	7.0

No. 62. H. C. Wilson. C. Z. 13 h. 1924. MAG. 9.2
 $13^{\text{h}} 33^{\text{m}} 25^{\text{s}}$ — $30^{\circ} 14'.5$.

9.8 and 10.1

1883.3	80. ±	2. ±	Cinc.	1 n
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No. 63. Dunlop 141. Q Centauri. MAG. 5.5
 $13^{\text{h}} 35^{\text{m}} 20^{\text{s}}$ — $54^{\circ} 3'.1$.

5.8 and 7.1

1835.4	164.0	5.40	h	2 n
1871.5	163.7	5.25	Russell	1
1891.4	163.8	5.36	Sellers	2
1897.1	162.9	5.07	See	3

Registered by Mr Russell both as ζ Centauri and h 1713.

No. 64. h. 4608. Lac. 5649. MAG. 7.3
 $13^{\text{h}} 36^{\text{m}} 36^{\text{s}}$ — $33^{\circ} 28'.5$.

8.0 and 8.2

1834.8	170.3	4. ±	h	2 n
1851.2	174.5	4.41	Jacob	2
1876.3	178.5	4.41	Cinc.	3
1879.3	180.3	4.85	Melbourne	1
1890.4	179.2	4.53	Glaserapp	2
1894.5	178.8	4.35	Sellers	1
1896.4	177.2	4.62	Scott	2

There are many other measures. Nature of change remains doubtful.

No. 65. λ 187. C. Z. 13 h. 2114. MAG. 8.3
 $13^{\text{h}} 36^{\text{m}} 37^{\text{s}}$ — $36^{\circ} 52'.2$.

Comes = 12.8

1897.4	33.0	3.89	Lowell	2 n
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No. 66. Howe 23. Lac. 5656. MAG. 7.0
 $13^{\text{h}} 37^{\text{m}} 55^{\text{s}}$ — $39^{\circ} 40'.4$.

7.5 and 8.0

1876.3	190. ±	1.5 ±	Howe	1 n
1897.4	187.8	2.08	See	1

Registered as Innes 222 by error.

No. 67. Σ 3081. W. B. 13 h. 645. MAG. 8.8
 $13^{\text{h}} 39^{\text{m}} 51^{\text{s}}$ — $11^{\circ} 19'.8$.

9.4 and 9.8

1830.6	76.3	1.97	Σ	3 n
1878.3	67.2	2.02	β	2
1880.3	67.8	2.08	Cinc.	2
1880.9	71.5	2.09	Pritchett	2
1886.3	69.6	2.12	Cinc.	1

No. 68. Innes 223. Lac. 5660. MAG. 6.8
 $13^{\text{h}} 40^{\text{m}} 12^{\text{s}}$ — $62^{\circ} 5'.2$.

6.9 red, and 10.4 blue

1897.4	310. ±	10. ±	Innes	1 n
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Retained on account of the marked colours of the stars.

C. P. D. mag. = 8.3.

SOUTHERN DOUBLE STARS.

13 hrs.

125A

No. 69. Harvard. M Centauri. ^{MAG.} 4.6
13^h 40^m 19^s — 50° 55'.9.

At Arequipa a companion within 30" has been noted. See *Harvard Circular*, No. 18.

Two distant faint stars only are revealed by the 7-inch Cape refractor.

Near a fine cluster of stars.

The mag. of M Centauri from the C. P. D. plates = 6.6.

No. 70. β 935a. 86 Virginis. ^{MAG.} 6.0
13^h 40^m 36^s — 11° 55'.5.

Comes = 10.4

1879.4	298.4	1.61	β	5 n
1880.4	299.9	1.63	Cinc.	3-2
1881.4	296.1	1.33	β	2
1889.3	299.6	1.66	"	3
1897.4	293.8	1.52	Aitken	3

With the next pair this forms the old pair Σ 1780 rej.

The p.m. is about 0".03.

β found two small diffused faint nebulae S. pr.

No. 71. β 935b. Anon. ^{MAG.} 10.2
13^h 40^m 36^s — 11° 55'.9.

Comes = 11.0

1879.4	274.2	1.72	β	3 n
1889.3	275.9	2.24	"	3
1897.4	270.6	2.09	Aitken	3

86 Virginis = β 935a is 26".9 N.pr.

It will be noted that β thus found both components of Σ 1780 rej. to be double stars.

No. 72. Cordoba [31]. C. Z. 13 h. 2375. ^{MAG.} 8.5
13^h 40^m 51^s — 63° 21'.7.

9.0 and 9.6

1896.5	257.1	2.44	Sellers	3 n
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No. 73. Dunlop 143. Bris. 4629. ^{MAG.} 7.5
13^h 42^m 16^s — 61° 36'.3.

Bris. 4630 = 8.1 greenish

1836.9	35.8	12.7	"	2 n
1871.3	34.9	12.0	Russell	1
1877.5	34.9	12.1	Cape M. Obs.	3
1878.3	38.6	12.4	C. G. A.	4
1879.5	34.7	11.6	Hargrave	1

Fixed.

No. 74. Howe 24. Lac. 5682. ^{MAG.} 6.4
13^h 43^m 11^s — 35° 12'.0.

C. Z. 13 h. 2526 = 10.0

1876.4	355. ±	8. ±	Howe	1 n
1897.4	353.0	11.45	See	2

No. 75. Harvard. μ Centauri. ^{MAG.} 3.3
13^h 43^m 36^s — 41° 58'.5.

A companion within 30" has been noted at Arequipa. See *Harvard Circular*, No. 18.

Prof. See measures a 14th mag. star 47" S.f., and here the 7-inch refractor shows nothing nearer.

No. 76. h. 4616. C. Z. 13 h. 2601. ^{MAG.} 9.5
13^h 44^m 35^s — 70° 40'.8.

9.7 and 11.7

1835.3	349.9	2. ±	"	1 n
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No. 77. h. 4617. Lac. 5701. ^{MAG.} 7.3
13^h 45^m 2^s — 29° 22'.7.

7.5 and 9.5

1835.0	255.0	4. ±	"	1 n
1880.3	259.7	1.27	Cinc.	1
1883.4	260.8	5.09	"	1
1897.5	260.3	5.10	See	1

The Cinc. distance of 1880.3 seems erroneous.

126A

13hrs.

REFERENCE CATALOGUE OF

No. 78. Rumker 18. N Centauri. 5.4
 13^h 45^m 38^s — 52° 18'.9.

Bris. 4655 = 7.3

1835.4	287.1	18.±	h	1 n
1871.4	289.5	18.1	Russell	1
1897.2	288.7	18.2	See	2

Erroneously called h 4617 by Mr Russell. See preceding entry.

No. 79. H. III. 101. h Centauri. 4.4
 13^h 46^m 3^s — 32° 29'.9.

4.7 and 5.9

1783.1	112.0	[11.58]	H	1 n
1836.6	112.7	8.82	h	5
1851.1	111.1	8.44	Jacob	2
1857.3	109.8	7.88	Secchi	1
1876.3	111.0	8.18	Cinc.	2
1890.4	109.7	7.64	Glasenapp	2
1897.2	109.3	8.11	See	2

There are other measures.

Common p.m. of 0".103 towards 194°.2 indicating physical connection.

Some change shown.

Also recorded as Dunlop 148.

No. 80. β 343. Lac. 5712. 6.7
 13^h 46^m 17^s — 31° 7'.4.

7.0 and 8.4

1877.4	130.2	1.37	Cinc.	1 n
1889.4	129.7	1.70	β	4
1894.4	122.0	0.93	Sellors	2
1897.2	123.0	1.05	See	3

No. 81. H. N. 51. h Centauri. 4.9
 13^h 47^m 27^s — 31° 26'.0.

C. Z. 13 h. 2820 = 8.0

1837.5	185.6	13.8	h	2 n
1897.4	185.1*	14.5	Scott	1

Fixed with a small common p.m. of 0".065 towards 203°.1.

Other measures.

No. 82. Howe 25. γ Centauri. 5.7
 13^h 47^m 42^s — 35° 10'.2.

6.4 and 6.6

1877.4	80.3	0.6 ±	Cinc.	2 n
1889.4	84.0	1.28	β	3
1893.5	86.3	0.85	Sellors	2
1897.4	86.5	0.99	Aitken	3

Also registered as β 1108, with a 15th mag. star at 27".5.

At Arequipa noted as triple within 30". See *Harvard Circular*, No. 18.

This was also noted as a wide pair in 1783 = H V. 124, 54", the companion being C. Z. 13 h. 2838 mag. 8.5.

No. 83. h. 4626. C. Z. 13 h. 2852. 9.0
 13^h 48^m 28^s — 69° 46'.8.

Both = 9.8

1835.3	58.1	3.±	h	2 n
1882.5	55.8	4.01	Hargrave	1

No. 84. Berlin. W.B. 13 h. 783. 8.7
 13^h 48^m 46^s — 14° 38'.1.

Both = 9.5

1890.4	115.±	1.9 ±	Berlin	2 n
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No. 85. Howe 26. Lac. 5751. 7.4
 13^h 49^m 30^s — 31° 36'.5.

7.6 and 9.1

1877.4	117.9	6.41	Cinc	1 n
1897.4	116.3	6.24	See	4

Also noted in the same year as double at Cordoba.

No. 86. Σ 1788. Bradley 1820. ^{MAG.} 6.4
 $13^{\text{h}} 49^{\text{m}} 43^{\text{s}}$ — $7^{\circ} 34'.0$.

6.6 and 8.3

1825.4	51.7	2.76	South	n
1831.4	54.0	2.37	Σ	5
1852.2	64.9	2.66	O Σ	2
1864.8	67.7	2.36	Dembowski	4
1877.4	70.1	2.57	Cinc.	2
1891.1	76.1	2.60	Maw	3-2
1893.3	76.0	2.74	Haverford	2
1896.0	76.0	2.58	Comstock	5

Common p.m. of $0''.202$ towards $270^{\circ}.0$.

A binary system, at present in slow motion.

The apparent rectilinear motion is seven times greater than the apparent orbital motion.

Other measures.

No. 87. Russell 227. Lac. 5741. ^{MAG.} 6.6
 $13^{\text{h}} 49^{\text{m}} 46^{\text{s}}$ — $53^{\circ} 38'.5$.

6.9 and 8.1, both yellow

1880.4	348.5	1.03	Russell	1 n
1891.4	349.0	1.20	Sellors	1
1897.2	352.7	1.44	See	2

At the time of discovery of this fine pair (in 1878) Mr Russell estimated both components = 9.0.

An 11th mag. star is about $30''$ pr. noted by Innes and See.

The chief star is probably also = Lac. 5738.

No. 88. Innes 224. Yarnall, 5852. ^{MAG.} 7.5
 $13^{\text{h}} 50^{\text{m}} 18^{\text{s}}$ — $38^{\circ} 10'.4$.

7.7 and 9.7

1897.4	183.0	2.28	See	1 n
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No. 89. Dunlop 151. Lac. 5750. ^{MAG.} 7.0
 $13^{\text{h}} 50^{\text{m}} 40^{\text{s}}$ — $55^{\circ} 32'.9$.

7.2 and 8.6 blue

1835.9	309.9	11.5	h	2 n
1876.4	1.3	11.3	C. G. A.	1
1894.5	22.2	13.2	Sellors	3
1895.5	23.0	13.4	"	3

Rectilinear motion, if in one star only, of about $0''.25$ towards 250° or 70° according to which star it is, the latter angle applying to the smaller star.

Many other measures.

h , in error, registers this star as a new pair = h 4634, but the measures on page 32 of Mr Russell's catalogue are not applicable to this pair, although there set down for h 4634.

No. 90. h . 4630. C. Z. 13 h. 3019. ^{MAG.} 8.2
 $13^{\text{h}} 50^{\text{m}} 53^{\text{s}}$ — $65^{\circ} 9'.1$.

8.8 and 9.1

1835.3	313.9	4.5 \pm	h	2 n
1874.5	314.5	4.46	Russell	1
1888.3	314.1	4.18	Tebbutt	1

In the field with the next pair.

No. 91. h . 4632. Lac. 5740. ^{MAG.} 6.2
 $13^{\text{h}} 51^{\text{m}} 3^{\text{s}}$ — $65^{\circ} 18'.7$.

Comes = 10.6

1835.3	11.8	6. \pm	h	1 n
1881.5	15.5	5.89	Sydney	2

Called triple (T) in *Harvard Circular*, No. 18, but with the 7-inch Cape refractor no third star can be seen. C. P. D. mag. = 8.0.

No. 92. λ 193. Lac. 5764. ^{MAG.} 8.0
 $13^{\text{h}} 51^{\text{m}} 13^{\text{s}}$ — $27^{\circ} 10'.2$.

Comes = 14.7

1897.5 163.7 6.72 See 1 n
 Lac. 5763, mag. 7.0, is closely N.pr.; and a close pair is N.f.

No. 93. Innes 234. Ö.A. 13,258. ^{MAG.} 8.3
 $13^{\text{h}} 51^{\text{m}} 28^{\text{s}}$ — $27^{\circ} 2'.0$.

8.7 and 9.4

1897.5	314.1	0.58	See	1 n
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Also registered as λ 194.

There is a 9.8 mag. star $3'$ N.

No. 94. h . 4636. C. Z. 13 h. 3088. ^{MAG.} 8.9
 $13^{\text{h}} 51^{\text{m}} 45^{\text{s}}$ — $39^{\circ} 29'.3$.

9.5 and 9.8

1834.8	29.9	1.6 \pm	h	5 n
1893.5	36.7	2.5 \pm	Sellors	1

h :—"A close double star in a very evident nebula $2'$ or $2\frac{1}{2}'$ in diameter." The nebula is h 3548.

C. Z. 13 h, 3105, mag. 9.0, is 19 secs. f. $1'$ N.

128A

13^{hrs.}

REFERENCE CATALOGUE OF

No. 95. h. 2692. Ö.A. 13,274. ^{MAG.} 9.0
 13^h 52^m 20^s — 16° 51'.0

9.4 and 10.2

1885.0	322.6	3.13	Cinc.	2 n
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Another star, 9.5 mag., is 27" S.pr.

B. D.—16°, 3770, mag. 9.3, is 4 secs. pr. 2'.4 N.

No. 96. Harvard. Lac. 5761. 6.4
 13^h 53^m 21^s — 65° 46'.9

A *comes* within 30" has been noted at Arequipa.
 See *Harvard Circular*, No. 18.

With the 7-inch Cape refractor only a *comes* distant
 40" or more is seen.

No. 97. β 344. Ö.A. 13,285. 9.2
 13^h 53^m 30^s — 25° 3'.6

9.9 and 10.1

1877.3	120.8	3.38	Cinc.	1 n
1879.3	126.3	.....	"	1
1880.3	124.4	3.31	"	2

No. 98. Innes 225. Bris. 4713. 7.2
 Orange.
 13^h 54^m 14^s — 62° 28'.0

Comes = 10.9

1897.4	290. ±	3. ±	Innes	1 n
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Noted as difficult at the time of discovery.

C. P. D. mag. = 8.5.

Lac. (5762), mag. 7.5, is 80 secs. pr. 10' N.

No. 99. Russell 231. C. Z. 13 h. 3221. 9.0
 13^h 54^m 26^s — 66° 41'.6

Comes = 9.8

1880.5	160.0	3.86	Russell	1 n
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No. 100. Russell 232. C. Z. 13 h. 3227. ^{MAG.} 8.5
 13^h 54^m 31^s — 66° 32'.0

Both = 9.3

1874.5	176.9	6.15	Russell	1 n
1880.5	175.6	4.99	"	1

Also noted as double at Cordoba.

This pair is also = Russell 234.

1899.2 :—N. star is 0.2 mag. fainter than the S.
 star.

No. 101. h. 4640. Lal. 25,730. 8.5
 13^h 55^m 55^s — 9° 53'.5

Both = 9.3

1836.4	134.3	4. ±	h	1 n
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h had a doubt as to duplicity.

Looked for in 1889 :—No such pair seen in the
 neighbourhood.

No. 102. β 1197. Lac. 5791. 6.5
 13^h 57^m 13^s — 31° 12'.3

6.7 and 8.7

1890.4	178.9	0.86	β	3 n
1897.4	185.2	1.18	See	1
1897.4	187.9	0.93	Aitken	3

No. 103. Cordoba [32]. Brisbane 4750. 7.8
 13^h 58^m 59^s — 49° 55'.2

Both = 8.6 coloured

1891.5	66.9	2.74	Sellors	1 n
1895.5	67.7	2.51	"	3

No. 104. Σ 1799. Lal. 25,841. 7.7
 13^h 59^m 34^s — 6° 4'.4

8.0 and 9.2

1830.7	293.0	4.03	Σ	3 n
1867.3	294.2	3.99	Dembowski	3
1879.3	294.3	4.35	Cinc.	2
1890.4	295.3	4.36	Glasenapp	2

Virtually fixed.

SOUTHERN DOUBLE STARS.

14 hrs.

129A.

No. 1. β 938. Piazz 13 h. 294. ^{MAG.} 8.0
 14^h 0^m 38^s — 26° 6'.0.

8.7 and 8.8

1879.4	117.6*	0.89	β	2 n
1892.4	119.1*	0.62	Haverford	4-2
1892.4	117.1	0.65	β	3
1897.4	111.5	0.72	Aitken	1

Closely N.pr. π Hydrae, 3.5 mag.

No. 2. Dunlop 156. θ Centauri. 2.2
 14^h 0^m 48^s — 35° 52'.7.

There is some unexplained mystery about this star. In 1826 Dunlop saw a companion S.f. 3", and we learn from Prof. See's list of new stars that a companion was again seen in 1891 (8.0 mag.) at Arequipa. It was looked for here in 1896 and 1897, but not seen.

Prof. See has measured a faint star 70" S.f. (his λ 196).

The p.m. of θ Centauri is 0".764 towards 227.0.

A somewhat similar case of disappearance is offered by the companion to ϵ Eridani (3^h 28^m) seen only at Cordoba.

No. 3. Sellors 19. Lac. 5817. 6.9
 14^h 1^m 13^s — 49° 23'.6.

7.4 and 8.1

1895.5	229.6	1.07	Sellors	3 n
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No. 4. h. 4649. C. Z. 14 h. 20 + 1. 8.3
 14^h 2^m 0^s — 59° 14'.9.

Both = 9.1

1836.4	67.6	11.±	h	2 n
1875.5	64.6	8.12	Sydney	2
1879.4	67.4	9.35	C. G. A.	2-3

Colour:—h and Sydney:—both red

Cordoba:—B, orange-yellow

and the latter observatory finds B a quarter of a mag. brighter than A.

No. 5. λ 197. Ö.A. 13,394. 8.5
 14^h 2^m 13^s — 26° 52'.1.

Both = 9.3

1897.5	36.0	0.26	See	1 n
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No. 6. Σ 1802. Lal. 25,901. ^{MAG.} 7.0
 14^h 2^m 40^s — 12° 27'.0.

7.3 and 8.5

1830.6	285.5	4.22	Σ	3 n
1867.0	284.7	4.68	Dembowski	3
1879.3	282.1	4.83	Cinc.	3

Common p.m. of 0".15 towards 137°.

No. 7. Washburn 16. Lal. 25,923. 8.4
 14^h 3^m 11^s — 3° 3'.5.

9.1 and 9.3

1881.4	218.3	3.09	Washburn	3 n
1883.7	211.4*	3.30	Engelmann	6
1888.4	215.2	3.05	Washburn	3
1893.4	215.7	2.37	Haverford	1

No. 8. h. 4655. C. Z. 14 h. 166. 8.0
 14^h 4^m 3^s — 36° 31'.2.

8.2 and 9.7

1834.8	268.9	5.±	h	2 n
1889.4	268.0	5.52	Pollock	2
1897.2	268.2	6.05	See	1

No. 9. Pollock [3]. Bris. 4789. 8.5
 14^h 4^m 35^s — 46° 26'.2.

9.0 and 9.7

1887.4	54.3	4.16	Pollock	2 n
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The place given in the second *Sydney Catalogue* is 17' in error.

Mr Power, at the Transit Circle, noted Bris. 4789 to be double, and a search with the 7-inch showed that it was the only double star in the neighbourhood agreeing with Mr Pollock's description.

No. 10. β 803. Lal. 25,991. 8.0
 14^h 5^m 48^s — 2° 12'.2.

Comes = 11.5

1888.4	220.0	5.38	Washburn	3 n
1892.4	226.5	5.54	β	3
1893.4	240.1	4.78	Haverford	1

Considerable change shown.

Washburn 17 = B.D.—1°, 408, mag. 9.2, a 4½" pair, is 30^s pr.

R

130A

14 hrs.

REFERENCE CATALOGUE OF

No. 11.	h. 4661.	Ö.A. 13,452.	MAG. 8.3
	14 ^h 6 ^m 18 ^s	— 28° 25'.1.	
	9.0 and 9.1		
1835.±	229.0*	2.±	h 1 n
1880.4	229.0*	.....	Cinc. 1
1883.4	232.5	4.40	,, 1

No. 12.	Cordoba [33].	Lac. 5844.	MAG. 6.9
	14 ^h 7 ^m 41 ^s	— 61° 14'.3.	
	7.1 and 9.2		

1887.5	159.6	2.98	Pollock	3 n
1890.5	156.9	2.28	Sellers	1

Separately observed on the meridian at Cordoba in 1875.

No. 13.	Harvard.	Lac. 5850.	MAG. 5.2
	14 ^h 7 ^m 59 ^s	— 56° 37'.0.	

Two comites within 30" have been seen. See *Harvard Circular*, No. 18.

No. 14.	Harvard.	Lac. 5846.	MAG. 5.9
	14 ^h 8 ^m 45 ^s	— 66° 7'.3.	

A companion within 30" has been seen. See *Harvard Circular*, No. 18.

No. 15.	β 939.	Lal. 26,065.	MAG. 8.5
	14 ^h 8 ^m 51 ^s	— 8° 3'.3.	

9.2 and 9.4

1879.9	156.1	0.65	β	2 n
1888.3	147.5	0.72	Haverford	2-1

B.D.—7°, 3798, mag. 9.5, is 87" N.pr.

No. 16.	Harvard.	R Centauri.	MAG. 6.0-9.8
	14 ^h 9 ^m 22 ^s	— 59° 26'.9.	

A variable star, with a companion within 30". See *Harvard Circular*, No. 18.

No. 17.	λ 202.	C. Z. 14 h. 620.	MAG. 8.3
	14 ^h 10 ^m 59 ^s	— 29° 30'.4.	

8.8 and 9.4

1897.5	109.1	0.91	See	1 n
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Prof. See also measures a 12.5 mag. star 31" S.f.

No. 18.	h. 1249.	Ö.A. 13,508.	MAG. 8.5
	14 ^h 11 ^m 30 ^s	— 15° 58'.5.	Red.

Comes = 11.6

1829.0	[155.±]	5.±	h	1 n
1878.4	163.5	.....	Cinc.	1

No. 19.	Howe 28.	Ö.A. 13,520.	MAG. 8.5
	14 ^h 12 ^m 27 ^s	— 27° 3'.5.	

Both = 9.3 white

1877.2	119.8	3.16	Cinc.	2 n
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Prof. See finds A to be a close pair.
Howe 27, a wide and faint pair, is about 20' S.pr.

No. 20.	h. 4667.	Lac. 5865.	MAG. 7.3
	14 ^h 13 ^m 19 ^s	— 73° 5'.8.	

7.9 and 8.3

1835.3	138.3	2.±	h	1 n
1879.5	138.2	1.60	Hargrave	1

Separately observed on the meridian at Cordoba.

No. 21.	β 1246.	Lac. 5892.	MAG. 6.1
	14 ^h 13 ^m 20 ^s	— 25° 21'.8.	

Comes = 14.3

1891.4	187.1	2.99	β	3 n
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Common p.m. of 0".512 towards 307°.3-
β notes another star 11th mag., 36" away.
C. P. D. combined mag. = 7.1.

No. 22. β 1110. Bris. 4857. ^{MAG.} 7.1
Orange-yellow.
14^h 13^m 41^s — 36° 23'.8

Comes = 10.6

1889.4	130.7	3.95	β	3 n
1897.4	133.4	3.52	See	1

The *comes* was well seen in 1896 with the 7-inch Cape refractor.

C. P. D. combined mag. = 8.1.

No. 23. h. 4672. Lac. (5887). 6.5
14^h 13^m 53^s — 42° 35'.9

6.6 yellow, and 9.5 blue

1837.3	302.0	3.±	h	1 n
1881.6	303.5	3.58	Hargrave	1
1890.5	303.7	4.01	Sellors	2
1897.2	304.2	4.02	See	1

There may be a p.m.

No. 24. Washburn 18. Piazz 14 h. 38. 7.8
14^h 13^m 54^s — 18° 3'.8

Comes = 11.3

1881.4	357.9	3.58	Washburn	3 n
1888.4	356.6	3.82	„	3-1

No. 25. Cape Lal. 26,177. 8.0
14^h 14^m 9^s — 13° 14'.5

8.5 and 9.0, both white

1876.4	278.8	3.21	Cinc.	2 n
1885.3	278.0	3.12	„	1
1893.4	276.5	3.08	Haverford	1

Other measures.

Fixed.

Also registered as β 116. This pair was discovered by G. W. H. Maclear, and not by W. Mann, as stated in error in the *Mem. R. A. S.*, vol. xxxiv. p. 45, 1866.

No. 26. λ 204. ψ Centauri. 4.2
14^h 14^m 28^s — 37° 25'.5

Comes = 13.0

1897.1	86.5	35.2	See	2 n
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C. P. D. mag. = 5.4.

No. 27. Cordoba [34]. C. Z. 14 h. 825. ^{MAG.} 8.0
14^h 14^m 31^s — 41° 59'.0

8.7 and 8.9

1889.4	211.3	1.83	Pollock	3 n
1896.5	211.6	1.77	Sellors	3

Separately observed on the meridian at Cordoba in 1878.

No. 28. Dunlop 159. Lac. 5893. 5.0
14^h 15^m 27^s — 58° 0'.1

5.2 yellow, 6.8 greenish

1836.9	163.3	9.64	h	3 n
1858.1	163.3	9.02	Jacob	2
1871.4	159.2	9.78	Russell	2
1879.5	159.9	9.01	Hargrave	1

The companion has been estimated as low as 10th mag. C. P. D. combined mag. = 6.5.

Equal to Rumker 19.

Another *comes*, mag. 9.7, = C. P. D. = 57°, 6620.

1835.0	4.1	35.±	h	1 n
1871.4	1.4	45.9	Russell	2

No. 29. Russell 244. Lac. 5901. 6.5
14^h 16^m 6^s — 47° 51'.8

6.6 and 9.6 blue

1881.5	125.3	3.95	Russell	1 n
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No. 30. h. 4671. Lac. 5864. 7.5
14^h 17^m 3^s — 79° 39'.1

8.1 and 8.4

1836.8	127.4	5.94	h	1 n
1873.4	126.8	6.76	Russell	1
1880.4	124.0	5.36	„	1

Mr Russell's later observation is recorded as a new pair, Russell 243.

Both components have been observed on the meridian at Cordoba.

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14 hrs.

REFERENCE CATALOGUE OF

No. 31. Σ 1833. Mayer 585. MAG. 6.2
 14^h 17^m 21^s — 7° 18' 6".

6.9 and 7.0

1832.4	166.7	4.92	Σ	3 n
1866.7	167.3	5.14	Dembowski	3
1879.2	168.4	5.32	Cinc.	3
1889.4	169.5	5.71	Glasenapp	4
1891.4	167.8	5.64	Hough	1

Practically fixed.

Common p.m. of $0''.171$ towards $185^\circ.0$.

The motion through space is at least ten times greater than the orbital motion.*

No. 32. Σ 1837. Bradley 1861. 6.5
 14^h 19^m 18^s — 11° 13' 0".

6.7 and 8.4

1829.8	326.9	1.41	Σ	4 n
1848.4	324.5	1.50	Mitchel	1
1853.0	318.4	1.56	Jacob	5
1868.2	312.9	1.40	Dembowski	7
1877.4	306.8	1.43	Cinc.	2
1888.4	303.2	1.45	Hall	3

Many other measures.

Some change shown.

Small common p.m. of about $0''.05$.

No. 33. Ormond Stone. Yarnall, 6052. 7.3
 14^h 19^m 25^s — 27° 40' 5".

7.6 and 8.7

1877.4	270.4	0.5 \pm	Cinc.	1 n
1880.4	275.6	0.8 \pm	"	2
1897.5	285.8	0.31	See	1

This pair seems worthy of more attention than it has received.

No. 34. β 225. Lal. 26,319. 7.3
 14^h 19^m 52^s — 19° 30' 8".

7.7 and 8.6

1867.4	102.5	1.06	Harvard	1 n
1875.7	101.9	1.40	Dembowski	3
1877.4	101.6	1.32	Cinc.	2
1890.4	101.5	1.66	Glasenapp	2
1893.5	98.7	1.24	Sellors	1

* No. 31. This assumes that the proper motion is wholly due to the stars themselves, and independent of the sun's movement through space.

Also registered as Harvard 138.
 Lal. 26,320, mag. 7.0, is 35" S.f., and, with the above pair, composes the old pair H. N. 80.

In several catalogues a correction of 10^m to the R.A. is required.

No. 35. Cordoba [35]. Lal. 26,334. MAG. 8.2
 14^h 20^m 37^s — 23° 45' 7".

8.5 and 9.7

1879.4	110.0	2.05	C. G. A.	3 n
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No. 36. Harvard. Lac. 5934. 6.3
 14^h 20^m 45^s — 45° 40' 9".

At Arequipa two *comites* within 30" have been seen.
 See *Harvard Circular*, No. 18.

No. 37. β 940. γ Hydrae. 5.0
 14^h 22^m 19^s — 29° 2' 5".

Comes = 11.1

1879.4	276.8	4.00	β	3 n
1889.4	278.7	4.27	"	3
1897.4	278.7	5.37	See	2

The p.m. of the chief star is $0''.068$ towards $242^\circ.8$.

No. 38. Hough 386. B.D.—22°, 7.8
 3793.
 14^h 22^m 43^s — 22° 33' 6".

Comes = 12.0

1893.3	326.6	3.76	Hough	1 n
B.D.—22°, 3794, mag. 8.1, is 6 ^s f. 2 $\frac{1}{2}$ ' N.				

No. 39. Harvard. Bris. 4918. 6.3
 14^h 22^m 55^s — 67° 16' 1".

At Arequipa two *comites* within 30" have been seen.
 See *Harvard Circular*, No. 18.

C. P. D. mag. = 7.6.

SOUTHERN DOUBLE STARS.

14hrs.

133A

No. 40. Σ 1846. ϕ Virginis. 4.9
 14^h 23^m 3^s — 1° 46'.8.

Comes = 9.3

1829.7	108.8	3.73	Σ	5 n
1848.4	109.3	4.00	Mitchel	1
1875.4	112.6	4.27	Temple Obsy.	2-1
1887.4	113.8	4.46	Hall	3
1890.4	109.9	4.50	Glasenapp	2

Common p.m. of 0".153 towards 269°.3.

Other measures.

No. 41. Harvard. Lac. 5950. 5.5
 14^h 23^m 41^s — 49° 4'.3.

At Arequipa two comites within 30" have been seen.

See *Harvard Circular*, No. 18.

No. 42. Cinc. W.B. 14 h. 388. 8.8
 14^h 24^m 3^s — 14° 34'.2.

9.2 and 10.1

1879.4	202.0	.....	Cinc.	1 n
1880.3	198.7	3.70	"	5

Discovered by H. V. Egbert.

No. 43. β 462. 1st Munich 10,229. 9.1
 14^h 24^m 48^s — 3° 16'.5.

9.8 and 10.0

1877.4	324.4	2.01	Dembowski	2 n
1880.3	328.9	1.96	β	1
1891.3	325.1	2.16	"	3

A 12th mag. star 15" away.

No. 44. β 117. Lal. 26,481. 8.0
 14^h 25^m 49^s — 15° 11'.1.

8.5 and 9.2

1867.4	96.7	2.16	Harvard	1 n
1876.4	95.8	2.44	Dembowski	3
1878.7	92.9	2.23	Cinc.	2
1881.9	92.2	2.17	β	2
1884.4	95.3	2.36	Hall	3
1888.4	90.4	2.29	Haverford	2
1890.4	96.6	2.53	Glasenapp	2

Common p.m. of 0".438 towards 147°.4.

Also equal to Harvard 139, and Prof. Hall remarks that this pair was discovered by J. R. Eastman. The pair is undoubtedly Burnham's by priority of publication.

No. 45. λ 206. Lac. 5975. 7.3
 14^h 26^m 3^s — 31° 44'.5.

7.4 and 10.5

1897.4	190.8	1.11	See	1 n
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A 14.5 mag. star is 23" N.f.

No. 46. Harvard. Lac. 5969. 6.5
 14^h 26^m 36^s — 52° 14'.2.

Noted as double within 30" at Arequipa.

See *Harvard Circular*, No. 18.

No. 47. β 1112. Lac. 5983. 6.0
 14^h 27^m 14^s — 30° 16'.4.

Comes = 11.0

1889.4	7.6	2.44	β	6 n
1897.4	3.1	2.46	Aitken	3
1897.4	7.7	2.66	See	2

C. P. D. mag. = 7.6.

Registered as a new pair in *Harvard Circular*, No. 18.

No. 48. h. 4685. C. Z. 14 h. 1713. 9.0
 14^h 28^m 18^s — 45° 43'.4.

9.6 and 9.9

1834.5	76.±	0.6±	h	1 n
1882.2	83.4	2.21	Russell	1

No. 49. λ 207. η Centauri. 2.5
 14^h 29^m 9^s — 41° 43'.1.

Comes = 13.5

1897.1	270.1	5.65	See	3 n
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The p.m. of the chief star is 0".058 towards 236°.4.

No. 50. Harvard. Piazz 14 h. 110. 6.3
 14^h 29^m 12^s — 41° 4'.6.

A companion within 30" has been seen at Arequipa.

See *Harvard Circular*, No. 18.

134A

14 hrs.

REFERENCE CATALOGUE OF

No. 51. Russell 248. C. Z. 14 h. 1772. ^{MAG.} 8.3
 14^h 29^m 12^s — 46° 14'.8.

8.7 and 9.5

1874.4	291.4	5.50	Russell	1 n
1897.2	290.9	5.43	See	3

Also noticed as a double star at Cordoba about the same time.

No. 52. Russell 249. C. Z. 14 h. 1758. ^{MAG.} 8.1
 14^h 29^m 18^s — 62° 4'.3.

8.3 and 10.1

1881.6	33.6	2.77	Russell	1 n
1882.5	35.0	4.14	Hargrave	1
1896.5	35.1	2.88	Sellers	3

First seen at Cordoba.

Also registered as Hargrave 102.

No. 53. h. 4687. C. Z. 14 h. 1793. ^{MAG.} 7.7
 14^h 29^m 29^s — 36° 6'.8.

8.4 and 8.6

1836.4	81.1	2.46	h	1 n
1837.6	83.5	2.03	"	1
1856.5	84.0	1.89	Jacob	2
1889.4	87.6	1.77	Pollock	1
1897.4	92.1	1.65	Lowell	4

The N.pr. of three stars.

No. 54. Harvard. Lac. 5995. ^{MAG.} 5.3
 14^h 29^m 46^s — 45° 48'.5.

A companion within 30" has been noted at Arequipa.

See *Harvard Circular*, No. 18.

Mag. in C. P. D. = 7.4.

No. 55. Cordoba [36]. C. Z. 14 h. 1808. ^{MAG.} 8.4
 14^h 30^m 6^s — 59° 55'.2.

8.7 and 10.0

1882.5	134.5	4.43	C. G. A.	1 n
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C. Z. 14 h. 1809, mag. 9.2, is 67" S.

No. 56. h. 4690. α Lupi. ^{MAG.} 5.4
 14^h 30^m 37^s — 45° 41'.8.

5.5 yellow, and 7.8 blue

1834.5	26.3	25.±	h	1 n
1846.8	24.8	19.0	Jacob	2
1880.4	23.6	19.8	Russell	1

Both components have been observed on the meridian at Cordoba.

Mags. in C. P. D. :—7.5 and 8.2.

No. 57. Howe 29. Yarnall, 6124. ^{MAG.} 7.5
 14^h 30^m 59^s — 37° 5'.8.

8.0 and 8.5 bluish

1889.4	214.6	4.30	Pollock	2 n
1890.5	215.4	3.96	Sellers	1
1897.2	213.8	4.24	See	3

Also seen at Cordoba.

No. 58. β 804. W.B. 14 h. 558. ^{MAG.} 8.4
 14^h 32^m 46^s — 8° 14'.3.

8.5 and 11.3

1881.5	166.2	1.40	β	2 n
1888.7	159.5	1.39	Washburn	3-2
1891.3	160.9	1.29	β	3

No. 59. Richaud. α Centauri. ^{MAG.} 0.2
 14^h 32^m 48^s — 60° 25'.4.

0.4 yellow, and 1.9 deep yellow

Orbits of this noble double star will be found in most treatises on Astronomy.

Here, an ephemeris for the next few years taken from Prof. See's paper in the *M. N. of the R. A. S.*, vol. liv. p. 114, may be sufficient.

1899.5	209.5	21.92
1900.5	210.0	21.96
1901.5	210.4	21.95
1902.5	210.8	21.89

Prof. See makes the length of the apparent major axis 32".50; the common p.m. of the centre of gravity of the system is 3".688 towards 281°.5. Remembering that this is the thwart motion only, it will take at most four and two-fifths years' motion through space to describe a distance equal to the apparent major semi-axis of the system. Moreover, adopting the parallax 0".75 found by Gill and Elkin, a distance equal to the major semi-axis of the Earth's orbit is described every seventy-four days.

SOUTHERN DOUBLE STARS.

14 hrs.

135A

This pair has been the subject of many papers, among which the following will be found:—

1856. Powell, Eyre B., "Orbit," *Mem. R. A. S.*, vol. xxiv. pp. 91-95.
 1876. Stone, E. J., "Proper Motions," *M. N. R. A. S.*, vol. xxxvi. pp. 258-265.
 1880. Elkin, W. L., "Dissertation." 4to. Karlsruhe.
 1884. Gill, D., and Elkin, W. L., "Orbit," etc., *Mem. R. A. S.*, vol. xlviii. p. 15.
 1893. Roberts, A. W., "Orbit," *Astr. Nachr.*, No. 3175.
 1893. See, T. J. J., "Orbit," *M. N. R. A. S.*, vol. liv. No. 2.
 1893. Tebbutt, J., "Measures," *M. N. R. A. S.*, vol. liv. No. 2.
 1895. Roberts, A. W., "Mass," etc., *Astr. Nachr.*, Nos. 3313 and 3324.
 1896. Doberck, W., "Orbit," *Astr. Nachr.*, No. 3330.
 1896. Roberts, A. W., "Orbit," *Astr. Nachr.*, No. 3360.

There are several faint stars near enough to this system to be of interest. One, mag. 10.5, at 82" was measured by Mr Sellors in 1896. With the McClean Telescope two fainter *comites* were picked up here in 1898, one of which is much nearer than the 10.5 mag. star. See appendix of new double stars.

No. 60. β 226. Lal. 26,665. ^{MAG.} 8.0
 14^h 33^m 13^s — 21° 53'.6.

8.7 and 8.9, both white

1875.4	81.0	0.7 ±	Schiaparelli	2 n
1877.4	80.9	0.97	Cinc.	2-1
1879.3	80.3	1.02	"	1
1879.4	82.7	0.95	β	1
1880.3	83.1	0.99	Cinc.	1
1884.3	85.3	1.01	"	2
1890.4	85.1	0.9 ±	Glazenapp	3

Slow increase in angle.

The mag. in the C. P. D. = 7.3.

No. 61. λ 209. Lac. 6026. 6.7
 14^h 33^m 46^s — 45° 21'.7.

Comes = 13.8

1897.2	240.7	12.78	See	1 n
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No. 62. β 805b. Anon. ^{MAG.} 10.0
 14^h 34^m 15^s — 26° 40'.4.

10.1 and 12.6

1881.4	239.7	1.99	β	3 n
1888.9	243.1	1.99	Washburn	2-1

Ö.A. 13,799, mag. 7.2, with a faint *comes* at 24", is 2' S.pr., and composes the pair β 805a.

No. 63. Dunlop 166. α Circini. 3.4
 White.

14^h 34^m 25^s — 64° 32'.4.

Cape 1880, 7974 = 8.2, brick-red

1837.0	244.0	15.7	<i>h</i>	4 n
1872.0	240.3	15.7	Russell	2
1885.6	239.2	15.9	Tebbutt	1
1897.2	249.9	17.8	See	1

Common p.m. of 0".315 towards 220°.1.

The contrast of colour in this pair is very striking; it requires no imagination to notice the peculiar hue of the *comes*. There is no other such coloured pair in the southern heavens.

No. 64. β 806b. Lac. 6042. 6.9
 14^h 34^m 36^s — 25° 49'.5.

7.1 and 9.1

1890.4	96.3	0.67	β	3 n
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Seen in 1897 with the Cape 7-inch refractor.

The chief star of the old pair β 806, since the discovery of which both stars have been proved double. See below for the second star which is 71".5 N.f. in the direction 67°.3 from β 's measures in 1881 and 1890.

A 13.5 mag. star, 17".8 distant, has been observed in the direction 329°.6.

No. 65. β 806a. C. Z. 14 h. 2121. 8.5
 14^h 34^m 41^s — 25° 49'.0.

8.9 and 9.8

1881.4	347.8	1.22	β	3 n
1890.4	344.9	1.20	"	3

This is the *comes* of the old pair β 806. See the preceding star.

136A

14 hrs.

REFERENCE CATALOGUE OF

<p>No. 66. Harvard. α Lupi. MAG. 2.5 $14^{\text{h}} 35^{\text{m}} 17^{\text{s}}$ — $46^{\circ} 57'.5$.</p> <p>A companion within $30''$ has been observed at Arequipa. See <i>Harvard Circular</i>, No. 18.</p> <p>No. 67. Dunlop 168. C. Z. 14 h. 7.5 $2164+2$. $14^{\text{h}} 35^{\text{m}} 36^{\text{s}}$ — $54^{\circ} 45'.2$.</p> <p>8.2 and 8.4, both bluish</p> <p>1837.1 204.1° $6''.70$ h 3 n 1872.5 202.2^* 6.05 Russell 1</p> <p>Indexed erroneously as h 4693 by Mr Russell. N.pr. Lac. 6057, mag. 6.4, and Bris. 5026, mag. 7.5, two stars $68''$ apart.</p> <p>No. 68. β 345. Lac. 6051. 7.2 $14^{\text{h}} 35^{\text{m}} 50^{\text{s}}$ — $29^{\circ} 16'.1$.</p> <p>7.6 and 8.3</p> <p>1877.4 308.2^* $0''.88$ Cinc. 1 n 1880.4 299.4 0.90 „ 1 1892.4 303.5 0.94 β 3 1897.4 301.9 0.98 Aitken 3 1897.5 303.7 0.92 See 2</p> <p>No. 69. β 414. Lac. 6052. 6.6 $14^{\text{h}} 35^{\text{m}} 53^{\text{s}}$ — $30^{\circ} 30'.2$.</p> <p>6.9 and 8.2</p> <p>1889.4 345.6 $1''.01$ β 3 n 1896.5 346.5 0.90 Lick 4 1897.4 342.5 0.86 See 1 1897.4 344.9 0.89 Aitken 3</p> <p>No. 70. λ 210. Yarnall, 6153. 8.0 $14^{\text{h}} 35^{\text{m}} 58^{\text{s}}$ — $32^{\circ} 23'.1$.</p> <p>Both = 8.8</p> <p>1897.4 264.8 $0''.48$ See 1 n Prof. See also measures two distant faint <i>comites</i>. A 6.9 mag. star is N.f.</p>	<p>No. 71. Cordoba. C. Z. 14 h. 2171. MAG. 8.3 $14^{\text{h}} 36^{\text{m}} 44^{\text{s}}$ — $75^{\circ} 33'.5$.</p> <p>9.0 and 9.2</p> <p>1880.6 124.5° $1''.24$ C. G. A. 1 n Noted as double in the C. P. D.</p> <p>No. 72. Cordoba [37]. C. Z. 14 h. 2250. 8.7 $14^{\text{h}} 37^{\text{m}} 3^{\text{s}}$ — $37^{\circ} 6'.8$.</p> <p>9.3 and 9.6</p> <p>1897.4 269.5° $2''.29$ Lowell 2 n</p> <p>No. 73. Harvard. Lac. 6039. 5.2 $14^{\text{h}} 37^{\text{m}} 21^{\text{s}}$ — $62^{\circ} 26'.9$.</p> <p>A companion within $30''$ has been observed at Arequipa. See <i>Harvard Circular</i>, No. 18.</p> <p>No. 74. β 807. W.B. 14h. 644. 8.5 $14^{\text{h}} 37^{\text{m}} 41^{\text{s}}$ — $6^{\circ} 22'.7$.</p> <p>8.9 and 10.0</p> <p>1881.4 239.0° $1''.24$ β 3 n 1888.5 242.4 1.13 Haverford 1 1888.5 237.2 1.19 Washburn 3</p> <p>No. 75. Harvard. Lac. 6057. 6.2 $14^{\text{h}} 37^{\text{m}} 58^{\text{s}}$ — $55^{\circ} 10'.6$.</p> <p>Two <i>comites</i> within $30''$ have been noted at Arequipa. See <i>Harvard Circular</i>, No. 18. Bris. 5026, mag. 7.5, is closely S.f., and with the above star forms the old pair, Dunlop 169.</p> <p>No. 76. Washburn 19. C. P. D. 9.3 — $24^{\circ} 53'66$. $14^{\text{h}} 37^{\text{m}} 59^{\text{s}}$ — $24^{\circ} 50'.7$.</p> <p>9.5 and 11.1</p> <p>1881.4 194.9° $1''.76$ Washburn 2 n 1888.4 195.3 1.64 „ 2 4 Librae, mag. 5.8, is N.pr.</p>
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SOUTHERN DOUBLE STARS.

14 hrs.

137A

No. 77. Innes 235. Lac. 6046. ^{MAG.} 7.2
 14^h 39^m 10^s — 68° 5' 9."

7.6 and 8.6

1897.5 120.± 1.± Innes 2 n
 Two other stars are in the field.

No. 78. h. 4696. Lac. 6072. ^{MAG.} 7.2
 14^h 39^m 25^s — 44° 26' 7."

Comes = 14.0

1834.4 212.6 4.± h 1 n

No. 79. h. 4698. *δ* Lupi. ^{MAG.} 5.1
 Yellow
 14^h 40^m 1^s — 51° 57' 6."

Comes = 11.8

1836.5 262.7 10.± h 1 n
 1897.2 259.9 9.01 See 4

This fine pair has a common p.m. of 0".128 towards 188°.7.

Registered as a new pair by Prof. See in the *Astr. Nachr.*

C. P. D. mag. = 7.2.

No. 80. H. III. 97. *m* Hydrae. ^{MAG.} 5.1
 14^h 40^m 13^s — 25° 1' 1."

5.3 and 7.2

1783.0 128.2 11.28 H 1 n
 1823.2 136.7 9.90 South —
 1834.4 136.8 7.± h 1
 1856.5 130.7 8.56 Secchi 1
 1876.4 129.8 9.68 Cinc. 1
 1880.4 129.5 9.20 " 3
 1890.4 129.1 8.73 Glasenapp 2
 1896.4 130.3 8.54 Scott 2
 1897.5 128.1 9.00 See 1

The companion is U.A. 383 Hydrae.

Common p.m. of 0".224 towards 243°.0.

The discordances, especially in distance, in the few measures of this easy pair, seem too large to be due to accidental errors. Can one of the components be double, and if so, is it beyond the reach of our present instruments?

No. 81. Harvard. Lac. 6074. ^{MAG.} 6.5
 14^h 40^m 13^s — 51° 47' 1."

No. 82. Harvard. Lac. 6059. ^{MAG.} 6.1
 14^h 40^m 16^s — 66° 10' 4."

To each of the above stars the Arequipa observers assign a companion within 30".

See *Harvard Circular*, No. 18.

No. 83. Washburn 20. 5 Librae. ^{MAG.} 6.6
 14^h 40^m 27^s — 15° 2' 3."

Comes = 11.7

1881.4 249.8 2.69 β 3 n
 1888.7 244.3 2.70 Washburn 4-2
 1889.4 249.2 2.79 β 3

The p.m. of 5 Librae is small, about 0".04.

No. 84. Σ 1876. Lal. 26,890. ^{MAG.} 7.8
 14^h 41^m 4^s — 6° 57' 7."

8.3 and 8.8 white

1831.0 46.8 1.01 Σ 3 n
 1833.3 55.4 1.31 " 4
 1844.3 57.2 1.24 Mädler 1
 1848.4 59.8 0.95 Mitchel 1
 1856.9 60.8 1.00 Secchi 2
 1857.5 61.6 1.± Dembowski 3
 1863.4 65.8 1.20 " 3-2
 1878.3 68.0 1.25 Cinc. 2
 1887.4 73.0 1.13 Hall 2
 1895.5 75.1 1.01 Comstock 3

Other measures.

A binary in slow motion.

An 11th mag. star at 71" has been measured by Prof. Hough.

No. 85. λ 212. C. Z. 14 h. 2568. ^{MAG.} 7.4
 14^h 41^m 51^s — 31° 49' 7."

8.0 and 8.4

1897.4 28.7 0.26 ± See 1 n
 C. P. D. mag. = 8.5.

8

138A

14 hrs.

REFERENCE CATALOGUE OF

No. 86.	λ 213.	Ö.A. 13,938.	MAG. 8.1
	14 ^h 42 ^m 13 ^s	— 29° 59'.8.	
	8.5 and 9.4		
1897.5	167.3	0.24	See 1 n
Ö.A. 13,941, mag. 8.0, is closely S.f.			
No. 87.	β 346.	Lal. 26,940.	MAG. 7.0
	14 ^h 42 ^m 57 ^s	— 16° 55'.3.	
	7.4 and 8.2		
1877.4	236.1	1.28	Dembowski 2 n
1878.4	235.3	1.23	Cinc. 2
1881.0	239.2	1.18	Schiaparelli 2
No. 88.	Innes 236.	Lac. 6066.	MAG. 5.6
	14 ^h 43 ^m 13 ^s	— 72° 46'.7.	
	<i>Comes</i> = 9.0		
1897.5	92. ±	1.9 ±	Innes 1 n
At Arequipa two <i>comites</i> to this star within 30" were noted in 1891. See <i>Harvard Circular</i> , No. 18. C. P. D. mag. = 7.1.			
No. 89.	β 617.	Ö.A. 13,951.	MAG. 8.7
	14 ^h 43 ^m 29 ^s	— 23° 50'.9.	
	8.9 and 10.5		
1878.3	336.6	2.73	β 2 n
1880.4	337.2	2.14	Cinc. 2
1897.5	335.3	2.57	See 1
Lac. 6111, mag. 5.7, is 59" N.f.			
No. 90.	β 106.	μ Librae.	MAG. 5.4
	14 ^h 43 ^m 50 ^s	— 13° 43'.9.	
	5.8 red, and 6.6 blue		
1875.6	335.0	1.38	Dembowski 5 n
1877.0	335.1	1.53	Schiaparelli 7
1877.4	335.8	1.67	Cinc. 2
1878.3	333.2	1.50	β 1
1879.3	335.0	2.02	Cinc. 3-2
1883.4	337.4	1.51	Engelmann 6
1888.3	339.2	1.63	Haverford 3
1889.4	340.6	1.61	β 3
1890.4	339.0	2.01	Glazenapp 2
1897.4	340.2	1.57	Aitken 3
Common p.m. of 0".097 towards 260°.6.			
A binary system in very slow motion.			
Five very faint distant <i>comites</i> have been observed by β .			

No. 91.	h. 4706.	Bris. 5073.	MAG. 8.1
	14 ^h 44 ^m 33 ^s	— 46° 59'.5.	
	8.5 and 9.4, both yellow		
1837.0	217.4	7.13	<i>h</i> 2 n
1848.1	221.1	6.41	Jacob 2
1878.5	219.9	7.82	C. G. A. 3
1881.5	216.7	6.26	Hargrave 1
1897.2	218.9	6.65	See 3
Fixed.			
No. 92.	h. 4707.	Bris. 5071.	MAG. 7.7
	14 ^h 45 ^m 46 ^s	— 66° 0'.2.	
	8.4 and 8.6		
1835.3	219.7	1.5 ±	<i>h</i> (mirror) 1 n
1837.5	225.2	1.50	„ (O. G.) 4
1871.4	Not found.	Foggy	Russell 1
1897.6	140°. ±	0".7 ±	Innes 1
A binary system showing some 280° change in sixty years, but more measures are required.			
The p.m. is about 0".29 towards 211°.5.			
No. 93.	h. 4712.	C. Z. 14 h. 2944.	MAG. 7.8
	14 ^h 48 ^m 6 ^s	— 55° 1'.4.	
	8.5 and 8.6		
1835.4	227.3	6.27	<i>h</i> 2 n
1877.4	227.8	6.70	Sydney 2
Fixed.			
No. 94.	β 118.	Ö.A. 14,034.	MAG. 8.3
	14 ^h 48 ^m 7 ^s	— 16° 6'.2.	
	8.7 and 9.5		
1875.9	307.4	1.84	Dembowski 2 n
1879.7	306.0	1.96	Cinc. 2
1886.3	308.6	1.95	L. McC. 1
1898.5	305.5	1.88	See 1
No. 95.	Innes 226.	Lac. 6135.	MAG. 7.0
	14 ^h 48 ^m 17 ^s	— 33° 44'.0.	
	<i>Comes</i> = 11.0		
1897.4	230. ±	2.5 ±	Innes 1 n

SOUTHERN DOUBLE STARS.

14 hrs.

139A

No. 96. β 942. Harvard Zone 51, No. 58. 11.3
 $14^{\text{h}} 48^{\text{m}} 31^{\text{s}}$ — $0^{\circ} 3'.3$.

12.0 and 12.1

1879.4	189.9	1.24	β	2 n
1892.3	191.2	1.26	"	3

The mags. given by β are 9.2 and 9.3.

No. 97. β 347. Lac. 6137. 6.3
 Orange

 $14^{\text{h}} 48^{\text{m}} 31^{\text{s}}$ — $32^{\circ} 53'.6$.*Comes* = 10.5

1889.4	320.6	13.0	β	3 n
1890.4	319.8	13.4	Glazenapp	2
1897.4	318.1	12.9	Aitken	2

The C. P. D. mag. = 7.7.

Another star, 9.8 mag., is $58''.5$ distant.

No. 98. Innes 84. Lac. 6138. 7.5
 $14^{\text{h}} 48^{\text{m}} 41^{\text{s}}$ — $36^{\circ} 1'.3$.

7.7 and 9.8

1896.7	270. \pm	4. \pm	Innes	3 n
1897.4	255.6	4.90	See	1

Prof. See gives a difference of brightness between the two components of 7.1 mags.

C. Z. 14 h. 3006, mag. 8.5, is $5'.5$ S.

No. 99. Harvard. Lac. 6105. 6.5
 $14^{\text{h}} 49^{\text{m}} 7^{\text{s}}$ — $74^{\circ} 37'.7$.

Noted as double at Arequipa, the *comes* being within $30''$.See *Harvard Circular*, No. 18.

No. 100. h. 4715. Lac. 6141. 5.7
 $14^{\text{h}} 49^{\text{m}} 44^{\text{s}}$ — $47^{\circ} 28'.4$.

6.0 and 7.2

1836.0	277.8	3.04	<i>h</i>	3 n
1850.8	281.1	2.41	Jacob	3
1854.0	278.5	2.54	"	2-1
1877.4	278.5	3.30	Melbourne	2
1893.5	275.9	2.08	Sellers	1
1896.5	277.3	3.25	Innes	1
1897.1	277.7	2.71	See	2

Fixed.

No. 101. Washburn 21. B. D.— 14° , 4070. 8.6
 $14^{\text{h}} 50^{\text{m}} 3^{\text{s}}$ — $14^{\circ} 19'.7$.

9.3 and 9.4

1881.4	23.0	3.92	Washburn	3 n
1888.4	21.5	3.79	"	3
1888.4	22.0*	3.86	Haverford	1

Other measures.

No. 102. Innes 227. Lac. 6152. 7.3
 $14^{\text{h}} 50^{\text{m}} 21^{\text{s}}$ — $34^{\circ} 13'.6$.

7.8 and 8.3

1897.4	110. \pm	0.9 \pm	Innes	1 n
1897.4	100.0	0.76	See	1

A 9.6 mag. star, $48''$ N.f., = C. P. D. — 34° , 6262. Equal to λ 215.

No. 103. h. 4716. C. P. D.— 24° , 5406. 9.1
 $14^{\text{h}} 50^{\text{m}} 32^{\text{s}}$ — $24^{\circ} 16'.2$.

9.5 and 10.3

1834.4	2.0	1.5 \pm	<i>h</i>	1 n
1856.5	11.7	1.5 \pm	Secchi	1
1879.8	357.7	3.10	Cinc.	2
1882.4	357.6	3.26	"	2
1897.5	357.8	3.03	See	1

Prof. See identifies this pair with C. Z. 14 h. 2984.

Identification adopted agrees with *h*'s position.

C. Z. 14 h. 3126 is 11 secs. f.

No. 104. h. 4718. Bris. 5123. 7.0
 $14^{\text{h}} 51^{\text{m}} 21^{\text{s}}$ — $34^{\circ} 58'.8$.

7.2 orange, and 8.8 blue

1834.3	72.5	1.2 \pm	<i>h</i>	1 n
1856.3	62.1	1.86	Jacob	2-1
1858.1	61.6	2.10	"	1
1897.4	62.3	2.26	See	1

Noted as double at Cordoba in 1878.

Combined mag. in C. P. D. = 8.2.

140A

14 hrs.

REFERENCE CATALOGUE OF

No. 105. H. N. 28. **Piazzi 14 h. 212-4.** ^{MAG.} 5.9
 14^h 51^m 37^s — 20° 57'.8.

6.1 yellow, and 7.6 orange

1806.0	251.4	9.4	Piazzi	M.O.
1823.3	270.1	10.82	South	1 n
1836.7	277.4	12.08	h	1
1856.3	284.0	13.34	Jacob	2
1877.4	290.2	14.98	Cinc.	1
1878.5	290.3	15.02	Dembowski	1
1879.3	289.5	15.42	Cinc.	2
1881.4	291.3	15.38	β	4
1881.5	290.8	15.46	Pritchett	1
1884.4	291.2	15.90	Hall	3
1885.3	292.0	15.61	Cinc.	1
1886.3	293.0	15.71	"	1
1896.4	293.6	16.76	Comstock	1
1896.4	292.4	15.60	Scott	2
1898.3	293.6	17.12	See	1

Common p.m. of 2".014 towards 151°.3.

An important system of the 61 Cygni class.

Also called South and h 190.

A determination of the parallax with the Cape heliometer has been undertaken by Mr de Sitter.

No. 106. Gilliss 213. **Lac. 6136.** 7.2
 14^h 52^m 20^s — 67° 35'.0

7.4 and 8.9

1872.6	335.5	5.65	Russell	1 n
1887.5	332.6	5.07	Pollock	3
1896.5	333.7	5.06	Sellers	3

Also registered as Russell 255.

In the *Mem. R. A. S.*, vol. xlvii., the Dec. is given as -69° 35' in error.

No. 107. β 239. **59 Hydrae.** 5.8
 14^h 52^m 44^s — 27° 15'.4.

6.5 and 6.6

1874.5	303.7*	0.8 ±	β	5 n
1875.4	308.4	0.9 ±	Schiaparelli	1
1878.4	309.5*	0.93	β	1
1879.4	310.5	0.98	Cinc.	3-2
1880.4	307.4	0.90	"	4
1881.4	312.0	1.07	β	4
1888.4	308.3*	0.95	Haverford	1
1889.4	311.4	0.86	β	3
1897.5	315.8	0.92	See	2

The p.m. is less than 0".1.

As is generally the case with close pairs so disadvantageously placed for northern observers, the measures are somewhat discordant.

A binary system.

No. 108. β 808. **B. D.—8°, 3872.** 9.4
 14^h 52^m 51^s — 8° 16'.9.

Both = 10.2

1881.4	201.5	0.63	β	2 n
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W.B. 14 h. 950, mag. 9.0, is 94" N.pr.

No. 109. Innes 237. **C. Z. 14 h. 3269.** 8.8
 14^h 52^m 55^s — 41° 33'.3.

9.3 and 9.8

1897.7	205. ±	0.8 ±	Innes	2 n
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In a line with C. Z. 14 h. 3264, mag. 9.3, and C. Z. 14 h. 3265, mag. 9.6.
 All N.f. κ Centauri, mag. 3.4.

No. 110. h. 4722. **Lac. 6183.** 7.2
 14^h 53^m 27^s — 30° 18'.6.

7.4 yellow, and 9.6 orange

1836.0	346.7	9. ±	h	2 n
1885.3	340.6	8.13	Cinc.	1
1890.4	341.0	8.77	Glasenapp	2
1897.5	338.7	8.63	Lowell	4

Also registered as Howe 30.

Prof. See also measures two distant faint stars.

No. 111. β 1085. **Piazzi 14 h. 229.** 6.5
 14^h 53^m 40^s — 4° 35'.2.

Comes = 13.7

1889.3	19.5	9.34	β	3 n
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The p.m. of the chief star is 0".430 towards 256°.6.

No. 112. h. 4723. **Lac. 6182.** 7.5
 14^h 54^m 51^s — 51° 31'.2.

7.6 yellow, and 11.0 blue

1836.0	171.5	5. ±	h	2 n
1872.5	166.5	5.60	Russell	1
1897.2	167.3	5.34	See	1

"The chief of a pretty bright group" :—h.

SOUTHERN DOUBLE STARS.

14 hrs.

141A

No.	Star	Lac.	MAG.
No. 113.	Cape 15.	Lac. 6158.	7.1
	14 ^h 56 ^m 24 ^s	— 71° 46'.7.	
	7.3 and 9.3		
	1880.5	42.1 1.68	Russell 1 n
The only measure found, but it was noted by Mr Russell in 1872.			
First intimation of duplicity, viz., "Very close double star," was given in the volume of <i>Cape Meridian Observations</i> for 1874, published in 1877.			
No. 114.	Washburn 22.	Porter 2557.	8.9
	14 ^h 56 ^m 27 ^s	— 19° 52'.9.	
	9.3 and 10.1		
	1881.4	360.1 2.22	Washburn 3 n
	1888.4	359.0 2.18	" 3
The combined C. P. D. mag. is 8.1.			
No. 115.	λ 218.	Lac. 6199.	6.7
	14 ^h 57 ^m 19 ^s	— 35° 33'.0.	
	Both = 7.5		
	1897.6	11.3 0.19 ±	See 1 n
No. 116.	h. 4728.	π Lupi.	3.8
	14 ^h 58 ^m 18 ^s	— 46° 39'.6.	
	4.5 and 4.6		
	1835.4	112.8 0.75 ±	h (o. g.) 1 n
	1836.3	109.8 0.7 ±	" (mirror) 1
	1837.0	108.6 0.75 ±	" (o. g.) 1
	1848.1	106.3 1.2 ±	Jacob 1
	1853.6	103.0* 1.24	" 4-3
	1872.4	100.1 0.57	Russell 1
	1877.4	98.7 1.42	Melbourne 1-2
	1880.4	99.3 0.90	Russell 1

1880.5	90.9	0.5 ±	Cruis	1
1886.6	91.3	0.71	Sydney	3-2
1887.6	87.2	1.24	Pollock	4-3
1888.7	86.3	1.50	Tebbutt	1
1891.6	85.8	0.86	Sellors	1
1892.5	87.4	1.42	Tebbutt	5-4
1893.5	86.8	1.01	Sellors	2
1894.5	88.2	0.96	"	2
1895.4	87.1	1.61	Tebbutt	4-3
1895.5	87.2	1.25	Sellors	3
1897.1	87.7	1.30	See	2
Common p.m. of 0".059 towards 234°.9.				
Evidently a binary system, but there has been no change since 1887. The distance has probably increased since its discovery.				
A somewhat similar arrest of motion occurs in the northern pair 44 Boötis. See Prof. Burnham's paper in <i>M. N. R. A. S.</i> , vol. lvii, pp. 393-398, 1897.				
No. 117.	Innes 85.	C. Z. 14 h. 3624.	MAG.	8.5
	14 ^h 58 ^m 34 ^s	— 35° 32'.1.		
	8.9 and 10.0			
	1896.6	181. ± 1.5 ±	Innes	1 n
Lac. 6199, mag. 6.7, 75 secs. pr., is a close pair = λ 218.				
C. Z. 14 h. 3631, mag. 9.1, is 4 secs. f. and S.				
No. 118.	Harvard.	Lac. 6209.	MAG.	5.3
	14 ^h 58 ^m 49 ^s	— 40° 40'.6.		
At Arequipa two <i>comites</i> within 30" have been noted. See <i>Harvard Circular</i> , No. 18.				
C. P. D. mag. of Lac. 6209 is 6.7.				
No. 119.	Hough 391.	Lal. 27,415.	MAG.	7.7
	14 ^h 58 ^m 50 ^s	— 6° 29'.8.		
	7.8 and 10.8			
	1891.4	141.6 1.85	Hough	1 n
A star, 12.5 mag., is 44" distant.				

142A

15hrs.

REFERENCE CATALOGUE OF

No. 1. β 119. Lal. 27,454. ^{MAG.} 7.3.
 15^h 0^m 14^s — 6° 37'.5.

7.9 and 8.3

1875.9	313.1	1.51	Dembowski	4 n
1878.6	311.1	1.41	Cinc.	2
1887.4	309.1	1.56	Tarrant	3
1888.4	306.4	1.61	Haverford	2
1890.4	304.9	1.78	Glasenapp	2
1892.4	307.1	1.47	Haverford	3

Slow change.

No. 2. Harvard. T Triang. Austr. ^{MAG.} 6.9-7.4.
 15^h 0^m 24^s — 68° 20'.1.

This variable star has a period of 0.98 days.

According to the Arequipa observers, there are two companions within 30".

See *Harvard Circular*, No. 18.

No. 3. λ 219. λ Lupi. ^{MAG.} 4.3
 15^h 2^m 6^s — 44° 53'.6.

4.8 and 5.4

1897.1	178.9	0.30	See	2 n
1897.5	340. ±	0.6 ±	Innes	1

In the latter observation the stars were all but separated.

The p.m. is very small, about 0".03 towards 180°.

No. 4. Σ 3090. Lal. 27,568. ^{MAG.} 8.5
 15^h 3^m 34^s — 0° 35'.7.

9.1 and 9.4

1830.0	275.5	1.79	Σ	3 n
1868.6	277.0	1.59	Dembowski	4-3
1880.3	276.4	1.60	Cinc.	2
1885.3	275.9	1.72	L. McC.	1
1890.4	273.5	.....	Glasenapp	2

Fixed.

No. 5. Cordoba [38]. Bris. 5199. ^{MAG.} 8.2
 15^h 3^m 47^s — 40° 37'.5.

8.6 and 9.6

1878.5	N.f.	5. ±	C. G. A.	1 n
1897.6	75°.7	5.22	See	1

Bris. 5200, mag. 8.4, is 7 secs. pr.

No. 6. h. 4734. Lac. 6236. ^{MAG.} 5.6
 15^h 3^m 48^s — 54° 57'.9.

Yellow

Comes = 11.8 blue

1835.8	241.8	12. ±	<i>h</i>	2 n
1887.5	244.8	11.3	Pollock	2
1897.2	246.3	11.4	See	1

Registered as a new pair by the last observer.

C. P. D. mag. = 7.4.

No. 7. β 809. B. D.—22°, 3908. ^{MAG.} 8.3
 15^h 4^m 13^s — 22° 20'.8.

8.6 and 10.2

1881.4	120.1	1.47	β	4 n
1888.5	123.5	1.75	Washburn	3
1892.4	119.2	1.64	Haverford	2
1898.3	121.0	2.04	See	1

No. 8. h. 4740. Ö.A. 14,309. ^{MAG.} 8.7
 15^h 4^m 21^s — 28° 4'.8.

9.2 and 9.7

1835.0	30. ±	Very close	<i>h</i>	1 n
1884.3	357.9	0".2 ±	Cinc.	1

No. 9. h. 4735. C. Z. 15 h. 186. ^{MAG.} 7.4
 15^h 4^m 47^s — 60° 0'.8.

Comes = 9.6

1835.3	29.8	4.50	<i>h</i>	2 n
1887.5	31.2	7.13	Pollock	3

No. 10. Dunlop 177. κ Lupi. ^{MAG.} 4.0
 15^h 4^m 59^s — 48° 21'.5.

4.2 and 5.9

1837.1	144.2	27.2	<i>h</i>	3 n
1847.1	144.8	27.2	Jacob	2
1876.5	144.1	27.3	Cape M.O.	3
1879.6	144.2	26.9	Hargrave	1

Common p.m. of 0".139 towards 239°.7.

SOUTHERN DOUBLE STARS.

15 hrs.

143A

- No. 11. h. 4731. Gilliss P. Z. 10,721. ^{MAG.} 9.3
 15^h 5^m 14^s — 77° 30'.0.
 9.6 and 10.8
 1835.4 261.1 1.5 ± h 1 n
 h:—"The southern of three."
- No. 12. Innes 238. Moesta 1283. 8.2
 15^h 5^m 19^s — 44° 38'.2.
 8.4 and 10.3
 1897.7 150. ± 3. ± Innes 1 n
 The pr. of two stars.
- No. 13. Washburn 121. Bris. 5212. 7.8
 15^h 5^m 37^s — 51° 39'.1.
 8.0 and 9.5
 1889.5 217.3 2.25 Pollock 3 n
 1890.5 222.7 2.33 Sellors 1
 Separately observed on the meridian at Cordoba
 in 1878, where the *comes* is put N.pr.
 Closely N.f. the wide double star ζ Lupi, mag. 3.5.
- No. 14. β 618. B. D.—19°, 4048. 9.0
 15^h 6^m 35^s — 19° 24'.9.
 9.6 and 10.0
 1878.3 24.3 1.86 β 4-3 n
 1879.9 23.4 1.74 " 2
 1885.3 19.8 1.40 Cinc. 2-1
 1896.5 19.1 1.68 Lick 5
 This pair is 57" S.f. υ₁ Librae, mag. 4.9, and with
 it forms the old pair H VI. 44.
- No. 15. Cordoba [39]. Bris. 5217. 7.6
 15^h 6^m 44^s — 59° 26'.7.
 7.8 and 9.8
 1878.5 310.6 5.84 Cord. M.O. 1878 3 n
 1897.2 215.8 2.16 See 1
 In the C. G. A. the *comes* is No. 20,595, but its
 R. A. is 1 sec. in error.
- No. 16. Innes 228. Bris. 5224. ^{MAG.} 7.7
 15^h 7^m 18^s — 43° 25'.1.
 8.3 and 8.6
 1897.7 225. ± 1.1 ± Innes 3 n
 1898.5 207.0 1.51 See 1
- No. 17. h. 4742. C. Z. 15 h. 415. 6.9
 15^h 8^m 50^s — 75° 11'.7.
Comes = 12.2
 1835.5 205.6 15. ± h 1 n
 Mr Russell looked for the faint star on one night
 in 1872, but without seeing it.
 C. P. D. mag. of the chief star = 8.0.
- No. 18. Harvard. δ Circini. 5.3
 15^h 8^m 52^s — 60° 35'.2.
 At Arequipa a companion within 30" has been
 noted.
 See *Harvard Circular*, No. 18.
- No. 19. h. 4750. Lac. 6274. 7.3
 15^h 9^m 20^s — 47° 40'.4.
Comes = 11.8
 1834.5 25.5 12. ± h 1 n
 The p.m. of the chief star is 0".7 towards 180°.
- No. 20. Hargrave 113. C. Z. 15 h. 521. 8.6
 15^h 9^m 28^s — 59° 54'.7.
 9.3 and 9.4
 1883.6 343.3 2.52 Hargrave 1 n
 The position given in the original catalogue is 7'
 further south.
- No. 21. λ 221. Bris. 5246. 7.5
 15^h 9^m 31^s — 36° 37'.5.
Comes = 13.9
 1897.4 40.8 4.82 See 1 n

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15hrs.

REFERENCE CATALOGUE OF

No. 22. β 350. Lac. 6291. ^{MAG.} 6.9
 $15^{\text{h}} 9^{\text{m}} 41^{\text{s}}$ — $27^{\circ} 13'.5$

7.1 and 8.6

1876.5	163.2	1.32	Hall	2 n
1878.5	161.0	1.01	Cinc.	1
1880.4	157.5	1.23	"	1
1882.4	160.1	1.41	"	1
1886.5	157.7	1.28	Hall	3
1892.4	160.2	1.15	Haverford	2
1897.5	154.1	0.95	See	1

Fixed.

No. 23. Cordoba [40]. Bris. 5241. 7.8
 $15^{\text{h}} 10^{\text{m}} 0^{\text{s}}$ — $53^{\circ} 52'.0$

8.0 and 9.5

1889.5	143.6	3.06	Pollock	2 n
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No. 24. Harvard. Lac. 6272. 5.4
 $15^{\text{h}} 10^{\text{m}} 46^{\text{s}}$ — $60^{\circ} 7'.7$

A companion within $30''$.

Seen only, so far, at Arequipa.

See *Harvard Circular*, No. 18.

No. 25. Σ 3091. 1st Munich 11,133. 7.5
 $15^{\text{h}} 10^{\text{m}} 47^{\text{s}}$ — $4^{\circ} 31'.0$

Both = 8.3 yellow

1832.4	47.3	$0.5 \pm$	Σ	6 n
1843.9	35.9	0.50	Mädler	2
1863.5	45.?	obl.?	Dembowski	1
1864.0	25.?	obl.	"	1
1875.4	Single	.....	Hall	1
1878.4	45.0*	$0.25 \pm$	β	1
1879.3	42.4	$0.4 \pm$	Cinc.	2
1881.5	47.5	0.30	β	1
1890.4	46.8	0.35	"	2

A binary system, wherein, in all probability, the plane of the orbit contains the line of sight.

As this pair is very close, any knowledge of the orbit will depend greatly on distance measures frequently made with the great refractors of the period.

No. 26. Σ 1925. W.B. 15 h. 153. ^{MAG.} 7.5
 $15^{\text{h}} 11^{\text{m}} 32^{\text{s}}$ — $7^{\circ} 54'.6$

7.7 and 9.2

1831.7	6.7	4.18	Σ	3 n
1848.5	7.3	4.19	Mitchel	1
1856.3	11.1	4.70	Secchi	3
1868.4	10.4	4.44	Dembowski	4
1877.4	10.1	4.87	Cinc.	2
1878.4	10.2	4.91	β	1
1879.3	10.6	4.76	Cinc.	3
1884.4	11.2	5.07	Hall	3
1890.4	10.7	5.59	Glasenapp	2-1

The distance is increasing.

There is a common p.m. of $0''.234$ towards $206^{\circ}.3$.

No. 27. h. 4753. μ Lupi. 4.2
 $15^{\text{h}} 11^{\text{m}} 34^{\text{s}}$ — $47^{\circ} 30'.4$

4.8 and 5.2

1836.2	173.5	2.08	$\frac{1}{2}$	5 n
1847.8	174.1*	$1.5 \pm$	Jacob	1
1851.5	170.1	$1.5 \pm$	"	4
1874.5	163.8	1.78	Russell	1
1879.7	161.5	1.98	Melbourne	1
1882.2	160.5	$2. \pm$	Tebbutt	1
1894.5	158.8	1.10	Sellers	2
1897.1	155.5*	1.74	See	1

Angle [and distance] decreasing slowly.

Common p.m. of $0''.095$ towards $212^{\circ}.4$.

Another star, 6.9 mag., makes up the old pair Dunlop 180, and has been measured as follows:—

1836.4	131.3	22.9	$\frac{1}{2}$	4 n
1847.8	128.6	22.1	Jacob	1
1876.5	127.8	24.3	Cape M.O.	4
1879.6	129.5	22.2	Hargrave	1
1897.1	130.2	23.4	See	1

Hargrave's measure is set against $\frac{1}{2}$ 4752.

The three stars constitute a very pretty object, and probably form one system.

No. 28. h. 4755. C. Z. 15 h. 790. 8.5
 $15^{\text{h}} 12^{\text{m}} 59^{\text{s}}$ — $36^{\circ} 20'.1$

8.9 and 9.8

1834.3	203.4	$3. \pm$	$\frac{1}{2}$	1 n
1848.1	209.3	3.99	Jacob	1
1882.5	201.8	4.32	Hargrave	1
1890.5	197.7	$3. \pm$	Glasenapp	2
1897.4	202.3	4.22	See	1

SOUTHERN DOUBLE STARS.

15 hrs.

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No. 29. β 227. Lac. 6317. MAG. 7.2
 $15^h 13^m 17^s$ — $23^\circ 54'.0$.

7.3 and 9.7

1874.4	184.1	1.7 ±	β	1 n
1876.5	180.9	1.98	Cinc.	1
1878.4	180.0	1.98	"	2
1886.3	177.5	2.28	L. McC.	1
1896.4	176.8	1.89	Scott	2
1898.3	175.0	2.25	See	1

Noted as double at the Cape in 1878.

Another double star is 31 secs. f.

No. 30. h . 4756. Lac. 6325. MAG. 7.3
 $15^h 13^m 48^s$ — $23^\circ 54'.3$.

7.9 and 8.2 white

1835.4	180. ±	0.7 ±	h	1 n
1877.0	329.9	1.17	Cinc.	2
1884.4	329.4	1.14	"	1
1886.3	328.4	...	L. McC.	1
1892.4	327.6	0.98	Haverford	2
1898.5	323.1	0.95	See	1

 h :—"Requires verification."Also noted as β 228.Perhaps in slow motion, and h 's angle = $360^\circ \pm$.

No. 31. Cordoba [41.] Bris. 5277. MAG. 7.4
 $15^h 14^m 40^s$ — $58^\circ 48'.0$.

7.5 and 10.0

1882.5	95.5	6.14	C. G. A.	3 n
1897.2	97.7	6.16	See	2

Several bright stars are near.

No. 32. Innes 86. Cor. D. M. MAG. 9.5
 $-37^\circ, 10,168.$
 $15^h 14^m 58^s$ — $37^\circ 54'.3$.

9.9 and 10.9

1896.3	pr.	1. ±	Innes	1 n
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Closely S.pr. Lac. 6329, a neat, easy pair.

No. 33. Howe 32. Lac. 6329. MAG. 6.7
 $15^h 15^m 3^s$ — $37^\circ 51'.4$.

6.8 and 9.0

1880.6	121.7	6.27	C. G. A.	1 n
1885.3	121.2	5.79	Cinc.	1
1887.5	123.7	5.50	Pollock	2
1897.4	122.7	6.07	See	1

Noted as a double star at the Cape in 1877.

No. 34. λ 228. Lac. 6309. MAG. 5.6
 $15^h 15^m 4^s$ — $60^\circ 17'.8$.

Comes = 12.7

1897.1	119.6	6.04	See	2 n
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No. 35. h . 4757. γ Circini. MAG. 4.4
 $15^h 15^m 25^s$ — $58^\circ 57'.6$.

5.1 and 5.2

1836.3	108.5	1.26	h	5 n
1871.4	[93.3]	[0.50]	Russell	1
1873.4	87.8	1.31	"	1
1878.6	89.1	1.48	Melbourne	3
1880.5	91.4	0.5 ±	Cruls	1
1881.6	91.9	0.64	Hargrave	1
1891.6	80.0	1.06	Sellors	2
1897.1	84.8*	1.17	Lowell	3

A neat pair, binary in slow motion.

Common p.m. of 0".09 towards 165° .

No. 36. λ 229. ϕ_1 Lupi. MAG. 3.3
 $15^h 15^m 28^s$ — $35^\circ 53'.9$.

B = 14.3 C = 13.8

A and B

1897.4	239.7	16.74	See	1 n
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A and C

1897.1	119.3	17.27	See	1 n
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The p.m. of the chief star is 0".130 towards $229^\circ.2$, and its mag. in the C. P. D. = 6.3.

T

No. 37. Sellors 20. Bris. 5291. ^{MAG.} 8.5
15^h 15^m 40^s — 47° 33'.3.

8.9 and 9.7

1895.6	217.7	1.62	Sellors	3 n
1897.2	214.5	1.43	See	2

Common p.m. of 0".473 towards 236°.6.

The mag. which is from the C. G. A. is too faint.

Discovered independently in 1895 as Innes 38, and published some time before Mr Sellors' notification appeared. There being no delay, however, in the publication of the latter's result, the star is named as above.

Likely to be a binary in rapid motion.

No. 38. Copeland [2]. ϵ Lupi. 3.6
15^h 15^m 53^s — 44° 19'.7.

3.8 and 6.0

1883.4	285.±	0.8±	Copeland	1 n
1896.6	282.3	1.34	Sellors	3
1897.1	280.5	0.77	See	2

This fine pair was discovered by Dr Copeland whilst on the Andes, and has since been noted by several other observers, and published as new.

Another star, 10th mag. (Dunlop 182), has been measured as follows:—

1837.3	174.9	26.3	<i>h</i>	4 n
1896.6	173.0	26.6	Sellors	3
1897.1	172.0	26.7	See	1

The p.m. is very small.

No. 39. Harvard. Lac. 6308. 6.5
15^h 16^m 48^s — 67° 57'.2.

Called double by the Arequipa observers. See *Harvard Circular*, No. 18.

No. 40. Innes 87. C. Z. 15 h. 1167. 9.2
15^h 18^m 48^s — 38° 24'.2.

9.9 and 10.0

1896.9	S.pr.	1.1±	Innes	3 n
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h Lupi, mag. 4.6, is 90" N.f., and has a faint *comes* 40"±N. It is, however, registered at Arequipa as having two or more *comites* within 30". See *Harvard Circular*, No. 18.

No. 41. Harvard. Lac. 6376. ^{MAG.} 5.6
15^h 20^m 54^s — 36° 25'.0.

Two *comites* within 30" have been noted at Arequipa. See *Harvard Circular*, No. 18.

No. 42. Cape 16. Lac. 6370. 7.0
15^h 21^m 38^s — 58° 0'.1.

7.4 and 8.4

1875.4	0.±	0.6±	Cape	1 n
1890.5	24.1	2.04	Sellors	1
1891.5	22.2	1.97	"	2

No. 43. Innes 239. U. A. 103 Lupi. 7.0
15^h 22^m 35^s — 31° 7'.8.

7.5 and 8.0

1897.7	[0.±]	0.6±	Innes	1 n
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No. 44. *h*. 4771. C. Z. 15 h. 1417. 8.0
15^h 22^m 40^s — 57° 45'.7.

Both = 8.8

1837.2	188.1	5.91	<i>h</i>	4 n
1873.5	184.1*	5.65	Russell	1

No. 45. λ 236. Anon. 9.0
15^h 22^m 46^s — 38° 18'.3.

9.6 and 10.0

1897.1	247.0	1.49	See	2 n
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This position is near Lac. 6388, mag. 6.8. There is no star here in either the Cor. D. M. or the C. P. D.

1899.4—Not found.

A similar pair is about 4^m pr., 5' S.

No. 46. β 1114. Lac. 6395. 6.8
15^h 22^m 54^s — 28° 31'.1.

7.4 and 7.7

1889.4	325.7	0.65	β	3 n
1897.4	323.1	0.81	Aitken	3
1897.5	319.2	0.60	See	1

A 9.4 mag. star 9" N.f. = C. Z. 15 h. 1470 makes up the old pair *h* 4774.

[contd.]

SOUTHERN DOUBLE STARS.

15 hrs.

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1834.4	8.5	10.±	h	1 n
1877.4	8.2	8.82	Cinc.	1
1880.4	6.5	9.17	"	1
1897.4	5.4	8.90	Aitken	2
1897.5	4.2	9.25	See	1

No. 47. h. 4776. Lac. 6393. MAG. 6.6
15^h 23^m 40^s — 41° 34'.4

6.8 white, and 8.0 yellow

1835.9	224.2	5.95	h	2 n
1848.1	225.8	6.21	Jacob	1
1889.5	228.3	5.80	Pollock	2

No. 48. h. 4777. Lac. 6389. 6.7
15^h 24^m 52^s — 57° 4'.0

7.4 and 7.5, both white

1837.1	301.7	6.33	h	2 n
1872.4	300.3	6.03	Russell	1
1875.6	292.2	6.35	C. G. A.	3
1880.5	299.1	7.49	Cruls	1

This pair is identical with Cape 1840, 2038 + 39.

In the *Cape 1880 Catalogue* the companion was noted as equal to 10th mag., and by Cruls as 9th.

No. 49. Howe 34. Lac. 6405. 7.0
15^h 25^m 0^s — 33° 28'.6

7.2 and 8.7

1876.5	60.±	1.2±	Howe	1 n
1878.5	Close double		Cape	3
1885.3	160.4	1.60	Cinc.	1
1898.4	155.0	2.37	See	1

No. 50. h. 4773. Bris. 5335. 8.7
15^h 25^m 12^s — 74° 1'.1

9.2 and 9.7

1835.5	267.9	8.±	h	1 n
1852.5	259.4	8.71	Gilliss, M. O.	2
1872.5	252.4*	7.76	Russell	1
1878.5	244.9	6.46	Cape M.O.	2-1

The Dec. given by both h and Russell is about 20' in error.

Considerable change, probably due to p.m. in one or both of the stars.

The position angle will decrease 1.6 per century through precession.

No. 51. β 33. Lal. 28,246. MAG. 7.5
15^h 25^m 49^s — 12° 38'.7

7.6 and 9.9

1875.4	47.5	2.75	Dembowski	3 n
1878.5	44.1	2.90	Cinc.	1
1886.4	41.0	3.14	L. McC.	1
1892.4	42.1	3.08	Haverford	2

Doolittle has observed a star, 11.5 mag., 39" S.

β 34 = B. D. - 12°, 4269, mag. 9.5, a faint pair of 10th mag. stars, is 4' S.f.

No. 52. Triple. Lac. 6420. 6.7
15^h 27^m 14^s — 24° 9'.0

A = 7.4 B = 8.3 C = 8.3

A and B + C = Lalande 123

1835.6	300.5*	9.55	h	5 n
1877.4	298.6	9.14	Cinc.	2
1890.4	298.6	8.72	Glazenapp	2
1897.5	299.1*	9.23	See	1

Also registered as South 673.

Separately observed in several meridian catalogues.

B and C = λ 238

1897.5	137.8	0.20	See	1 n
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No. 53. Innes 240. Lac. 6399. 7.2
15^h 27^m 17^s — 64° 46'.6

7.4 and 9.4

1897.5	200.±	1.7±	Innes	1 n
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No. 54. Innes 241. C. Z. 15 h. 1800. 8.0
15^h 28^m 27^s — 64° 11'.8

8.2 and 10.2

1897.7	270.±	1.5±	Innes	1 n
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A fainter star S.f. 8" ±.

C. Z. 15 h. 1797; mag. 8.5, is 80" S.

No. 55. h. 4786. γ Lupi. ^{MAG.} 3.0
 15^h 28^m 28^s — 40° 49'.8.

3.7 and 3.9

1835.0	94.3	0.8 ±	h	9 n
1837.0	93.8	0.7 ±	"	6
1853.1	273.4	1.03	Jacob	2
1856.2	275.4	0.75 ±	"	3-2
1877.4	Plainly elongated		Melbourne	1
1871	} Perhaps elongated in		Russell	8
1887		270° or 90° ...		Pollock
1895.6	Single	...	Sellers	3
1896.0	"	...	Innes	2
1897.1	91°.7	0".38	Lowell	3

Common p.m. of 0".072 towards 238°.9.

This star was not seen double, for certain, from 1856-1897, when it was seen by Prof. See, who, however, misidentified it as β Lupi, and it was thus registered as a new pair. See *Popular Astronomy*, vol. iv., where it is called "the finest close double in the entire heavens!"

It was clearly divided with the 18-in. McClean Refractor in 1898.

There are really no data on which to found an orbit. It may be suggested that the period is about eighty years, and that duplicity is only visible when the stars are in apastron.

Paper:—

1897. See *M. N. R. A. S.*, vol. lviii, pp. 15-18.

No. 56. h. 4788. δ Lupi. 4.8
 15^h 29^m 0^s — 44° 37'.4.

4.9 and 7.8

1836.6	349.0	3.14	h	4 n
1852.0	353.5	2.62	Jacob	3
1877.5	358.0	2.55	Melbourne	2
1880.6	356.1	1.98	Hargrave	1
1895.5	358.7	2.14	Sellers	3
1897.1	9.1	2.40	See	1

Slow increase in angle, and diminution in distance.

The p.m. is very small.

Formerly called f Lupi.

A pretty pair.

No. 57. Harvard. κ_2 Apodis. 5.8
 15^h 29^m 16^s — 73° 7'.0.

Two comites within 30" have been noted at Arequipa. See *Harvard Circular*, No. 18.

No. 58. h. 4780. C. P. D.—80°, 779. ^{MAG.} 9.0
 15^h 30^m 45^s — 80° 13'.2.

9.6 and 9.9

1836.00	270.6	2.8 ±	h	2 n
1874.46	271.9	5.62	Russell	1
1874.52	271.1	5.72	"	1
1880.52	273.9	6.42	"	1
1880.52	274.0	4.70	"	1

Near a 10" pair = h 4787 = Gilliss P. Z. 11, 125 + 7.

Mr Russell's 2nd and 3rd measures are set against Russell 262, his last against Russell 265—the pair being called new on those occasions.

No. 59. λ 241. Cor. D. M.—23°, 12,411. 9.7
 15^h 30^m 55^s — 23° 20'.9.

Comes = 13.2

1897.5	27.3	0.97	See	1 n
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No. 60. Innes 242. C. Z. 15 h. 2046. 7.5
 15^h 31^m 14^s — 31° 11'.7.

8.1 and 8.4

1897.7	45	1.5 ±	Innes	2 n
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The preceding star of a group of five, each of which is double.

No. 61. Innes 88. C. P. D.—51°, 8319. 9.6
 15^h 31^m 17^s — 52° 3'.0.

Comes = 10.1

1897.2	341.0	2.10	See	1 n
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This pair and Lac. 6437, mag. 5.4, 5 secs. f., compose the old pair Dunlop 189.

No. 62. Harvard. ω Lupi. 4.0
 15^h 31^m 19^s — 42° 14'.3.

Comes = 11.7

1897.1	27.0	11.7	See	1 n
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Noted as double at Arequipa.

See *Harvard Circular*, No. 18.

ω Lupi has a p.m. of 0".238 towards 297°.5.

C. P. D. mag. = 6.6.

SOUTHERN DOUBLE STARS.

15 hrs.

149A

No. 63. Innes 243. C. Z. 15 h. 2073. ^{MAG.} 7.2
15^h 31^m 40^s — 30° 55'.3

7.7 and 8.2

1897.4 5.7 0.59 See 1 n

See also Nos. 60 and 67.

First found by See, his λ 242.*

No. 64. Harvard. Lac. 6448. 5.9
15^h 32^m 7^s — 38° 47'.9

Noted as double at Arequipa.

See *Harvard Circular*, No. 18.

C. P. D. mag. = 7.1.

No. 65. β 121. Lac. 6469. 8.3
15^h 33^m 32^s — 27° 19'.0

9.0 and 9.1

1877.0 278.6 1.67 Cinc. 2 n

1879.3 277.0 1.62 „ 1

1888.5 274.0 1.5 \pm Haverford 1

1889.5 277.5 1.45 β 3

1890.5 281.8* 1.6 \pm Glasenapp 2

1898.4 280.0 1.95 See 1

No. 66. Σ 3094. Lal. 28,492. 8.7
15^h 33^m 43^s — 8° 14'.5

9.0 and 10.2

1831.6 295.6 2.38 Σ 5 n

1870.0 298.3 2.31 Dembowski 5

1879.3 298.1 2.49 Cinc. 2

Σ 1962, a 12" pair, first observed by H β or Lalande, is about 20' S.pr.

No. 67. Innes 244. C. Z. 15 h. 2214. 8.2
15^h 33^m 47^s — 31° 3'.7

8.8 and 9.1

1897.5 27.1 1.09 Lowell 2 n

Found independently as λ 243.

In a group of five stars in the finder, all of which are double. See Nos. 60 and 63.*

The brightest star of the group, Lac. 6473, mag. 6.9, is noted as double in the C. P. D.; it having a faint comes beyond the limits of inclusion in this catalogue.

No. 68. Howe 38. Lal. 28,483. ^{MAG.} 8.2
15^h 33^m 52^s — 20° 41'.4

8.4 and 9.9

1876.3 190. \pm 1.5 Howe 1 n

1892.5 197.9 2.22 Hough 3

1898.3 197.3 2.80 See 2

A star, 5.8 mag. (C. P. D. = 6.9), is 84 secs. pr. o'. 3 N. Also registered as Hough 395, Howe's R.A. being 5^m too great.

No. 69. β 122. Lal. (28,495). 7.6
15^h 34^m 8^s — 19° 26'.6

8.2 and 8.6

1868.5 202.5* 2.09 Harvard 1 n

1875.4 204.0 1.76 Dembowski 4

1877.4 205.4 1.91 Cinc. 2

1887.4 205.8 1.75 Tarrant 2

1888.4 206.9 1.96 Haverford 3

1890.4 206.1* 2.03 Glasenapp 2

1894.5 207.9 1.67 Sellors 2

Also observed on the meridian at Berlin, where the magnitudes are reversed. One of the stars may be variable.

Also registered as Harvard 140.

No. 70. Innes 89. Lac. 6471. 6.8
15^h 34^m 29^s — 39° 39'.4

7.0 and 8.5

1896.3 S.f. 1. \pm Innes 1 n

1897.2 154.1 0.89 See 2

The p.m. is insensible.

No. 71. Washburn 25. B. D.—14°, 4256. 9.2

15^h 34^m 43^s — 14° 12'.2

9.8 and 10.1

1881.4 313.8 1.24 Washburn 3 n

1888.5 311.8 1.42 „ 3

* Note to Nos. 63 and 67. I detected these two pairs, together with No. 60, in Sept. 1897; but, after publication, I learned that Professor See had already found the two former in June 1897, as well as another pair S. f., his λ 244 (R. A. 15^h 35^m 30^s. S. D. 31° 31'.5), which has been accidentally omitted, but it will be found in the additions at the end. It is curious that in this group of stars, all the companions are in the N. f. quadrant.

150A

15 hrs.

REFERENCE CATALOGUE OF

No. 72.	Dunlop 190.	Bris. 5413.	MAG. 8.3
	15 ^h 34 ^m 57 ^s	— 57° 47'.6	
	8.5 orange, and 10.0 blue		
1834.3	94.7	5.±	h 1 n
1871.5	91.9	6.75	Russell 1
1878.4	103.7*	7.17	C. G. A. 4
h and Russell call the chief star about 7 th mag.; and in the C. G. A. the magnitudes are reversed.			
No. 73.	λ 245.	C. Z. 15 h. 2441.	MAG. 8.3
	15 ^h 36 ^m 35 ^s	— 34° 22'.4	
	9.0 and 9.1		
1897.2	168.0	0.35	See 2 n
ψ ₂ Lupi, mag. 4.8, is 17 secs. pr.			
No. 74.	h. 4795.	Lac. 6472.	MAG. 7.4
	15 ^h 36 ^m 51 ^s	— 58° 48'.3	
	Comes = 9.8		
1836.0	224.3	7.±	h 2 n
1881.6	219.3	6.76	Hargrave 1
No. 75.	β 35.	Piazzi 15 h. 150.	MAG. 7.3
	15 ^h 37 ^m 9 ^s	— 15° 41'.6	
	7.4 and 9.8		
1875.4	99.2	2.40	Dembowski 4 n
1877.4	97.3	2.51	Cinc. 2
1887.4	98.0	2.28	Tarrant 2
1890.4	102.4	2.64	Glasenapp 2-1
1898.3	99.3	2.56	See 1
η Librae, mag. 5.5, is 30' N.f. Noted as double at Cordoba in 1879.			
No. 76.	β 354.	Piazzi 15 h. 149.	MAG. 7.2
	15 ^h 37 ^m 12 ^s	— 25° 5'.8	
	7.4 and 9.0		
1876.9	285.6	5.27	Cinc. 2 n
1890.4	287.7	5.32	Glasenapp 2
Separately observed on the meridian at Cordoba in 1879.			

No. 77.	Howe 37.	Lac. 6493.	MAG. 6.5
	15 ^h 37 ^m 38 ^s	— 41° 30'.0	
	6.7 and 8.9		
1883.7	350.±	4.±	Hargrave 1 n
1890.4	354.9	4.5±	Glasenapp 2
1890.5	349.4	4.12	Sellors 1
1891.5	346.0	3.48	" 1
1897.3	348.4	3.92	See 2
Also registered as Hargrave 121. First seen by Howe in 1876; also noted at the Cape and Cordoba in 1877-8.			
No. 78.	Washburn 124.	Lac. 6488.	MAG. 6.7
	15 ^h 37 ^m 40 ^s	— 50° 28'.1	
	6.9 and 8.7		
1890.5	213.7	2.26	Sellors 2 n
1895.5	207.2	2.50	" 3
1897.1	206.0	2.52	See 2
Duplicity noted at Cordoba in 1874.			
No. 79.	λ 248.	Lac. 6503.	MAG. 7.7
	15 ^h 38 ^m 42 ^s	— 34° 47'.1	
	Both = 8.5		
1897.5	190.±	0.2±	See 1 n
No. 80.	Rumker 20.	Lac. 6477.	MAG. 5.8
	15 ^h 38 ^m 46 ^s	— 65° 7'.7	
	6.5 and 6.6		
1835.3	155.9	2.42	h 3 n
1876.0	152.8	2.70	Russell 2
1879.6	154.2	1.56	Hargrave 1
1887.7	152.1	2.25	Tebbutt 8
1890.6	152.0	1.85	Sellors 2
Fixed, but the measures are not accordant for so easy a pair. If there is any p.m., it is inconsiderable. This is erroneously catalogued twice in Mr Russell's catalogue, once as a new pair = Russell 267, and again as h 4799. Noted as being triple at Arequipa.			

SOUTHERN DOUBLE STARS.

15 hrs.

151A

No. 81. Σ 3095. W.B. 15 h. 705. ^{MAG.} 8.3
 15^h 39^m 23^s — 14° 51'.7.

8.6 and 9.9

1831.3	349.7	2.85	Σ	3 n
1869.4	337.5	2.84	Dembowski	5
1879.4	335.8	2.96	Cinc.	4
1880.5	339.4	2.87	Pritchett	3
1890.5	336.6	3.92	Glazenapp	2-1

Other measures.

No. 82. Innes 245. Bris. 5461. 7.5
 15^h 40^m 1^s — 43° 55'.9.

7.7 and 9.4 orange

1897.6	N.pr.	1.±	Innes	1 n
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Lac. 6519, mag. 7.2, is 1^m 20^s f. and 7' S.

No. 83. β 620. Lac. 6516. 6.7
 15^h 40^m 8^s — 27° 44'.9.

7.4 and 7.7

1878.4	166.8	0.86	β	1 n
1892.4	165.5	0.65	Haverford	1
1892.4	154.4	0.50	β	3
1896.5	170.2	0.72	Lick	1
1896.5	174.5	0.63	Leavenworth	3

C. Z. 15 h. 2696, mag. 9.3, 51" S.pr., makes up the old pair *h* 4803.

No. 84. λ 249. Lac. 6521. 6.5
 15^h 40^m 59^s — 37° 36'.0.

Comes = 14.0

1897.5	130.2	15.2	See	2 n
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Another companion, distant 25", has been noted at Arequipa, and measured by Prof. See.

See *Harvard Circular*, No. 18.

The p.m. of Lac. 6521 is 0".588 towards 240°.4.

No. 85. Howe 39. C. Z. 15 h. 2083. 8.0
 15^h 41^m 28^s — 35° 24'.5.

8.5 and 9.0

1876.2	330.±	1.3±	Howe	1 n
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No. 86. Innes 90. Lac. 6530. ^{MAG.} 7.3
 15^h 41^m 55^s — 25° 40'.6.

Comes = 10.4

1896.7	10.±	1.±	Innes	1 n
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Ö.A. 14,870, mag. 8.5, is a little way N.pr.

No. 87. Cinc. Ö.A. 14,882. 8.8
 15^h 42^m 3^s — 19° 23'.5.

Both = 9.6

1885.3	0.±	0.5±	Cinc.	-n
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No. 88. Dunlop 193. Lac. 6524. 5.7
 15^h 43^m 20^s — 54° 45'.0.

Comes = 9.1

1835.4	22.4	24.0	<i>h</i>	1 n
1837.3	21.4	22.7	"	1
1871.6	18.8	21.4	Russell	1
1880.7	18.2	21.5	Hargrave	1

Called *h* 4807 by Mr Russell in error.

According to the Arequipa observers, this is a triple system, and according to *h*, quadruple—viz., "two more companions forming a curve."

No. 89. Σ 1974. Lal. 28,787. 8.2
 15^h 43^m 59^s — 2° 55'.7.

8.9 and 9.1

1831.4	166.0	2.61	Σ	3 n
1848.5	165.1	2.44	Mitchel	1
1886.3	162.9	32.52	L. McC.	1
1890.4	163.3	2.72	Glazenapp	2

Σ 3126, a fainter pair, is a little way N.f.

No. 90. λ 250. C. Z. 15 h. 3019. 8.0
 15^h 44^m 30^s — 34° 44'.6.

8.5 and 9.1

1897.5	100.7	0.56	See	1 n
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152A

15 hrs.

REFERENCE CATALOGUE OF

No. 91. Sellors 11. Lac. 6540. ^{MAG.} 6.4
 15^h 46^m 25^s — 60° 26'.7

6.6 and 8.1

1891.5	97.1	0.56	Sellors	2 n
1893.5	93.9	1.00	,,	1
1895.5	91.4	1.09	,,	3
1897.1	95.2	1.19	See	1

The chief star of the 44" double ζ 4809.

Finely situated near the middle of a triangle of 9th mag. stars.

Prof. See associates my name with this pair—an inadvertence, probably, as I do not remember making any reference to it.

No. 92. h. 4813. Lac. 6546. ^{MAG.} 6.1
 15^h 47^m 10^s — 59° 52'.7

6.2 yellow, and 9.7 blue

1836.5	96.8	2.±	ζ	1 n
1871.5	98.9	3.34	Russell	3
1880.7	100.5	2.66	Hargrave	1
1890.5	96.8	4.05	Sellors	1
1897.1	98.9	3.65	See	2

Sometime called κ Circini.

The Sydney measure of 1890 is credited to Lac. 6550 in error.

A third star was seen at Arequipa in 1891.

No. 93. Dunlop 195. Lac. 6561. ^{MAG.} 6.8
 15^h 47^m 28^s — 50° 2'.4

7.4 and 7.7

1836.4	10.7	12.28	ζ	3 n
1848.1	9.4	12.01	Jacob	1
1873.5	7.7	1.58	Russell	1
1876.5	12.3	12.31	Cape M.O.	3

Although the position given by Mr Russell is that of Dunlop 195, he calls the star ζ 4815, a 15" pair 15° away.

The mags. given by Mr Russell are 8.0 and 12.0, and the night was noted as hazy. Hence it is uncertain if the measure given applies to this pair.

No. 94. β 36. A Scorpii. ^{MAG.} 4.7
 15^h 47^m 36^s — 25° 1'.7

4.8 yellow, and 8.0

1877.4	277.2	2.53	Cinc.	1 n
1878.5	279.0	2.58	,,	2
1881.4	272.7	2.88	,,	2
1885.9	279.3	2.84	,,	2
1892.4	277.8	2.86	Haverford	2
1894.6	276.6	1.94	Sellors	2
1897.5	274.4	2.93	See	1

Mr Sellors' distance looks like a misprint for 2".94. The p.m. of the chief star is 0".045 towards 251°.7, and is evidently shared by the *comes*.

The companion was well seen by several observers during the series of occultations of this star which occurred in 1896.

No. 95. Σ 3099. W.B. 15 h. 887. ^{MAG.} 8.4
 15^h 49^m 3^s — 13° 23'.3

8.7 and 10.0

1831.1	112.2	1.88	Σ	4 n
1867.5	116.7	2.35	Dembowski	3-2
1879.4	113.9	2.20	Cinc.	6-3

No. 96. Harvard. Lac. 6582. ^{MAG.} 6.5
 15^h 49^m 25^s — 39° 34'.2

A companion within 30" has been noted at Arequipa. See *Harvard Circular*, No. 18.

No. 97. Piazz. ξ Lupi. ^{MAG.} 5.1
 15^h 50^m 30^s — 33° 40'.4

5.6 and 6.2

1835.5	49.3	11.0	ζ	3 n
1857.5	47.4	10.7	Secchi	1
1892.5	49.9	10.8	Scott	1
1897.1	48.4	10.6	See	2

Fixed.

The p.m. is very small.

Separately observed on the meridian frequently.

SOUTHERN DOUBLE STARS.

15 hrs.

153A

No. 98.	H. II. 85.	Lal. 28,987.		MAG.
	15 ^h 50 ^m 44 ^s	— 1° 52'.2.		7.0
	7.3 and 8.7			
1783.3	316.2	"....	H	1 n
1831.9	326.6	5.42	Σ	4
1858.4	330.1	5.61	Morton	3
1877.5	331.7	5.66	Cinc.	2
1890.4	334.9	5.66	Glasenapp	2
1896.5	336.6	5.79	Hussey	3

Also called Σ 1985.
Many other measures.
The angle is increasing by 0°.18 per an.

No. 99.	Russell 269.	Anon.		MAG.
	15 ^h 51 ^m ... ^s	— 65° 42'.		8.5
	9.0 and 9.5			
1872.6	134.2	2.43	Russell	1 n
1881.5	131.3	1.91	"	1

Not identified.*

No. 100.	λ 252.	C. Z. 15 h. 3468.		MAG.
	15 ^h 51 ^m 4 ^s	— 40° 42'.3.		8.4
	A = 9.1	B = 9.2	C = 12.6	
	A and B			
1897.2	281.5	0.37	See	1 n
	A + B and C			
1897.2	214.7	18.43	See	1 n

No. 101.	Rumker 21.	η Lupi.		MAG.
	15 ^h 53 ^m 30 ^s	— 38° 6'.6.		3.8
	Comes = 7.8			
1834.7	22.2	15.1	h	3 n
1846.6	20.3	15.2	Jacob	1
1857.5	21.0	15.4	Secchi	1
1879.6	21.0	7.1	Hargrave	1
1881.7	20.3	14.9	Tebbutt	1
1886.6	19.8	15.3	"	2
1890.4	20.7	15.0	Glasenapp	2
1890.5	21.0	6.±	Sellers	1
1897.2	20.9	14.7	See	3

Excluding the discordant Sydney distances, there is no sign of change.

The p.m. is inconsiderable.

Separately observed on the meridian at Cordoba.

* This star is identical with C.Z. 15h. 3258, R. A. 15^h 48^m 46^s, Dec. - 65° 18'.0. Mags. = 9.2 and 9.7; combined = 8.7.

Russell 268 = C.Z. 15h. 3228, mag. 8.5, is a wide pair 18' N. pr. in the same field. The positions given by Mr Russell are much in error. (1899, May 11.)

No. 102.	Σ 3101.	Lal. 29,070.		MAG.
	15 ^h 53 ^m 41 ^s	— 2° 47'.3.		7.9
	8.5 and 8.8			
1831.8	60.3	2.04	Σ	4 n
1868.2	62.1	2.10	Dembowski	4
1879.3	58.7	2.24	Cinc.	2
1890.4	66.0	2.72	Glasenapp	2

Common p.m. of 0".3.

No. 103.	Howe 40.	C. Z. 15 h. 3680.		MAG.
	15 ^h 54 ^m 0 ^s	— 35° 48'.3.		7.7
	8.1 and 9.1			
1876.2	100.±	4.±	Howe	1 n
1877.5	100.0	6.99	"	1
1897.4	101.8	6.70	See	1

No. 104.	λ 254.	Bris. 5555.		MAG.
	15 ^h 54 ^m 2 ^s	— 46° 15'.3.		7.7
	7.9 and 10.0			
1897.2	193.7	1.11	See	1 n

(Seen).

No. 105.	Cordoba [42.]	Lac. 6625.		MAG.
	15 ^h 54 ^m 9 ^s	— 40° 9'.2.		6.4
	6.5 and 9.8			
1880.5	171.9	9.80	C. G. A.	2 n
1889.5	156.5	8.36	Pollock	2
1897.2	158.1	7.91	See	2

The first measure is (as usual in measures marked C. G. A.) derived from the meridian results, and is probably somewhat rough.

No. 106.	Triple.	ι Normae.		MAG.
	15 ^h 55 ^m 24 ^s	— 57° 29'.6.		4.8
	A = 5.6	B = 5.8	C = 9.0	
	A and B both yellow = λ 258			
1897.1	266.1	0.84	See	2 n
	A + B and C = h 4825			

The common p.m. of the close pair is about 0.1 towards 220°. It is doubtful if C shares in it.

Also noted as triple at Arequipa. See *Harvard Circular*, No. 18.

Mags: — A + B = 9, C = 11. Russell, 1871.

154A

15hrs.

REFERENCE CATALOGUE OF

No. 107.	λ 259.	Lac. 6641.	MAG. 7.1
	$15^h 55^m 32^s$	$- 36^\circ 27'.7$	
	7.8 and 7.9		
1897.4	17.7	$0.2 \pm$	See 1 n
No. 108. Cordoba [43]. C. G. A.			
	21,713+4.		8.0
	$15^h 55^m 47^s$	$- 37^\circ 46'.4$	
	8.7 and 8.9		
1877.6	S.f.	$6. \pm$	C. G. A. 3 n
No. 109. β 623. Lac. 29,127. 8.4			
	$15^h 55^m 55^s$	$- 6^\circ 41'.4$	
	8.8 and 9.6		
1878.5	238.4	0.97	β 1 n
1878.7	236.8	0.99	Cinc. 3
1888.3	237.8	1.01	Haverford 1
No. 110. β 37. C. Z. 15 h. 3846. 9.0			
	$15^h 56^m 27^s$	$- 24^\circ 18'.1$	
	Comes = 9.9		
1879.4	40.9	2.79	Cinc. 1 n
1891.5	44.6	2.69	β 3
1892.4	43.4	3.09	Haverford 3
No. 111. β 38. Lal. 29,136. 7.5			
	$15^h 56^m 51^s$	$- 24^\circ 44'.1$	
	Comes = 9.1		
1877.5	352.0	3.95	Cinc. 1 n
1880.5	351.5	4.07	" 1
1891.5	352.9	4.52	β 3
No. 112. Howe 41. Lac. 6653. 7.1			
	$15^h 57^m 27^s$	$- 32^\circ 47'.5$	
	7.8 and 8.0		
1875.5	363.8	1.90	C. G. A. 4 n
1877.4	346.7	2.77	Cinc. 1
1897.4	345.4	3.00	See 1
1897.4	344.8	2.47	Scott 4

Also noted as double at the Cape in 1878.

No. 113.	h. 4828.	C. Z. 15 h. 3929.	MAG. 8.5
	$15^h 57^m 42^s$	$- 43^\circ 3'.9$	
	Comes = 10.4		
1834.6	90.7	$3. \pm$	h 1 n
No. 114. Harvard. Lac. 6657. 6.4			
	$15^h 58^m 1^s$	$- 37^\circ 35'.0$	
1891	Double within $30''$. Arequipa.		
1897.7	Single, 7-inch refractor, Cape		1 n
No. 115. λ 262. C. Z. 15 h. 3957. 9.0			
	$15^h 58^m 3^s$	$- 40^\circ 7'.6$	
	9.5 and 10.0		
1897.6	328.8	1.01	See 1 n
No. 116. Triple. ξ Scorpii. 4.1			
	$15^h 58^m 52^s$	$- 11^\circ 5'.8$	
	A = 4.6	B = 5.5	C = 7.1
	A and B = H. I. 33		
1782.4	188.0	"	H 1 n
1825.5	355.3	1.15	Σ 3
1834.5	7.1	1.17	Dawes 4
1842.5	21.6	.....	" 2
1856.2	65.5	0.60	Jacob 3
1865.5	166.9	0.49	Engelmann 7
1875.4	180.5	1.10	Dembowski 5
1884.5	194.6	1.28	Hall 5
1892.5	208.0	1.23	Maw 3
1895.5	213.4	0.81	Comstock 3
1899.5	225.6	0.74	
1900.5	229.6	0.70	

The above measures and ephemeris are taken from Prof. See's *Evolution of Stellar Systems*.
According to Prof. See the orbit of this well-known binary is :-
P = 104 years T = 1864.6
 $a = 1''.36$
 $e = 0.131$ $i = 70^\circ.3$
 $\Omega = 9^\circ.5$ $\lambda = 111^\circ.6$

The orbit is much less elliptical than usual in binary systems.

SOUTHERN DOUBLE STARS.

15 hrs.

155A

From the inclination of the orbit and the position of λ there are two maxima and two minima in the distances in each revolution, they occur approximately as follows:—

1835	"	1.42
1860	0.38	
1884	1.29	
1912	0.50	

The common p.m. is $0''.098$ towards $258^\circ.8$.

A(+B) and C = \mathbb{H} . II. 20

1782.3	88.6	6.38	\mathbb{H}	1 n
1822.5	78.4	6.77	$\frac{1}{2}$	—
1832.5	76.2	6.70	Σ	3
1836.5	74.7	7.07	"	3
1852.2	74.7	6.99	O Σ	—
1854.1	69.3	7.73	Jacob	2-1
1862.7	70.5	7.15	Dembowski	5
1867.8	70.0	7.03	"	5
1871.8	61.6	7.12	"	5
1876.5	67.3	7.30	Hall	2
1880.5	65.2	7.29	Pritchett	3
1888.6	65.3	7.17	Hall	2

It will be thus seen that whilst the motion of the close pair is direct, that of the third companion is retrograde. Its distance is perhaps increasing. Many other measures.

Sometimes called ξ (51) Librae in error.

Also called Σ 1998.

Paper:—

1893. Hall, A., *Ast. Journal*, vol. xiii. No. 302.

No. 117: λ 264. C. Z. 15 h. 4048. ^{MAG.} 8.0
15^h 59^m 21^s. — 32° 34'.9.

A = 8.2 B = 9.7 C = 12.7

A and B

1897.5	340.0	0.55	See	1 n
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A and C

1897.5	9.8	9.96	See	1 n
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The brightest star of a small group.

No. 118. Washburn 127. B. D.
—20°, 4395.

MAG.

9.1

15^h 59^m 36^s — 20° 13'.2.

Comes = 11.5

1889.5 131.1 2.00 Washburn 2 n

B. D. — 20°, 4394, mag. 9.5, is N.pr., and a 7.7 mag. star is 12^s f. and N.

No. 119. Triple. β Scorpii. 3.1
15^h 59^m 37^s — 19° 31'.9.

B = 10.1 C = 6.4

A and B = β 947

1879.6	97.3	0.85	Hall	1 n
1880.1	88.4	0.91	β	6
1881.5	92.7	0.96	"	3
1887.6	99.2	1.09	Hall	2
1889.4	93.9	0.94	β	5
1891.5	95.7	1.00	Hall	2
1892.4	95.8	1.03	β	3
1897.6	90.6	1.00	Aitken	3
1898.3	93.4	1.13	See	1

A and C = \mathbb{H} . III. 7

1782.3	25.1	[14.4]	\mathbb{H}	1 n
1823.3	26.5	13.7	South	2
1852.7	25.4	13.7	Jacob	3-2
1868.4	25.5	13.7	Dembowski	4
1879.6	24.3	13.8	Cinc.	7
1880.5	25.2	13.4	β	3
1890.4	23.0	13.3	Glasenapp	2
1896.5	25.3	13.6	Hussey	3

Virtually fixed.

This great triple system has a common p.m. of $0''.046$ towards $233^\circ.7$.

156A

16hrs.

REFERENCE CATALOGUE OF

No.				MAG.					MAG.
No. 1.	β 948.	Lal. 29,280.		6.4					
	16 ^h 0 ^m 24 ^s	— 6° 1'.2.							
		6.5 and 9.1							
	1879.6	150.5	1.47	β	4 n				
	1888.5	147.4	1.55	Haverford	2				
	1892.4	149.3	1.54	"	4-3				
	Two more distant <i>comites</i> have been noted by Σ and others.								
	Curiously enough, h , in observing the distant stars, in 1835, remarks, "The large star not noticed as close double." Why this remark was made is not apparent.								
No. 2.	Harvard.	Piazzii 15 h. 255.		6.5					
		16 ^h 0 ^m 41 ^s	— 36° 29'.0.						
	1891	Double 13-inch.	Arequipa						
	1897	Single 7-inch.	Innes						
	See <i>Harvard Circular</i> , No. 18.								
No. 3.	β 39.	'11 Scorpii.		5.6					
	16 ^h 2 ^m 3 ^s	— 12° 28'.6.							
		<i>Comes</i> = 10.5							
	1872.5	258.2	3.75	Knott	1 n				
	1875.7	256.5	3.35	Dembowski	4				
	1879.5	258.4	3.33	β	2				
	1882.4	254.6	3.36	Cinc.	2				
	1888.4	259.4	3.33	Haverford	1				
	Common p.m. of about 0 ^h .07.								
	A few other measures.								
No. 4.	β 949.	Lal. 29,365.		6.5					
	16 ^h 2 ^m 59 ^s	— 9° 49'.9.							
		7.2 and 7.3							
	1880.3	197.8	0.62	β	4 n				
	This fine pair seems to have met with unmerited neglect.								
No. 5.	Brisbane.	Lac. 6706.		6.6					
	16 ^h 3 ^m 10 ^s	— 32° 23'.0.							
		7.3 and 7.4							
	1837.5	86.4	15. \pm	h	1 n				
	1890.4	86.5	6.86	Glasenapp	2				
	1897.4	85.2	7.85	See	1				
	Both stars have been observed on the meridian at the Cape and Cordoba.								
	A 9.1 mag. star 5' S.f.								
No. 6.	Harvard.	Piazzii 15 h. 271.		6.0					
		16 ^h 3 ^m 28 ^s	— 33° 16'.8.						
	1891	Double 13-inch refractor.	Arequipa						
	1897	Single 7-inch	"	Innes					
	From <i>Harvard Circular</i> , No. 18.								
No. 7.	λ 266.	Lac. 6708.		7.2					
	16 ^h 3 ^m 29 ^s	— 35° 22'.6.							
		7.5 and 8.7							
	1897.4	206. \pm	0.2 \pm	See	1 n				
No. 8.	Cordoba [44].	Bris. 5620.		8.3					
		16 ^h 5 ^m 21 ^s	— 56° 9'.4.						
		8.5 and 10.0							
	1879.6	150.3	2.53	C. G. A.	3 n				
No. 9.	λ 267.	C. Z. 16 h. 278.		7.5					
		16 ^h 5 ^m 22 ^s	— 42° 6'.9.						
		<i>Comes</i> = 14.2							
	1897.6	189.2	4.92	See	1 n				
	Another star 40" pr.								
No. 10.	Harvard.	κ Normae.		5.1					
		16 ^h 5 ^m 35 ^s	— 54° 22'.3.						
		<i>Comes</i> = 13.9							
	1897.2	209.8	17.5	See	3 n				
	From <i>Harvard Circular</i> , No. 18.								
	C. P. D. mag. = 7.4.								
No. 11.	β 40.	Ö.A. 15,343.		8.0					
		16 ^h 5 ^m 42 ^s	— 27° 17'.5.						
		8.5 and 9.0							
	1876.5	352.1	5.22	Cinc.	1 n				
	1877.5	354.8	4.69	"	1				
	1890.5	354.7	5.71	Glasenapp	2				
	1891.5	355.2	5.07	β	4				
	Separately observed on the meridian at Cordoba.								
	This is β 's first discovery.								

SOUTHERN DOUBLE STARS.

16hrs.

157A

No. 12. h. 4839. ϵ_1 Scorpii. MAG. 5.5
 16^h 6^m 5^s — 28° 9'.4

5.6 and 8.6

1834.8	81.7	4.62	h	2 n
1876.5	82.2	4.50	Cinc.	2
1880.4	77.2	4.36	"	2
1890.5	79.7	4.03	Glasenapp	2
1897.4	77.4	4.42	Scott	3

C. P. D. mag. = 6.6.

About 30' S. of ϵ_2 Scorpii, mag. 4.7.

No. 13. Jacob [9.] Piazzii 16 h. 3. 7.3
 16^h 6^m 10^s — 19° 11'.4

7.7 and 8.7

1846.6	39.0	1.11	Mitchel	2 n
1847.7	43.8	1.7 ±	Jacob	2
1850.6	41.0	2.13	"	3-2
1868.5	41.3	2.03	Harvard	1
1874.4	45.7	.....	β	6
1874.5	48.4	1.89	Dembowski	2
1876.3	47.4	1.90	"	2
1877.4	46.2	1.86	Cinc.	1
1879.4	45.2	2.07	"	5
1881.3	46.6	2.02	β	4
1887.6	47.8	2.00	Hall	5
1888.4	48.3	2.22	Haverford	3
1890.4	47.5	2.58	Glasenapp	2
1896.6	47.3	2.22	Hussey	2
1896.6	51.0	2.09	Pritchett	3
1897.5	43.6	2.05	Aitken	3
1898.3	47.5	2.30	See	1

The angle and distance are perhaps increasing slowly.

Other measures.

The pr. and N. star of a quadruple system. Connecting the two pairs there are many measures, some of which are quoted (\mathbb{H} . V. 6).

1782.3	334.8	.....	\mathbb{H}	1 n
1821.4	338.2	40.8	South	-
1847.7	336.6	40.6	Jacob	2
1851.4	336.8	40.8	Smyth	-
1874.5	336.8	40.8	Dembowski	4
1888.6	336.4	40.8	Hall	2

No. 14. β 120. ν Scorpii. MAG. 4.2
 16^h 6^m 11^s — 19° 12'.1

4.4 and 5.9

1875.9	359.9	0.73	Dembowski	11-6 n
1877.5	8.9	0.59	Cinc.	2-1
1878.4	359.4	0.52	Russell	2
1878.5	0.6	0.72	Dembowski	2
1879.0	0.2	0.74	Cinc.	5
1880.5	0.9	0.54	Pritchett	12
1881.4	6.7	0.81	β	6
1886.2	7.2	0.65	L. McC.	1
1886.4	3.9	0.74	Hall	3
1888.4	4.1	0.80	Haverford	3
1888.6	5.0	0.60	Hall	2
1889.4	1.2	0.80	β	3
1896.5	3.5	1.15	Hussey	1
1896.6	7.4	0.88	Pritchett	2
1897.5	0.6	0.71	Aitken	3
1898.3	3.4	1.32	See	1

Other measures.

The angle and distance are probably increasing, but the measures of both this and the pair N.pr. are puzzling. The discordances are in excess of the probable errors.

Also registered in the first list of new double stars discovered at the Sydney Observatory.

The common p.m. of this quadruple system is very small (0".04 about), and is the same in amount and direction as that of several neighbouring stars, e.g., 48 and 50 Librae, ψ Ophiuchi, etc.

See:—

Burnham, *M. N. R. A. S.*, vol. xxxv. pp. 28-30.

No. 15. Russell 274. δ Triang. Austr. 4.0
 16^h 6^m 20^s — 63° 25'.8

Comes = 10.3

1880.4	140. ±	0.3 ±	Russell	1 n
1891.6	176.6	0.72	Sellers	1

A fine pair deserving more attention than the published measures show, but it is doubtful if the companion could be seen by any other telescope in the Southern Hemisphere in the time covered by the above measures.

The p.m. of the chief star is 0".023 towards 226°.3, and its mag. in C. P. D. = 5.9.

158A

16hrs.

REFERENCE CATALOGUE OF

No. 16. λ 268. C. Z. 16 h. 455. ^{MAG.} 7.5
 $16^{\text{h}} 8^{\text{m}} 0^{\text{s}}$ — $38^{\circ} 52'.6$.

8.2 and 8.3

1897.4 164.5 $2''.17$ See 2 n

No. 17. Harvard. θ Normae. ^{MAG.} 5.3
 $16^{\text{h}} 8^{\text{m}} 0^{\text{s}}$ — $47^{\circ} 7'.0$.

1891 Double $< 30''$ 13-inch. Arequipa
 1897 Single 7-inch. Innes

No. 18. Harvard. Lac. 6735. ^{MAG.} 5.4
 $16^{\text{h}} 8^{\text{m}} 53^{\text{s}}$ — $53^{\circ} 33'.6$.

1891 Double $< 30''$ 13-inch. Arequipa

1897 { Two stars, 11 and 12 mag, } Innes
 $40'' \pm$ to the N.

C. P. D. mag. = 7.5.

No. 19. λ 269. Lac. 6738. ^{MAG.} 6.8
 $16^{\text{h}} 9^{\text{m}} 36^{\text{s}}$ — $52^{\circ} 50'.1$.

A = 7.6 B = 7.6 C = 13.0
 A and B

1897.2 213.4 $0.20 \pm$ See 1 n
 A and C

1897.2 5.0 $21''.1$ See 1 n

No. 20. Russell 275. Bris. 5644. ^{MAG.} 8.4
 $16^{\text{h}} 9^{\text{m}} 59^{\text{s}}$ — $64^{\circ} 19'.4$.

8.8 and 9.5

1874.5 350.0 4.53 Russell 1 n

1881.5 352.6 3.83 " 1

1887.5 350.5 3.94 Pollock 3-2

Separately observed on the meridian at Cordoba.

There is another double star about $5'$ S.f. See next star.

No. 21. Innes 15. Lac. 6731. ^{MAG.} 7.0
 $16^{\text{h}} 10^{\text{m}} 42^{\text{s}}$ — $64^{\circ} 24'.1$.

7.2 and 9.2

1895.6 314.5 1.20 Sellors 3 n

Russell 275 is $5'$ N.pr.

No. 22. h. 4836. Lac. 6765. ^{MAG.} 7.5
 $16^{\text{h}} 10^{\text{m}} 56^{\text{s}}$ — $34^{\circ} 34'.4$.

8.2 and 8.4

1836.8 292.8 $5''.14$ h 2 n

1880.6 298.4 4.46 Hargrave 2

1890.5 298.5 5.40 Glasenapp 2

1892.0 294.3 4.34 Hough 2

1897.4 297.1 5.02 See 1

Also registered as h 4840 and Hough 401.

Both stars have been observed on the meridian at the Cape.

No. 23. λ 271. λ Normae. ^{MAG.} 5.6
 $16^{\text{h}} 12^{\text{m}} 20^{\text{s}}$ $42^{\circ} 25'.8$.

6.0 and 6.8

1897.2 152.0 $0''.35$ See 2 n

No. 24. h. 4841. γ_2 Normae. ^{MAG.} 4.2
 $16^{\text{h}} 12^{\text{m}} 21^{\text{s}}$ — $49^{\circ} 54'.6$.

C. P. D. -49° , $9162 = 9.4$

1834.5 350.9 $25. \pm$ h 1 n

1881.7 359.9 $20. \pm$ Hargrave 1

The p.m. of the chief star is $0''.202$ towards $252^{\circ}.1$.

In the C. P. D. the mag. of the chief star is 6.7.

No. 25. λ 272. Lac. 6781. ^{MAG.} 6.7
 $16^{\text{h}} 12^{\text{m}} 45^{\text{s}}$ — $35^{\circ} 14'.8$.

Both = 7.5

1897.5 280.2 $0''.30$ See 3-2 n

No. 26. λ ... Lac. 6784. ^{MAG.} 7.3
 $16^{\text{h}} 13^{\text{m}} 26^{\text{s}}$ — $39^{\circ} 15'.4$.

8.0 and 8.2

1897.1 179.3 $1''.67$ See - n

Lac. 6785, mag. 7.5, is $8'$ S. and is also double. See next star.

No. 27. λ 273. Lac. 6785. ^{MAG.} 7.5
 $16^{\text{h}} 13^{\text{m}} 28^{\text{s}}$ — $39^{\circ} 23'.3$.

Both = 8.3

1897.4 $175.5 \pm$ $0''.35 \pm$ See 1 n

See also No. 26.

SOUTHERN DOUBLE STARS.

16^{hrs.}

159A

No. 28. Innes 91. Piazzì 16 h. 37. 6.3
16^h 13^m 47^s — 39° 11'.2.

Comes = 10.6

1896.7	290.±	6.±	Innes	1 n
1896.9	295.9	10.8	See	3-2

This star was also noted, as double at Arequipa in 1891.

See *Harvard Circular*, No. 18.

No. 29. h. 4843. Lac. 6796. 7.3
16^h 15^m 0^s — 33° 3'.0.

Comes = 10.0

1837.5	270.6	15.±	h	1 n
1897.5	267.2	12.23	See	1

Also registered as Innes 92.

Another companion 45" ± S.f.

Lac. 6797, mag. 7.3, is about 6' N.f.

No. 30. H. IV. 121. σ Scorpii. 3.0
16^h 15^m 6^s — 25° 21'.2.

Comes = 7.6

1834.5	273.8	15.±	h	2 n
1847.6	271.1	22.34	Mitchel	1
1879.3	272.3	20.42	Cinc.	2
1882.4	271.2	20.42	"	1
1896.5	272.1	20.61	Hussey	2

The p.m. of the chief star is 0".044 towards 235°.7

No. 31. β 624. Lal. 29,770. 7.3
16^h 16^m 52^s — 22° 52'.9.

7.5 and 9.2

1878.5	321.7	1.12	β	2 n
1879.4	320.0	1.25	Cinc.	3
1891.5	322.2	1.17	β	6
1895.6	316.1	1.15	Lick	3

Near ρ Ophiuchi, mag. 4.8.

No. 32. h. 4845. Lac. 6804. 7.5
16^h 16^m 53^s — 41° 0'.7.

8.1 and 8.5

1836.4	135.0	1.20	h	2 n
1878.7	137.6	1.52	Melbourne	1
1891.6	136.1	2.13	Sellors	1

Lac. 6802, mag. 7.3, is about 12' N.pr.

No. 33. h. 4848. Lac. 6815. 6.5
16^h 17^m 30^s — 32° 57'.9.

7.1 and 7.4

1836.5	155.0	6.04	h	2 n
1846.2	155.0	6.14	Jacob	2
1877.5	153.4	5.92	Cinc.	1
1890.4	155.8	6.12	Glasenapp	2
1893.4	153.0	5.85	Scott	2

There is a 9.0 mag. star 92" N.

No. 34. Cordoba [45]. C. Z. 16 h. 1114. 7.7
16^h 17^m 52^s — 48° 54'.8.

A = 8.6 B = 8.6 C = 10.8

A and B

1895.6	206.9	1.64	Sellors	3 n
			A and C	

1895.6	108.3	9.91	Sellors	3
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No. 35. H. N. 39. Piazzì 16 h. 60. 5.4
16^h 18^m 22^s — 29° 28'.2.

6.0 and 6.4

1834.4	356.5	4.±	h	1 n
1835.9	348.3	7.54	"	3
1851.5	347.9	7.09	Jacob	2
1867.4	351.9	7.04	Harvard	1
1882.4	352.1	6.88	Cinc.	1
1890.4	350.4	6.35	"	2
1893.4	351.3	6.24	Scott	2
1897.5	349.6	6.60	See	1

Common p.m. of 0".128 towards 150°.

C. P. D. combined mag. = 6.9.

Other measures.

Also registered as h 4850.

Looked for at S. Dec. 57° 29' at Sydney in 1880, and not found.

No. 36. Dunlop 201. i Triang. Austr. 5.3
Yellow

16^h 18^m 40^s — 63° 49'.8.

Comes = 8.9 blue

1836.9	27.2	24.7	h	2 n
1871.6	21.7	22.1	Russell	2
1880.4	19.7	21.7	"	1
1886.6	20.5	21.6	Pollock	1

Mr Russell's first measures are set against h 4847, his second against Russell 278.

160A

16 hrs.

REFERENCE CATALOGUE OF

<p>No. 37. β 1115. Piazz 16 h. 68. MAG. 7.0 $16^h 19^m 24^s$ — $23^\circ 13'.8$</p> <p style="text-align: center;">7.4 and 8.5</p> <table border="0"> <tr><td>1889.4</td><td>26.3</td><td>0.90</td><td>β</td><td>4 n</td></tr> <tr><td>1897.4</td><td>18.4</td><td>0.72</td><td>Aitken</td><td>3</td></tr> <tr><td>1897.6</td><td>26.7</td><td>0.97</td><td>See</td><td>1</td></tr> </table> <p>Closely S.pr. ρ Ophiuchi, mag. 4.8.</p>	1889.4	26.3	0.90	β	4 n	1897.4	18.4	0.72	Aitken	3	1897.6	26.7	0.97	See	1	<p>No. 41. Howe 42. Lac. 6835. MAG. 8.2 $16^h 19^m 37^s$ — $34^\circ 45'.1$</p> <p style="text-align: center;">8.7 and 9.3</p> <table border="0"> <tr><td>1876.5</td><td>110.±</td><td>1.2±</td><td>Howe</td><td>1 n</td></tr> <tr><td>1892.0</td><td>103.7</td><td>1.09</td><td>Hough</td><td>2</td></tr> <tr><td>1897.5</td><td>106.7</td><td>1.85</td><td>Lowell</td><td>2</td></tr> </table> <p>Also registered as Hough 404. An 8.6 mag. star is 5^s f. 2' N.</p>	1876.5	110.±	1.2±	Howe	1 n	1892.0	103.7	1.09	Hough	2	1897.5	106.7	1.85	Lowell	2																									
1889.4	26.3	0.90	β	4 n																																																				
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1892.0	103.7	1.09	Hough	2																																																				
1897.5	106.7	1.85	Lowell	2																																																				
<p>No. 38. Innes 93. Lac. 6822. 7.7 $16^h 19^m 28^s$ — $47^\circ 49'.0$</p> <p style="text-align: center;">7.8 and 10.1</p> <table border="0"> <tr><td>1896.7</td><td>300.±</td><td>0.8±</td><td>Innes</td><td>2 n</td></tr> <tr><td>1897.2</td><td>284.1</td><td>1.13</td><td>See</td><td>1</td></tr> </table> <p>Very difficult, Prof. See calls the companion 12.1 mag. About 40' S. pr. beautifully-coloured pair ϵ Normae.</p>	1896.7	300.±	0.8±	Innes	2 n	1897.2	284.1	1.13	See	1	<p>No. 42. λ 278. C. Z. 16 h. 1282. 8.5 $16^h 19^m 40^s$ — $31^\circ 0'.2$</p> <p style="text-align: center;">Both = 9.3</p> <table border="0"> <tr><td>1897.5</td><td>317.5</td><td>0.63</td><td>Cogshall</td><td>1 n</td></tr> </table> <p>Found by Mr Cogshall.</p>	1897.5	317.5	0.63	Cogshall	1 n																																								
1896.7	300.±	0.8±	Innes	2 n																																																				
1897.2	284.1	1.13	See	1																																																				
1897.5	317.5	0.63	Cogshall	1 n																																																				
<p>No. 39. Innes 94. Lac. 6837. 7.7 $16^h 19^m 31^s$ — $29^\circ 41'.5$</p> <p style="text-align: center;">7.9 and 9.5</p> <table border="0"> <tr><td>1896.6</td><td>195.±</td><td>1.±</td><td>Innes</td><td>1 n</td></tr> <tr><td>1897.6</td><td>202.5</td><td>0.42</td><td>See</td><td>2</td></tr> </table> <p>Also recorded as λ 277. h 4850, mag. 5.7 (C. P. D. = 6.9), a wide pair is 69^s pr. and 13' N.</p>	1896.6	195.±	1.±	Innes	1 n	1897.6	202.5	0.42	See	2	<p>No. 43. Hough 403. B. D.—12°, 4501. 8.8 $16^h 19^m 45^s$ — $12^\circ 56'.9$</p> <p style="text-align: center;">Comes = 13.9</p> <table border="0"> <tr><td>1893.0</td><td>166.4</td><td>3.50</td><td>Hough</td><td>2 n</td></tr> </table>	1893.0	166.4	3.50	Hough	2 n																																								
1896.6	195.±	1.±	Innes	1 n																																																				
1897.6	202.5	0.42	See	2																																																				
1893.0	166.4	3.50	Hough	2 n																																																				
<p>No. 40. h 11. 19. ρ Ophiuchi. 4.8 $16^h 19^m 35^s$ — $23^\circ 13'.0$</p> <p style="text-align: center;">5.2 and 6.2, both yellowish</p> <table border="0"> <tr><td>1835.4</td><td>362.1</td><td>4.±</td><td>h</td><td>1-2 n</td></tr> <tr><td>1857.5</td><td>363.2</td><td>3.19</td><td>Secchi</td><td>1</td></tr> <tr><td>1877.5</td><td>357.3</td><td>3.30</td><td>Schiaparelli</td><td>4-3</td></tr> <tr><td>1882.5</td><td>357.0</td><td>3.66</td><td>Cinc.</td><td>3</td></tr> <tr><td>1889.4</td><td>355.0</td><td>3.41</td><td>β</td><td>3</td></tr> <tr><td>1890.4</td><td>355.6</td><td>3.35</td><td>Glasenapp</td><td>2</td></tr> <tr><td>1897.4</td><td>352.8</td><td>3.39</td><td>Scott</td><td>2</td></tr> <tr><td>1898.5</td><td>354.2</td><td>3.33</td><td>Solá</td><td>1</td></tr> </table> <p>Other measures. Small common p.m. Slow decrease in angle. β 1115 is in the field.</p>	1835.4	362.1	4.±	h	1-2 n	1857.5	363.2	3.19	Secchi	1	1877.5	357.3	3.30	Schiaparelli	4-3	1882.5	357.0	3.66	Cinc.	3	1889.4	355.0	3.41	β	3	1890.4	355.6	3.35	Glasenapp	2	1897.4	352.8	3.39	Scott	2	1898.5	354.2	3.33	Solá	1	<p>No. 44. β 950. W.B. 16 h. 324. 8.2 $16^h 19^m 47^s$ — $9^\circ 38'.1$</p> <p style="text-align: center;">8.6 and 9.5</p> <table border="0"> <tr><td>1880.5</td><td>355.1</td><td>1.18</td><td>β</td><td>5 n</td></tr> <tr><td>1888.5</td><td>350.9</td><td>1.2±</td><td>Haverford</td><td>1</td></tr> <tr><td>1892.4</td><td>354.5</td><td>1.07</td><td>β</td><td>3</td></tr> </table> <p>The p.m. is very small.</p>	1880.5	355.1	1.18	β	5 n	1888.5	350.9	1.2±	Haverford	1	1892.4	354.5	1.07	β	3
1835.4	362.1	4.±	h	1-2 n																																																				
1857.5	363.2	3.19	Secchi	1																																																				
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1888.5	350.9	1.2±	Haverford	1																																																				
1892.4	354.5	1.07	β	3																																																				
<p>No. 45. h. 4853. ϵ Normae. 4.7 $16^h 19^m 51^s$ — $47^\circ 19'.6$</p> <p style="text-align: center;">4.9 green and 6.9 purple</p> <table border="0"> <tr><td>1836.0</td><td>335.3</td><td>23.9</td><td>h</td><td>3 n</td></tr> <tr><td>1846.0</td><td>335.0</td><td>22.9</td><td>Jacob</td><td>3</td></tr> <tr><td>1871.5</td><td>335.6</td><td>23.1</td><td>Russell</td><td>1</td></tr> <tr><td>1881.7</td><td>336.0</td><td>22.4</td><td>Hargrave</td><td>1</td></tr> <tr><td>1897.2</td><td>335.3</td><td>22.8</td><td>See</td><td>2</td></tr> </table> <p>The colours of this pair are very fine. At the Sydney Observatory in 1881 the mags. were recorded as 8th and 10th respectively; Prof. See also records the companion as 10.3 mag.</p>	1836.0	335.3	23.9	h	3 n	1846.0	335.0	22.9	Jacob	3	1871.5	335.6	23.1	Russell	1	1881.7	336.0	22.4	Hargrave	1	1897.2	335.3	22.8	See	2																															
1836.0	335.3	23.9	h	3 n																																																				
1846.0	335.0	22.9	Jacob	3																																																				
1871.5	335.6	23.1	Russell	1																																																				
1881.7	336.0	22.4	Hargrave	1																																																				
1897.2	335.3	22.8	See	2																																																				

SOUTHERN DOUBLE STARS.

16 hrs.

161A

No. 46. h. 4854. Lac. 6827. ^{MAG.} 6.6
Orange
16^h 21^m 25^s — 57° 32'.0.

1836.±	N.f.	< 2"	h	1 n
1871.5	Not divided		Russell	1
1872.4	46°.4	1".75	"	1
1874.5	Not divided		"	1
1880.5	Single		"	2

h:—"Very difficult," 1836.

Russell:—"Very easy," 1872.

The p.m. is 0".15 towards 180°.

The mag. of the companion is not given by either observer.

No. 47. Burg. Antares. ^{MAG.} 1.1
Red
16^h 23^m 16^s — 26° 12'.6.

Comes = 7.0 green

1847.3	273.7	3.47	Dawes	11-9 n
1852.6	272.8	2.94	Jacob	3
1856.7	274.3	3.30	"	6-5
1877.6	271.5	3.25	Hall	4
1880.0	271.7	2.92	β	2
1886.6	270.3	2.88	Hall	3
1894.6	273.0	2.76	Sellers	3-2
1896.5	274.6	3.16	Hussey	5
1896.6	272.3	3.18	See	3

Many other somewhat discordant measures.

Common p.m. of 0".041 towards 223°.4.

Combined mag. in C. P. D. = 4.2, owing to the red colour of the chief star.

Found many years ago during an occultation.

A good test requiring a fine atmosphere, and best seen in daylight.

No. 48. Σ 2048. Piazzini 16 h. 88. ^{MAG.} 7.2
16^h 23^m 25^s — 7° 54'.3.

7.3 and 9.7

1831.5	302.7	4.69	Σ	3 n
1848.2	301.0	4.69	Mitchel	2
1878.5	301.3	5.04	β	1
1879.4	300.6	5.02	Cinc.	2
1890.4	301.9	4.46	Glasenapp	2

Not much evidence of change.

Common p.m. of 0".114 towards 195°.1.

No. 49. h. 4857. C. Z. 16 h. 1503. ^{MAG.} 7.7
16^h 23^m 46^s — 46° 15'.6.

8.0 white, and 9.3 reddish

1834.5	73.5	5.±	h	1 n
1872.6	72.7	7.44	Russell	1
1880.6	73.4	5.19	Hargrave	1

No. 50. Russell 281. C. Z. 16 h. 1637. ^{MAG.} 8.5
16^h 26^m 15^s — 61° 41'.1.

8.9 and 9.9

1880.4	123.4	3.76	Russell	1 n
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No. 51. Σ 3105. Lal. 30,053. ^{MAG.} 7.9
16^h 26^m 26^s — 6° 48'.4.

8.6 and 8.7

1830.9	59.4	0.4±	Σ	2 n
1835.6	57.5	0.62	"	1
1870.0	53.2	0.5±	Dembowski	7
1878.5	50.9	0.61	β	1
1880.4	42.7	0.7±	Cinc.	1
1886.2	41.5	0.51	L. McC.	1
1888.5	40.5	0.45	Hall	3
1895.6	34.9	0.39	Comstock	3-2

Some very discordant measures have been omitted.
Distance decreasing, and the angular motion increasing.

No. 52. Innes 95. Lac. 6871. ^{MAG.} 7.3
16^h 26 32^s — 33° 19'.1.

7.4 and 9.8

1896.6	350.±	1.5±	Innes	2 n
1897.6	359.0	1.58	See	3

C. Z. 16 h. 1635, mag. 8.0, is 52 secs. pr. 4' N.

No. 53. h. 4858. β Apodis. ^{MAG.} 4.2
16^h 28^m 47^s — 77° 18'.5.

Comes = 12.0

1835.4	104.4	20.±	h	1 n
1871.5	No companion found.		Russell	1
1895.4	Well seen.		Innes	2

The p.m. of β Apodis is 0".467 towards 223°.3.

C. P. D. mag. = 6.4.

x

162A

16hrs.

REFERENCE CATALOGUE OF

No. 54. h. 4863. C. Z. 16 h. 1894. 8.2
 16^h 29^m 24^s — 53° 34'.3.

8.7 and 9.4

1834.5	123.1	4.±	h	1 n
1880.7	121.1	3.48	Hargrave	1

Separately observed on the meridian at Cordoba.

No. 55. h. 4866. Lac. 6887. 7.3
 16^h 31^m 26^s — 56° 47'.6.

7.9 and 8.3 yellowish

1836.0	127.1	3.±	h	4 n
1875.6	124.4	3.43	Sydney	2
1890.0	123.7	3.66	Sellors	2

Separately observed on the meridian at Cordoba.
 C. Z. 16 h. 2038, mag. 9.0, is 3'.5 N.

No. 56. β 819. B.D.—4°, 4133. 9.0
 16^h 31^m 30^s — 4° 57'.6.

9.1 and 11.8

1881.4	230.8	1.59	β	3 n
1888.6	231.3	1.59	Washburn	3

No. 57. Sellors 12. Lac. 6902. 7.3
 16^h 32^m 33^s — 47° 35'.0.

7.9 and 8.2

1893.6	178.1	1.00	Sellors	2 n
1895.6	181.4	1.31	"	3

At one time wrongly identified as C. Z. 16 h. 2139.
 See also the two double stars, Nos. 59 and 60,
 which must not be confused with this pair.

No. 58. λ 282. C. Z. 16 h. 2186. 8.5
 16^h 32^m 59^s — 34° 0'.4.

Comes = 12.8

1897.7	205.0	2.49	See	1 n
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The f. of a small group.

No. 59. Cordoba [46]. C. Z. 16 h. 2202. 8.0
 16^h 33^m 19^s — 47° 28'.3.

8.4 and 9.3

1889.5	101.4	2.61	Pollock	2 n
1895.6	99.8	2.61	Sellors	3

No. 60. Sellors 21. Lac. (6915). 7.8
 16^h 33^m 41^s — 47° 33'.0.

8.0 and 9.7

1895.6	321.9	1.51	Sellors	3 n
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See also two preceding pairs, Nos. 57 and 59.

No. 61. Multiple. Lac. 6912. 5.6
 16^h 33^m 51^s — 48° 34'.0.

A = 6.1 B = 9.5 C = 12.0 D = 7.1

A and B = Melbourne [8]

1878.8	12.0	2.05	Melbourne	1 n
1897.2	11.6	1.73	Lowell	3

A and C = Innes 96

1896.6	180.±	9.±	Innes	1 n
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A and D = h 4876

1837.0	265.1	9.83	h	2 n
1846.3	265.8	9.91	Jacob	1
1876.5	265.6	9.76	Cape M. O.	3
1897.2	266.1	9.53	Lowell	3

h measures two more distant stars, one of which
 (164°.9, 12") may be Innes 96.

Very beautiful, followed by a group of stars, one of
 which is double.

Also noted as T (triple?) at Arequipa in 1891.

See *Harvard Circular*, No. 18.

C. P. D. mag. = 6.8.

No. 62. Innes 97. C. Z. 16 h. 2233. 8.5
 16^h 33^m 56^s — 48° 33'.5.

8.6 and 11.3

1896.6	N.f.	2.±	Innes	1 n
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Closely N.f. the quadruple star Lac. 6912.

SOUTHERN DOUBLE STARS.

16^{hrs.}

163A

No. 63. h. 4874. Bris. 5784. ^{MAG.} 7.5
16^h 34^m 5^s — 60° 43'.9.

8.2 and 8.3 yellow

1834.6	300.2	2.±	<i>h</i>	1 n
1871.6	304.1*	3.80	Russell	1
1880.6	297.1	2.82	Hargrave	1
1891.5	295.0	3.80	Sellors	1

Mr Russell's measure is from Russell 282 in his list of new double stars.

The mag. of the chief star has been estimated as follows:—

h:— 9.5
Russell:— 6.5
Stone:— 8.1
C.G.A.:— 8.2
Hargrave:— 10.0
Sellors:— 8.0

No. 64. β 820. Lal. 30,279. ^{MAG.} 7.3
16^h 34^m 11^s — 2° 54'.5.

Comes = 10.0

1892.4	237.4	4.28	β	3 n
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The p.m. of the chief star is 0".112 towards 290°.9.

No. 65. Innes 39. Lac. 6931. ^{MAG.} 8.0
16^h 35^m 16^s — 32° 37'.6.

Comes = 10.9

1895.8	pr.	3.±	Innes	1 n
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C. P. D. mag. = 7.5.

The pr. and brightest star of a group in the finder.

No. 66. Russell 283. Lac. 6933. ^{MAG.} 6.9
16^h 35^m 48^s — 36° 52'.9.

7.3 and 8.3, both yellow

1881.6	87.8	0.42	Russell	1 n
1896.6	94.4	0.90	See	3
1897.5	86.6	1.06	Lowell	4

The dec. of this fine pair is upwards of 1° wrong in the original catalogue, and no reference to a star catalogue was given. It was refound independently, and registered as Innes 98; and a later search revealed no similar pair nearer the Sydney position.

Also recorded as λ 284.

No. 67. Harvard. Lac. 6906. ^{MAG.} 5.3
16^h 36^m 37^s — 66° 55'.3.

1891.0	Double within 30"	Arequipa	- n
1897.0	Single	Innes	1

From *Harvard Circular*, No. 18.

No. 68. Harvard. Lac. 6927. ^{MAG.} 6.6
16^h 36^m 45^s — 52° 57'.8.

Double, Arequipa 1891.

From *Harvard Circular*, No. 18.

No. 69. Harvard. Lac. 6946. ^{MAG.} 6.4
16^h 37^m 2^s — 37° 57'.9.

1891.0	Double within 30"	Arequipa	- n
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From *Harvard Circular*, No. 18.

No. 70. β 1116. Lac. 6958. ^{MAG.} 6.8
16^h 38^m 5^s — 27° 16'.1.

6.9 and 9.5

1889.4	359.4	1.78	β	3 n
1897.5	356.7	2.21	See	1
1897.5	355.3	1.85	Aitken	3

Prof. See also measured a faint star 25" S.
A 9.5 mag. star is closely N.f.

No. 71. h. 4885. Cape 1880, 9095. ^{MAG.} 7.8
16^h 40^m 7^s — 48° 10'.0.

8.2 and 9.1

1834.6	247.0	4.±	<i>h</i>	1 n
1880.6	244.4	3.68	Hargrave	1
1897.2	242.7	4.24	See	3

Lac. 6960, mag. 7.7, is 45" N.f.; and Lac. 6959, mag. 7.0, is a little way N.pr.

No. 72. Innes 99. C. Z. 16 h. 2834. ^{MAG.} 7.5
16^h 42^m 22^s — 43° 46'.0.

7.9 and 8.9

1896.5	N.f.	1.±	Innes	2 n
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C. Z. 16 h. 2711, mag. 8.3, is 1^m 43^s pr.

164A

16hrs.

REFERENCE CATALOGUE OF

No. 73. Cordoba [47]. Lac. 6982. ^{MAG.} 6.4
 16^h 42^m 58^s — 49° 52'.2.

7.1 and 7.2

1889.6	44.2	2.87	Pollock	2 n
1894.6	43.9	2.62	Sellors	1

No. 74. λ 289. Yarnall, 7069. 8.0
 16^h 44^m 14^s — 31° 27'.8.

Comes = 15.0

1897.5	99.5	3.43	See	1 n
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No. 75. h. 4889. Lac. 6999. 6.7
 16^h 44^m 15^s — 37° 20'.5.

6.8 and 9.4

1835.4	5.0	7.24	h	3 n
1847.4	6.3	6.82	Jacob	-
1877.5	5.4	6.44	Cinc.	1
1878.8	5.6	6.94	Melbourne	1
1880.6	7.7	6.49	Hargrave	1
1890.5	3.6	6.91	Glasenapp	2-1
1897.5	6.1	6.88	See	2

Separately observed on the meridian at Cordoba in 1878, but the comes was made S.pr.

No. 76. λ 291. Lac. 7022. 7.0
 16^h 46^m 8^s — 25° 25'.9.

Comes = 13.9

1897.7	6.9	2.64	See	1 n
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No. 77. λ 292. ζ_1 Scorpii. 5.0
 16^h 46^m 56^s — 42° 11'.7.

5.5 and 6.0

1897.1	175.0	0.20	See	1 n
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The p.m. is very small.

No. 78. λ 293. Piazzii 16 h. 200. 6.6
 16^h 47^m 1^s — 41° 38'.4.

Both = 7.4

1897.5	270. ±	0.2 ±	See	1 n
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Prof. See also measures two distant faint stars.
 See also the next star, which is about 57" N.f.

No. 79. Triple. Piazzii 16 h. 201. ^{MAG.} 7.7
 16^h 47^m 3^s — 41° 37'.5.

A = 7.9 B = 14.7 C = 10.1

A and B = λ 294

1897.5	51.1	6.41	See	1 n
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A and C = h 4892

1834.6	299.1	5. ±	h	1 n
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1847.3	301.5	8.31	Jacob	1
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1881.7	299.4	8.34	Hargrave	1
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1897.4	301.0	9.05	See	2
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A cluster is S.f., several wide pairs in which have been measured by Prof. See.

No. 80. Innes 100. Lac. 6969. 6.8
 16^h 47^m 39^s — 73° 15'.8.

7.0 and 8.5

1896.5	S.f.	0.8 ±	Innes	1 n
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No. 81. Innes 101. C. Z. 16 h. 3270. 9.0
 16^h 47^m 55^s — 40° 54'.1.

9.4 and 10.4

1896.7	355. ±	1. ±	Innes	1 n
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Lac. 7029, mag. 6.1, is S.f.; and C. Z. 16 h. 3280, mag. 8.9, is more closely N.f.

No. 82. β 123. Ö.A. 16,094. 8.0
 16^h 48^m 41^s — 21° 52'.7.

8.5 and 8.9

1877.4	204.6	1.65	Cinc.	2 n
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1886.4	205.1*	1.56	"	1
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1892.5	203.9	1.57	Haverford	3
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1898.3	201.6	1.67	See	1
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A 7.3 mag. star is 10'.6 N.

No. 83. h. 4896. C. Z. 16 h. 3337. 8.0
 16^h 48^m 50^s — 46° 41'.2.

8.2 and 9.8

1836.3	28.0	4.39	h	3 n
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1871.5	23.7	4.50	Russell	1
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1897.2	23.0	4.01	See	1
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SOUTHERN DOUBLE STARS.

16hrs.

165A

No. 84. Hough 408. Cor. D. M. ^{MAG.}
 —23°, 12,973. 9.5
 16^h 49^m 20^s — 24° 0'.6.

10.2 and 10.4

1893.5 247.4 2".14 Hough 2 n

No. 85. β 241. Lal. 30,725. ^{MAG.} 6.5
 16^h 49^m 35^s — 21° 24'.5.

7.2 and 7.3

1874.5 [314.2*] 0.5 \pm β 4 n
 1877.4 341.8 0.55 Cinc. 2-1
 1878.6 345.1 0.6 \pm Schiaparelli 2
 1879.1 339.6* 0.63 Cinc. 5
 1881.6 343.0 0.65 β 3
 1888.6 344.2 0.6 \pm Haverford 2
 1890.5 340.0* 0.75 β 3
 1895.6 342.1* 0.71 Lick 3
 1898.5 343.2 0.71 See 1

No certain change.

No. 86. λ 311. Lac. (7058). 7.3
 16^h 49^m 52^s — 31° 8'.7.

Comes = 14.9

1897.5 128.9 3".25 See 1 n

No. 87. λ 313. Yarnall₃ 7133. 7.7
 16^h 50^m 11^s — 38° 16'.4.

7.9 and 9.7

1897.6 232.8 2".50 See 1 n

No. 88. Σ 3106. W.B. 16 h. 912. 8.5
 16^h 50^m 20^s — 5° 0'.4.

Both = 9.3

1831.9 246.5 2.35 Σ 4 n
 1867.2 246.3 2.19 Dembowski 3
 1878.5 246.8 2.19 β 2-1
 1886.4 245.7* 2.29 L. McC. 1
 1890.5 248.0 2.54 Glasenapp 2-1

Fixed, with a common p.m. of 0".246 towards 284°.1.

Other measures.

No. 89. h. 4899. C. Z. 16 h. 3469. ^{MAG.} 8.5
 16^h 50^m 35^s — 45° 46'.8.

9.2' and 9.3

1834.5 271.2 1". \pm h 1 n
 1880.6 275.4 3.19 Hargrave 1
 1897.2 275.8 2.48 Lowell 2
 h :—"The chief of a cluster."

No. 90. β 1117. 24 Ophiuchi. 5.6
 16^h 50^m 46^s — 22° 59'.5.

6.3 and 6.5

1889.4 264.2 0".70 β 4 n
 1890.4 264.3 0.58 " 3
 1893.5 270.6 0.56 Goodsell 2
 1897.5 267.2 0.62 Aitken 3
 1898.3 266.0 0.66 See 1

Common p.m. of 0".028 toward 265°.8.

No. 91. Piazzii. Mayer 682. 6.9
 16^h 51^m 11^s — 19° 22'.9.

7.3 and 8.4

1836.5 229.6 5". \pm h 1 n
 1879.0 230.9 4.84 Cinc. 4
 1890.4 231.7 4.57 Glasenapp 2

Fixed.

Also registered as South and h 240.

No. 92. Harvard. Lac. 7052. 6.5
 16^h 51^m 59^s — 54° 26'.5.

Noted as Double at Arequipa. See *Harvard Circular*, No. 18.

No. 93. λ 315. Piazzii 16 h. 237. 6.6
 16^h 52^m 6^s — 37° 27'.9.

Both = 7.4

1897.5 203.4 0".31 See 1 n

166A

16hrs.

REFERENCE CATALOGUE OF

No. 94. h. 4901. Bris. 5907. ^{MAG.} 8.2
 16^h 52^m 27^s — 58° 41'.9.

Both = 9.0 white

1836.5	132.7	2.5 ±	h	2 n
1872.5	131.6	3.17	Russell	2
1878.8	132.7	3.10	Melbourne	1
1888.6	129.8	2.89	Tebbutt	1
1890.6	130.1	2.73	Sellers	1

This is also registered as Russell 287.
 Combined mag. in C. P. D. = 7.0; in C. Z. = 6.8.

No. 95. Washburn 131. Lac. 7057. 6.9
 16^h 52^m 46^s — 56° 24'.2.

Comes = 10.5

1891.6	133.6	3. ±	Sellers	1 n
1895.6	134.9	2.10	"	2

Noted as double at Arequipa in 1891. See *Harvard Circular*, No. 18.

C. Z. 16 h. 3545, mag. 8.0, is S.pr., and a 9.0 mag. star is more closely N. pr.

No. 96. λ 316. Lac. 7064. 6.4
 16^h 52^m 54^s — 48° 29'.6.

6.9 and 7.6

1897.2	178.9	0.59	See	2 n
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In C. P. D. combined mag. = 7.6.

No. 97. Hargrave [288]. C. Z. 16 h. 3778. 8.5
 16^h 54^m 47^s — 48° 46'.2.

9.1 and 9.5

1881.7	55.6	1.99	Hargrave	1 n
1887.6	50.2	2.84	Pollock	3-2
1894.6	52.2*	2.23	Sellers	1

This is the principal star of h 4906, which, curiously enough, Mr Hargrave could not find on the same night that the close pair was discovered.

The comes noted by h is 11th mag., distance 15".

No. 98. λ ... Cor. D.M.—39°, 11,005. 10.0
 16^h 54^m 51^s — 39° 30'.6.

10.4 and 11.4

1897.1	126.9	1.62	See	- n
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h 4908, a similar but larger pair, is S.f.

No. 99. Harvard. ε₂ Arae. ^{MAG.} 5.4
 16^h 55^m 9^s — 53° 5'.2.

Noted as double < 30" at Arequipa.

See *Harvard Circular*, No. 18.

C. P. D. mag. = 6.7.

No. 100. Cordoba [48]. Lac. 7075. 7.0
 16^h 55^m 11^s — 50° 0'.8.

7.5 and 8.2

1873.3	230.0	9.96	C. G. A.	3 n
1888.6	234.1	8.02	Pollock	5-4
1894.6	232.3	7.51	Sellers	1

No. 101. Cordoba [49]. C. Z. 16 h. 3841. 7.6
 16^h 55^m 33^s — 46° 36'.3.

8.0 and 9.0

1897.2	41.0	3.17	Cogshall	1 n
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No. 102. λ ... C. Z. 16 h. 3847. 8.0
 16^h 55^m 38^s — 46° 2'.3.

8.2 and 10.2

1897.2	226.6	1.71	Cogshall	1 n
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In Prof. See's list this star is called "Cordoba duplex," but the reference has not been found.

No. 103. h. 4909. Lac. 7083. 8.1
 16^h 56^m 13^s — 50° 56'.3.

8.4 and 9.6

1877.7	158.8	10.7	C. G. A.	4 n
1880.5	158.0	5. ±	Russell	1

No. 289 of Mr Russell's list of new double stars.

The nearest of several stars. The star, Cape 1840, No. 2255, mag. 8.2, is 17" away, and was the only one measured by h, who, however, noted the others. See page 272 of his *Results of Astronomical Observations*.

SOUTHERN DOUBLE STARS.

16hrs.

167A

No. 104. h. 4904. Lac. 7028. ^{MAG.} 7.4
 16^h 56^m 55^s — 75° 14'.5.

7.7 and 9.0

1835.4	184.2	3."±	h	1 n
1872.5	183.5	7.11	Russell	1

No. 105. h. 4913. C. Z. 16 h. 3975. 8.0
 16^h 57^m 37^s — 47° 5'.8.

8.5 and 9.2

1834.5	243.6	3."±	h	1 n
1889.4	236.6	3.31	Pollock	2

Separately observed on the meridian at Cordoba in
 1880.

No. 106. Harvard. h Scorpii. 5.0
 16^h 58^m 15^s — 33° 58'.9.

Noted as double at Arequipa, comes within 30".

See *Harvard Circular*, No. 18.

C. P. D. mag. = 6.2.

No. 107. λ 318. C. Z. 16 h. 4113. ^{MAG.} 8.0
 16^h 59^m 21^s — 38° 29'.5.

8.5 and 9.0

1897.6	235.3	0.29	See	1 n
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No. 108. Harvard. Lac. 7123. 6.5
 16^h 59^m 35^s — 37° 5'.4.

A = 6.5 B = 11.5 C = 11.5

A and B

1897.4	84.8	7.13	See	1 n
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A and C

1897.8	N.f.	40."±	Innes	1 n
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Noted as triple within 30" at Arequipa in 1891.

From *Harvard Circular*, No. 18.

It is at present unknown whether the stars above
 noted are those referred to in the *Harvard Circular*.

168A

17hrs.

REFERENCE CATALOGUE OF

No. 1. Cordoba [73]. Lac. 7120. ^{MAG.} 7.3
 17^h 0^m 7^s — 44° 18'.4.

7.4 and 9.9

1897.6 139.4 5.07 See 1 n
 Also registered in error as Innes 102.

No. 2. Σ 2119. Lal. 31,068. 7.3
 17^h 0^m 50^s — 13° 47'.9.

8.0 and 8.1

1831.8	17.8	1.95	Σ	3 n
1848.6	15.2	2.30	Mitchel	1
1858.1	13.7	1.6 ±	Dembowski	2
1868.5	15.0	1.73	Harvard	1
1879.8	14.8	2.00	Cinc.	3
1884.5	14.4	1.95	"	1
1890.4	12.9	2.61	Glaserapp	2
1896.6	14.0	2.25	Hussey	2

The angle is slowly decreasing.

No. 3. h. 4914. C. Z. 16 h. 4161. 8.7
 17^h 1^m 13^s — 72° 34'.7.

9.4 and 9.5

1835.5	82.4*	1.5 ±	h	2 n
1875.5	76.8	3.04	Sydney	2

No. 4. Dunlop 213. Lac. 7141. 6.5
 17^h 2^m 56^s — 46° 36'.6.

6.9 and 7.9

1836.5	166.1	8.65	h	2 n
1871.5	165.2	8.10	Russell	1
1876.6	167.9	7.42	Cape M.O.	1
1879.7	165.5	7.30	Hargrave	1
1897.2	166.8	7.97	See	1

Distance decreasing?

Erroneously called h 4919 by both Mr Russell and Mr Hargrave.

No. 5. Dunlop 214. Lac. 7107. ^{MAG.} 6.5
 17^h 3^m 5^s — 67° 4'.1. Yellow

Comes = 9.4 blue

1835.5	330.4	28.6	h	1 n
1871.6	340.9	27.9	Russell	1
1880.5	344.3	27.1	C. G. A.	1

The p.m. of the chief star is about 0".1, viz., R. A. = -0".02. Dec. = +0".075, which about accounts for the change shown.

6. h. 4923. Lal. 31,140. 8.2
 17^h 3^m 17^s — 18° 7'.6.

8.6 and 9.6

1835.0	184. ±	3. ±	h	1 n
1879.4	168.2	7.31	Cinc.	3
1898.5	163.3	8.91	See	1

The change shown is probably due to p.m.

No. 7. Innes 246. Lal. 31,152. 7.5
 17^h 3^m 53^s — 27° 38'.8.

7.6 and 10.0

1897.8	30. ±	0.9 ±	Innes	1 n
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A more distant star = 10.5 mag. in the same direction.

No. 8. h. 4920. Lac. 7136. 6.9
 17^h 4^m 20^s — 58° 28'.2.

7.1 and 8.9

1836.5	331.4	3.5 ±	h	1 n
1872.5	329.9	3.08	Russell	2
1886.6	328.3	2.64	Pollock	1

The components have been separately observed on the meridian at Cordoba.

Some change shown.

SOUTHERN DOUBLE STARS.

17hrs.

169A

No. 9. β 1118. η Ophiuchi. ^{MAG.} 2.6
 17^h 4^m 38^s — 15° 36'.1.

3.1 and 3.6

1889.4	274.7	0.35	β	4 n
1890.4	271.1	0.38	"	4
1892.4	270.0	0.36	"	3
1896.5	259.8	0.38	Leavenworth	3
1897.5	260.7*	0.53	See	1
1897.5	259.1	0.40	Aitken	4

Common p.m. of 0".097 towards 2°.6.

On account of the closeness and brightness of this pair, it is one of the most remarkable double stars known.

See:—

1889. Burnham, S. W., "Discovery," *Astr. Nach.*, No. 2912.

No. 10. β 124. Lal. 31,224. ^{MAG.} 8.0
 17^h 5^m 1^s — 0° 38'.0.

8.0 and 11.2

1875.1	253.5	1.12	Dembowski	3 n
1879.4	263.2	1.13	Cinc.	2-1
1881.4	266.3	0.94	β	2
1891.7	266.8	0.94	"	2

No. 11. λ 320. Lac. 7159. ^{MAG.} 5.7
 17^h 5^m 22^s — 39° 22'.9.

6.2 and 6.8

1897.7	294.0	0.62	See	2 n
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The p.m. is very small.

See also No. 16.

No. 12. β 956. Piazz16 h. 308. ^{MAG.} 8.0
 17^h 5^m 24^s — 26° 34'.7.

8.2 and 9.9

1880.5	163.1	0.63	β	2 n
1897.7	163.3	0.58	See	1

Suspected in 1873 by β with a 6-inch refractor.

Almost directly preceding A Ophiuchi, 4.7 mag., and about 22' N.pr. the double star β 125.

No other measures found.

No. 13. β 125. Piazz16 h. 311. ^{MAG.} 7.0
 17^h 5^m 58^s — 26° 55'.0.

7.2 and 9.5

1877.4	62.8	1.72	Cinc.	2 n
1880.5	68.3	1.56	β	2
1889.5	61.3	1.48	"	3
1897.7	67.1	1.65	See	2

 β 956 is 22' N.pr.

No. 14. Howe 46. Lac. 7168. ^{MAG.} 7.0
 17^h 7^m 3^s — 38° 10'.5.

7.1 and 9.6

1880.8	138.8	2.34	Russell	1 n
1890.6	145.0	3.10	Sellers	1
1893.5	148.9	3.14	Hough	1
1897.2	144.0	2.86	See	3

Found by Prof. Howe in 1876. Seen at Cordoba in 1874, at the Cape in 1877; registered as a new pair, Russell 296, in 1880, and again in 1893 by Prof. Hough.

No. 15. Σ 2132. Lal. 31,290. ^{MAG.} 8.2
 17^h 7^m 28^s — 3° 56'.0.

8.6 and 9.4

1831.5	108.0	1.52	Σ	3 n
1848.6	107.1	1.53	Mitchel	1
1857.0	111.9	1.39	Secchi	2
1880.1	110.8	1.63	Cinc.	3
1890.5	113.3	1.95	Glazenapp	2

No. 16. Triple. Lac. 7171. ^{MAG.} 7.0
 17^h 7^m 32^s — 39° 38'.9.
 Orange

A = 7.6 B = 7.9 C = 10.0

A and B = λ 321

1896.7	102.8	0.61	See	2 n
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A + B and C = h 4926.

1835.2	333.5	11.±	h	3 n
1896.7	331.8	15.65	See	1

h and See also measure a more distant star, 11.0 mag., S.pr.

y

170A

17hrs.

REFERENCE CATALOGUE OF

No. 17.	β 1247.	Lal. 31,296.		MAG.	
	17 ^h 8 ^m 9 ^s	— 9° 9'.9.		7.3	
		7.4 and 9.7			
1891.5	345.5	1.62	β	4 n	
1897.6	339.6	1.39	Aitken	3	
No. 18.	Innes 229.	C. Z. 17 h. 433.		8.5	
	17 ^h 8 ^m 23 ^s	— 39° 32'.0.			
		8.8 orange, and 10.0 blue			
1898.5	235.0	5.04	See	1 n	
	Mag. in C. P. D. = 9.7.				
	Several distant <i>comites</i> make up a pretty field.				
No. 19.	Barnard.	W.B. 17 h. 93.		7.8	
	17 ^h 8 ^m 44 ^s	— 8° 17'.3.			
		7.8 and 11.4			
1891.5	154.7	2.16	β	3 n	
1895.5	148.9	2.06	Lick	3	
No. 20.	Innes 104.	Lac. 7146.		6.5	
	17 ^h 9 ^m 7 ^s	— 69° 55'.8.			
		6.6 and 9.5			
1896.5	S.f.	2. ±	Innes	1 n	
	Apodis, mag. 5.6, is S.f.				
No. 21.	South and h. 243.	A Ophiuchi.		4.7	
	17 ^h 9 ^m 12 ^s	— 26° 27'.4.			
		5.3 and 5.6 white			
1823.7	227.9	5.35	South	2 n	
1835.2	223.5	5.19	<i>h</i>	5-4	
1841.6	219.3	4.78	Dawes	3-2	
1847.6	216.1	4.27	Mitchel	1	
1848.6	215.5	4.30	Harvard	1	
1854.1	214.4*	4.13	Jacob	2	
1856.9	213.2	4.45	Morton	5	
1856.9	212.4	4.43	Secchi	3	
1862.4	212.4	4.22	Dembowski	-	
1871.5	204.1	4.16	Harvard	1	
1876.6	203.3	4.16	Plummer	3	
1880.5	200.6	4.21	Pritchett	3	
1888.6	197.2	4.33	Hall	2	
1896.6	194.6	4.09	Pritchett	3	
1897.7	192.5*	4.21	See	1	
1898.5	191.8	4.20	Solá	2	

Other measures.

Large common p.m. of 1".250 towards 204°.5, which is about the same in amount and direction as that of Bradley 2179, a star of the 6.8 mag., about 13' N.f.; and it is not very different from that of Lal. 31,055, a 7.3 mag. star 22° N.pr.

Both components of A Ophiuchi have been thought variable.

Lal. 31,302, mag. 7.8, about 3' distant, has been measured as follows:—

1879.3	305.9	198.0	β	1 n
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				MAG.
No. 22.	λ 322.	Piazz 17 h. 10.		6.9
	17 ^h 9 ^m 16 ^s	— 33° 37'.3.		

7.6 and 7.7

1897.4	1.3	0.20	See	1 n
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No. 23.	λ 323.	C. Z. 17 h. 500.		8.0
	17 ^h 9 ^m 20 ^s	— 38° 13'.4.		

8.6 and 8.9

1897.5	184.3	0.20	See	1 n
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No. 24.	β 282.	U.A. 105 Ophiuchi.		6.4
	17 ^h 9 ^m 39 ^s	— 14° 28'.1.		

Comes = 10.7

1875.4	154.1	4.23	Dembowski	3 n
1880.0	153.5	4.25	Cinc.	2-1
1881.4	151.7	4.41	β	4
1889.4	151.9	4.31	"	3
1896.6	153.7	4.28	Hussey	2

At Cincinnati the chief star was suspected to be a close double, but β , with the 36-inch Lick telescope, found it single.

No. 25.	Harvard.	Lac. 7189.		6.2
	17 ^h 9 ^m 41 ^s	— 35° 37'.5.		

1891.0 Double < 30" Arequipa - n
See *Harvard Circular*, No. 18.

Prof. See measures a star 36".5 distant in 18°.5.

SOUTHERN DOUBLE STARS.

17hrs.

171A

No. 26. Cinc. Ö.A. 16,530. MAG. 8.8
 17^h 9^m 53^s — 18° 5'.0.
 9.5 and 9.6
 1884.5 293.1 1.31 Cinc. 1 n
 The chief star of the wide pair *h* 4932, the *comes* of
 10.5 mag. being S.p.r. 10".5.

No. 27. β 957. Lal. 31,341. 7.5
 17^h 10^m 4^s — 10° 11'.0.
 8.2 and 8.3

1880.2	203.6*	0.58	β	3 n
1888.5	199.5*	0.5 ±	Haverford	1
1889.5	201.7	0.47	β	3

No. 28. β 958. Lal. 31,344. 7.9
 17^h 10^m 35^s — 19° 13'.5.

8.4 and 8.9				
1880.5	221.0	1.38	β	2 n
1888.5	216.2	1.37	Haverford	1
1892.4	216.9	1.38	β	3
1897.7	212.6	1.61	See	1

No. 29. β 1119. Lac. 7212. 6.9
 17^h 10^m 57^s — 30° 3'.2.

7.4 and 8.0				
1889.4	355.8	0.75	β	3 n
1897.6	357.5	0.54	Aitken	3
1897.7	353.7	0.56	See	1

C. P. D. mag. = 7.9.

Hough 413, a wide pair, 8.5 and 12.5 mags., is 5^m 3^s
 f. and 3' S.

The p.m. is insensible.

No. 30. λ 324. Lac. 7207. 7.2
 17^h 11^m 15^s — 38° 3'.3.

Both = 8.0				
1897.7	35.2	0.27	See	1 n

No. 31. Brisbane. Lac. 7194. MAG. 5.5
 17^h 11^m 26^s — 46° 32'.0.

5.6 yellow, and 8.4

1880.7	6.1	2.91	C. G. A.	1 n
1880.8	0.3	3.66	Russell	1
1896.7	45. ±	2. ±	Innes	1
1897.2	46.3	2.91	See	2
1898.7	55.5	...	Innes	1

Common p.m. of 0".84 towards 79°.7.

First noted as double about 1825 in Brisbane's
Paramatta Catalogue, after which it escaped observa-
 tion for upwards of half a century.

Also registered as Russell 297, and at Arequipa in
 1891 as a triple.

An interesting binary in quick motion.

In the *B. A. C.* this star is erroneously called Lac.
 7195.

C. P. D. mag. = 7.3.

No. 32. H. I. 35. 38 Ophiuchi. 7.4
 17^h 11^m 27^s — 26° 31'.1.

7.6 and 9.6 white.

1783.2	330.8	.....	H	1 n
1876.5	333.4	6.12	Cinc.	2
1890.5	334.8	5.54	Glasenapp	2
1897.7	333.4	5.92	See	2

Other measures. No change.

No. 33. h. 4931. Bris. 6016. 7.5
 17^h 11^m 48^s — 59° 20'.1.

Both = 8.3

1836.5	261.8	0.9 ±	<i>h</i>	1 n
1871.6	[254.6]	[2.22]	Russell	1
1873.5	258.1	0.57	"	2-1
1878.8	257.3	1.29	Melbourne	1
1879.6	257.5	1.00	Hargrave	1
1886.6	256.8	0.7 ±	Sydney	2

Angle decreasing?

No. 34. H. III. 25. o Ophiuchi. 5.2
 17^h 11^m 55^s — 24° 10'.7.

5.5 yellow, and 6.9 blue

1837.5	358.3	15. ±	<i>h</i>	1 n
1857.0	355.2	10.8	Secchi	2
1877.6	356.0	10.6	Cinc.	1
1879.3	354.9	10.7	"	3-2
1890.4	354.6	10.3	Glasenapp	2

Common p.m. of 0".085 towards 258°.5.

C. P. D. mag. = 6.3.

172A

17hrs.

REFERENCE CATALOGUE OF

No. 35. Ternary System. Lac. 5.9
7215.17^h 12^m 8^s — 34° 52'.7.

A = 6.1 B = 8.1 C = 10.0

A and B = Melbourne [4]

1867.64 { Companion 8th } Melbourne 3 n
 { Mag. preceding }

1876.52	240. ±	1.8 ±	β	1
1877.53	226.3	1.68	Howe	1
1877.64	224.4	1.97	Russell	1
1888.72	147.5	1.88	β	1
1889.43	134.1	1.35	"	3
1889.63	131.9	0.97	Pollock	1
1891.53	82.3	0.51	β	3
1892.38	24.4	0.58	"	4
1894.57	330.8	0.94	Sellers	7-2
1894.63	334.1	1.31	Barnard	4
1895.60	321.7	0.91	Comstock	2-1
1895.62	322.2	1.43	Sellers	3
1895.74	320.0	1.3 ±	See	1
1896.59	315.8	1.87	Sellers	4
1896.44	314.8	1.45	Aitken	1
1896.60	314.9	1.26	Comstock	1
1897.39	307.0	1.69	See	1
1897.52	310.2	1.86	Lehman	4

A or A + B and C = *h* 4935

1837.4	130. ±	.....	<i>h</i>	1 n
1875.5	130.5	29.44	C. Z. C.	1
1876.5	130. ±	.....	β	1
1877.6	132.4	.....	Russell	1
1889.4	128.6	31.03	β	3
1891.5	128.8	30.52	"	3
1892.4	129.4	30.55	"	2
1897.4	129.3	29.98	See	1

C. P. D. mag. = 7.2.

This, one of the most important ternary systems known, has a common p.m. of 1".15 towards 98°.1.

The close pair was, as noted above, discovered at Melbourne in 1867, and was recorded in the volume of *Melbourne Observations* published in 1869. It was noted nine years later as β 416, and again, in the following year, as Russell 298.

Some care has been taken to give the measures, etc., correctly. Prof. Howe's is often quoted with corrections which are not of great weight, and are here omitted. Mr Russell's distance is 1".97 as printed, not 1".77 as sometimes quoted. When Mr Russell observed the system in 1877, he noted the third star as 7th mag.

The close pair is so easy in that part of the orbit where the *comes* precedes, that had it been preceding in 1837, *h* could hardly have overlooked it.

Orbits have been computed by Glasenapp, Gore, Burnham, and See. Prof. See's elements are:—

P = 33 years.

T = 1891.8

a = 1".22*e* = 0.512*i* = 37°.3

Ω = 144°.6

λ = 86°.1

Assuming the mass of the close pair to be equal to that of the Solar System, the parallax would be 0".12.

If the third star did not share in the proper motion of the close pair, its distance in 1875 — using β's measure of 1892 as basis—should have been about 50" not 29" as actually observed.

Assuming that we now see the third star at a distance equal to its semiaxis major, its period of revolution, by Kepler's Law, would not be greatly different from 4000 years.

Papers:—

1891. Burnham, *Sidereal Messenger*, vol. x. pp. 489-491.1893. Gore, *M. N. R. A. S.*, vol. liii., pp. 335-6." Glasenapp, *Astronomy and Astrophysics*.1894. " *Proc. Roy. Soc. of N. S. Wales*, 1894, pp. 59-62.1898. Innes, *M. N. R. A. S.*, vol. lviii. pp. 90-91.No. 36. Washburn 132. C. Z. 8.9
17 h. 770.17^h 12^m 50^s — 23° 53'.4.

9.3 and 10.4

1888.6 30.0 1".96 Washburn 3 n
C. Z. 17 h. 774, mag. 9.2, is closely S.f.No. 37. β 126. Piazzini 17 h. 43. 6.0
17^h 14^m 4^s — 17° 39'.1.

6.3 and 8.2

1875.1	261.3	1".74	Dembowski	5 n
1877.4	260.4	1.56	Cinc.	2
1879.5	261.3	1.24	β	2
1879.6	262.0	1.81	Schiaparelli	4
1888.5	263.4	1.89	Haverford	2
1890.5	262.8	2.20	Glasenapp	2
1892.4	262.0	1.67	β	3
1897.4	262.4	1.66	Scott	2

Fixed.

β has measured a 12th mag. star 12" S.f., first noted by Prof. Howe.

SOUTHERN DOUBLE STARS.

17hrs.

173A

No. 38. Harvard 144. Piazzini 17 h. 48. ^{MAG.} 8.0
 17^h 14^m 18^s — 26° 26'.8.

Both = 8.8

1868.6	24.6	4.39	Harvard	1 n
1898.5	13.0	4.50	See	1

Prof. See also measures a star 38" distant.

Harvard:—"Another double star f."

A 5" pair of faint stars, noted as β 127, is nearly 1° S.

No. 39. Harvard. Lac. 7213. 6.4
 17^h 14^m 18^s — 57° 54'.6.

Noted as triple at Arequipa in 1891.

From *Harvard Circular*, No. 18.

The p.m. of the chief star is very small.

No. 40. Ormond Stone. Ö.A. 16,653. 9.1
 17^h 15^m 23^s — 17° 56'.1.

9.5 and 10.5

1880.4	44.3	0.8 ±	Cinc.	2 n
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Close to another star of the same mag.

No. 41. λ 325. Lac. 7246. 7.6
 17^h 15^m 44^s — 30° 24'.1.

Comes = 10.1

1897.5	232.8	4.24	See	1 n
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No. 42. Harvard. ι Arae. 5.4
 17^h 15^m 46^s — 47° 22'.2.

Noted as double within 30" at Arequipa in 1891.

From *Harvard Circular*, No. 18.

The p.m. of the chief star is about 0".1 towards 180°.

No. 43. λ 326. Ö.A. 16,672. 8.5
 17^h 16^m 6^s — 20° 38'.5.

9.0 and 9.5

1897.6	13.7	0.59	See	1 n
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No. 44. h. 4942. γ Arae. ^{MAG.} 3.4
 17^h 16^m 59^s — 56° 17'.0.

Comes = 11.4

1836.3	323.1	18. ±	h	1 n
1872.5	329.5	16.7	Russell	1
1882.7	328.5	16.8	Hargrave	1
1897.1	328.6	18.6	See	1

Another star, 11th mag., 28" away.

The chief star has a p.m. of 0".028 towards 248°.8.

Also registered as a new triple or multiple in *Harvard Circular*, No. 18, probably in addition to h 's stars, as in the *Circular* it is remarked that all h 's stars are rejected, and that T may signify a multiple star.

No. 45. Washburn 133. Ö.A. 16,701. 8.2
 17^h 17^m 38^s — 21° 37'.0.

8.8 and 9.2

1888.6	166.0	1.16	Washburn	3 n
1890.5	161.1	0.82	Hough	1

No. 46. h. 4945. C. Z. 17 h. 1088. 9.0
 17^h 17^m 55^s — 47° 49'.3.

Comes = 9.8

1834.5	111.4	4. ±	h	1 n
1882.7	112.6	5.27	Hargrave	1

No. 47. Washburn 28. Ö.A. 16,709. 8.1
 17^h 18^m 3^s — 30° 26'.0.

8.6 and 9.1

1874.0	S.pr.	.....	Cordoba	1 n
1881.6	236°.8	3".42	Washburn	3
1888.4	232°.8	3.51	"	1

No. 48. Harvard. κ Arae. 5.3
 17^h 18^m 12^s — 50° 32'.5.

1891 Triple within 30" Arequipa - n
From *Harvard Circular*, No. 18.

The p.m. is very small.

C. P. D. mag. = 7.2.

174A

17hrs.

REFERENCE CATALOGUE OF

No. 49. β 242. Lal. 31,610. ^{MAG.} 7.8
 17^h 18^m 29^s — 11° 35'.9.

8.3 and 8.9

1874.6	69.4	0.92	Dembowski	1 n
1875.9	68.8	0.95	"	4
1879.6	73.4	0.9 ±	Schiaparelli	3
1888.5	74.0	0.99	Haverford	1
1892.5	70.9	0.99	"	3

Two other companions:—

11.5 mag. at 9"
 10.5 " 48"

No. 50. Washburn 134. Mayer 701. 6.5
 17^h 18^m 43^s — 21° 20'.9.

Comes = 12.3

1889.1	149.4	3.98	Washburn	4 n
1898.3	152.5	3.99	See	1

The p.m. of the chief star is about 0".04.

No. 51. Σ 2156. Lal. 31,647. 8.5
 17^h 18^m 48^s — 0° 44'.6.

9.0 and 9.7

1829.5	31.8	3.54	Σ	1 n
1831.4	32.6	3.14	"	2
1848.6	34.7	3.00	Mitchel	1
1878.9	34.9	3.37	Cinc.	3
1896.6	37.7	3.32	Pritchett	3

Other measures.

No. 52. h. 4949. Piazzzi 17 h. 73. 5.3
 17^h 19^m 29^s — 45° 45'.2.

5.6 and 6.9

1836.4	267.4	3.23	h	4 n
1856.4	266.0	2.51	Jacob	2
1878.7	264.7	2.77	Melbourne	1
1880.7	263.2	1.82	Hargrave	1
1886.6	262.7	2.34	Pollock	1
1886.6	264.9	2.78	Tebbutt	2
1890.6	260.7	2. ±	Sellors	1

A slow decrease in the angle.

A 7.7 mag. star about 2' N.pr. makes, with the above pair, the old pair Dunlop 216.

No. 53. Harvard. Lac. 7265. ^{MAG.} 6.3
 17^h 20^m 0^s — 52° 12'.5.

C. P. D. mag. = 7.4.

No. 54. Harvard. Lac. 7263. 6.0
 17^h 20^m 22^s — 55° 5'.0.

The above two stars have been noted as triple at Arequipa.

See *Harvard Circular*, No. 18.

No. 55. β 128. Lal. 31,668. 7.3
 17^h 20^m 38^s — 26° 14'.7.

Comes = 10.0

1876.6	327.3	3.66	Cinc.	1 n
1877.5	324.9	4.05	"	2
1891.6	328.0	4.04	β	3
1897.7	322.8	3.97	See	2

The p.m. is very small.

Equal to Harvard 146.

No. 56. Dunlop 217. Lac. 7288. 6.6
 17^h 21^m 46^s — 43° 53'.4.

C. Z. 17 h. 1348 = 8.5

1836.2	171.3	14.5	h	2 n
1881.8	170.2	13.3	Hargrave	1

Called h 4953 in error in the *Sydney Catalogue*.

No. 57. β 129. Piazzzi 17 h. 100. 7.3
 17^h 22^m 28^s — 25° 25'.6.

8.0 and 8.2

1878.4	99.1	0.99	Cinc.	2 n
1880.6	99.4*	1.10	Schiaparelli	3
1889.1	100.0	0.93	β	3
1893.6	100.1	0.87	Sellors	2
1897.6	99.0	0.93	Aitken	3
1897.7	106.4	1.02	See	1

Discovered a second time as β 1120.

SOUTHERN DOUBLE STARS.

17hrs.

175A

No. 58. λ 329. \ddot{O} .A. 16,826. ^{MAG.} 8.4
 17^h 22^m 48^s — 23° 21'.5.

Comes = 12.0

1897.7 112.2 3.42 Cogshall 1 n
 Found by Mr Cogshall.

No. 59. Howe 47. Lac. 7312. 6.8
 17^h 23^m 30^s — 33° 38'.2.

7.0 and 9.0

1877.7 320.0 4.10 Cinc. 1 n
 1881.4 324.7 4.65 β 3
 1893.5 323.5 4.16 Hough 1
 1897.4 319.2 4.42 See 1

Prof. Hough measures a 12.5 mag. star at 15".
 C. Z. 17 h. 1484, mag. 9.0, is about 1' N.f.

No. 60. Σ 2171. Piazzini 17 h. 110. 7.5
 17^h 23^m 46^s — 9° 54'.6.

8.1 and 8.4

1830.5 75.7 1.62 Σ 4 n
 1841.5 71.9 1.66 $O\Sigma$ 1
 1848.6 68.1 1.41 Mitchel 1
 1856.5 70.0 1.52 Secchi 2
 1868.3 69.1 1.58 Dembowski 5
 1879.3 69.0 1.58 Cinc. 2
 1880.6 67.8 1.59 Pritchett 3
 1888.5 68.2 1.48 Haverford 3-2
 1893.5 67.4 1.63 Bigourdan 1
 1896.6 68.0 1.86 Pritchett 2-1

Slow decrease in angle.

No. 61. λ 330. \ddot{O} .A. 16,837. 8.7
 17^h 23^m 48^s — 30° 10'.7.

9.0 and 10.7

1897.5 169.1 1.62 See 1 n

No. 62. λ 331. Lac. 7304. 7.5
 17^h 24^m 6^s — 48° 40'.5.

7.8 and 9.0

1897.2 193.8 0.70 See 1 n
 A 9.8 mag. star is 1'.5 N.pr.

No. 63. Howe 48. C. Z. 17 h. 1538. ^{MAG.} 7.5
 17^h 24^m 25^s — 38° 56'.4.

7.8 yellow, and 9.1 bluish

1876.2 230.± 2.± Howe 1 n
 1896.6 230.5 3.20 Sellors 3
 1896.9 230.7 3.08 See 3

No. 64. Innes 40. Lac. 7308. 6.5
 17^h 24^m 25^s — 45° 57'.6.

Comes = 10.5

1895.8 S.pr. 6.± Innes 1 n
 Lac. 7310, mag. 7.5, orange-coloured, is 4' S.f.

No. 65. β 1089. Lal. 31,816. 6.6
 17^h 24^m 27^s — 5° 50'.3.

Comes = 11.0

1888.64 5.2 0.95 β 3 n
 1897.52 354.6 0.92 Aitken 3

No. 66. Washburn 136. Lac. 7315. 7.3
 17^h 24^m 40^s — 40° 57'.8.

7.9 and 8.3

1882.± 95.± 1.± Washburn 1 n
 1896.6 110.0 1.39 Sellors 3
 C. Z. 17 h. 1545, mag. 8.5, is closely S.pr.

No. 67. h. 4957. C. Z. 17 h. 1560. 8.8
 17^h 24^m 56^s — 46° 33'.2.

9.5 and 9.7

1834.5 93.0 1.7± h 1 n
 1880.7 270.± 1.0± Hargrave 1
 1897.2 266.6 2.86 Lowell 2

No. 68. Innes 105. C. Z. 17 h. 1604. 8.4
 17^h 25^m 11^s — 30° 12'.9.

9.1 and 9.3

1898.3 167.7 1.90 See 1 n
 C. Z. 17 h. 1603, mag. 7.9, is 2'.8 N.pr.

176A

17hrs.

REFERENCE CATALOGUE OF

No. 69. Σ 2173. Pos. Med. 1949. 5.4
 17^h 25^m 15^s — 0° 58'.8.

6.0 and 6.4, both yellow

				MAG.
1829.6	147.2	0.62	Σ	2 n
1831.7	141.5	0.62	"	3
1836.7	Single		"	4
1840.6	358.8	0.61	O Σ	3
1846.5	336.1	0.85	"	5
1851.7	335.6	1.18	Mädler	2
1858.6	328.3	0.88	"	4-2
1864.5	Single		Dembowski	1
1866.3	180.7	0.47	O Σ	3
1872.1	155.7	0.89	"	5
1876.6	144.0	0.61	"	2
1881.5	114.9	0.24	β	3
1883.9	24.8	0.22	Engelmann	9
1888.5	344.4	0.53	Hall	3
1891.5	340.1	0.97	"	3
1895.6	337.7	1.13	Comstock	3
1897.7	337.0	1.20	Doolittle	3
1898.5	335.5	1.34	Solá	2

Common p.m. of 0".2.

The close pair is a well-known binary, for which Prof. See gives the following orbit (*Evolution of Stellar Systems*).

$$\begin{aligned} P &= 46 \text{ years} \\ T &= 1869.5 \\ a &= 1''.14 \\ e &= 0.20 \\ i &= 80^\circ.75 \\ \Omega &= 153^\circ.7 \\ \lambda &= 322^\circ.2 \end{aligned}$$

The relative positions for future observations can be found approximately by adding forty-six years to the dates given above.

A 10th mag. star 7" pr. was seen at Cincinnati in 1883, but its real existence has been doubted. β with the 36-in. Lick Refractor could not find it in 1890.

No. 70. Washburn 29. Ö.A. 16,893. 8.4
 17^h 25^m 53^s — 30° 22'.9.

8.9 and 9.5

1881.4	230.2	1.35	Washburn	3 n
1888.6	229.4	1.58	"	3
1897.6	230.9	1.50	See	1

There is a somewhat similar pair 10' N, 42 secs. pr. In Prof. See's list Washburn 29 is identified as C. Z. 17 h. 1564, a star 69 secs. pr. 9' N.

No. 71. Harvard. Lac. 7321. 6.7
 17^h 27^m 14^s — 53° 17'.0.

1891 Triple within 30" Arequipa -n

No. 72. h. 4962. Lac. (7345). 5.8
 17^h 28^m 10^s — 32° 30'.8.

Comes = 10.5

1836.5	98.8	5.±	h	2 n
1877.5	102.9	4.92	Cinc.	1
1893.5	103.2	5.04	Hough	1
1893.6	99.8	4.81	Sellers	1
1897.6	101.7	6.08	See	1

An 11th mag. star, 13" distant, first noted by Prof. Hough.

There are several other stars near making a fine low power field.

The p.m. is inconsiderable.

No. 73. h. 4963. C. Z. 17 h. 1894. 8.0
 17^h 29^m 34^s — 41° 52'.1. Yellow

Comes = 9.5 yellowish

1834.5	327.6	8.±	h	1 n
1897.7	315.8	6.73	See	1

Two stars, 8th to 9th mag., are N.pr.

No. 74. Innes 106. Lac. 7344. 7.7
 17^h 29^m 35^s — 49° 10'.8.

8.1 and 9.1

1897.7	30.±	0.8±	Innes	2 n
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A fainter star is 3' N.f.
 λ Aræ, 4.9, mag., is 12' S.f.

No. 75. λ 335. θ Scorpii. 2.0
 17^h 30^m 8^s — 42° 56'.1.

Comes = 14.0

1896.7	321.5	6.24	See	6 n
1897.4	316.9	6.77	"	2

The p.m. of the chief star is 0".021 towards 235°.7
 See:—

1896. See, T. J. J., "Discovery," *Astr. Nach.*, No. 3387.

SOUTHERN DOUBLE STARS.

17hrs.

177A

No. 76. Innes 247. Lac. 7357. ^{MAG.} 7.1
 17^h 31^m 1^s — 37° 47'.7.

7.2 and 9.5

1897.7 120.± 1.± Innes 2 n
 There is a coarse double about 10' N.pr.

No. 77. Washburn 30. Lal. 32,046. 8.0
 17^h 31^m 43^s — 23° 19'.6.

8.3 and 9.5

1881.4 111.7 3.27 Washburn 3 n
 1888.6 111.7 3.34 " 3

No. 78. Innes 107. Messier 6,
 C. G. A. 10. 8.9
 17^h 33^m 0^s — 32° 17'.5.

9.3 and 10.3

1896.7 130.± 1.5± Innes 1 n
 Closely S.pr. Piazzi 17 h. 159, an outlier of the
 scattered cluster, Messier 6.

The mag. is taken from the C. G. A., as the Cor.
 D.M. magnitudes of this cluster are too faint.

No. 79. β 960. Lal. 32,122. 9.0
 17^h 33^m 5^s — 1° 5'.5.

Comes = 12.4

1880.5 294.9 3.18 β 4 n
 1891.6 301.2 2.98 " 3

No. 80. Washburn 31. B.D.—14°,
 4712. 9.7
 17^h 33^m 17^s — 14° 46'.8.

10.3 and 10.6

1881.4 338.2 1.38 Washburn 2 n
 1888.6 332.0 1.90 " 3

No. 81. Pollock [4]. Lac. 7365. 7.8
 17^h 33^m 26^s — 53° 25'.0.

Comes = 9.0

1887.6 296.4 10.82 Pollock 2 n

No. 82. Hargrave 124. C. P. D. ^{MAG.} 8.6
 —52°, 10,777.
 17^h 34^m 2^s — 52° 44'.6.

Both = 9.4

1882.7 126.7 4.57 Hargrave 1 n
 1887.6 126.3 4.83 Pollock 3

No. 83. Pollock [5]. C. Z. 17 h. 2246. 7.8
 17^h 34^m 36^s — 34° 54'.9.

8.3 and 8.8

1886.6 258.2 4.53 Pollock 1 n
 1887.7 256.8 4.97 " 2

No. 84. h. 4970. Lac. 7377. 7.5
 17^h 34^m 36^s — 48° 35'.4.

8.0 and 8.6

1834.5 74.0 4.± h 1 n
 1881.7 70.8 7.22 Hargrave 1
 1897.2 69.0 7.95 See 1

The companion is C. Z. 17 h. 2226.

C. Z. 17 h. 2220, mag. 9.1, is 4.5 secs. pr.

No. 85. β 631. Piazzi 17 h. 182. 6.5
 17^h 34^m 49^s — 0° 35'.0.

7.2 and 7.3

1878.6 70.2 0.37 β 2 n
 1880.5 75.7 0.42 " 2
 1883.9 72.2 0.41± Schiaparelli 7
 1886.6 65.8 0.36 Engelmann 7
 1887.6 62.3 0.37± Schiaparelli 5
 1888.5 57.2 0.44 Haverford 3-1
 1891.6 67.2 0.36 β 3

There seems to be a decrease of angle in this very
 close pair.

No. 86. Harvard. Lac. 7381. 6.5
 17^h 36^m 19^s — 57° 29'.7.

1891 Double within 30" Arequipa -n
 (Harvard Circular, No. 18.)

2

178A

17hrs.

REFERENCE CATALOGUE OF

No. 87. Russell 303. C. P. D.—54°,
8468. 7.5

17^h 36^m 53^s — 54° 5'.3.

7.8 and 9.0

1880.6	109.7	2.54	Russell	1 n
1887.6	109.7	3.53	Pollock	2

The co-ordinates furnished by Russell and Pollock differ between themselves by over 1°, and neither are correct.

No. 88. Cape 17. Lac. 7399. 7.7
17^h 37^m 48^s — 50° 44'.0.

8.4 and 8.6

1890.7	217.9	0.90	Sellers	1 n
1891.6	218.8	1.36	"	1

See *Cape Results*, 1876, where, however, the note of duplicity is set against the wrong star by error. The correct star is indicated in the *Cape* 1880 *Catalogue*.

No. 89. Innes 248. Lac. 7407. 8.0
17^h 38^m 13^s — 46° 52'.5.

8.2 and 9.7

1897.8	120.±	2.±	Innes	1 n
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No. 90. h. 4975. Lac. 7413. 6.4
17^h 40^m 18^s — 55° 21'.9.

Comes = 9.5

1835.37	115.7	2.±	h	1 n
1837.66	81.4	1.51	"	1
1871	Not seen, bad defn.		Russell	1
1880-1	Not divided, etc.		Sydney	4
1880.55	95°.2	2".67	Cruls	1

Found single at Melbourne on two nights, 1878.8.
h:—"Certain; quite sure; no doubt whatever."

No. 91. Innes 108. Cor. D.M.—40°,
11,849. 9.3

17^h 40^m 59^s — 40° 6'.1.

9.8 and 10.5

1896.5	1.5±	Innes	2 n
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♄ Scorpii, mag. 3.1, is 24 secs. pr. 1' N., and has a faint companion at 38" measured as λ 338.

No. 92. h. 4978. Lac. 7426. 5.8
17^h 42^m 20^s — 53° 34'.7.

Comes = 9.9

1834.9	269.5	12.1	h	2 n
1878.8	269.4	12.6	Melbourne	1
1881.7	276.5	11.9	Hargrave	1

The chief star was formerly called ν_1 Arae.

No. 93. Harvard. Lac. 7419. 5.7
17^h 42^m 36^s — 60° 7'.9.

1891 Double within 30" Arequipa -n

See *Harvard Circular*, No. 18.

C. P. D. mag. = 7.2.

No. 94. h. 4979. Lac. 7421. 7.1
17^h 43^m 2^s — 60° 21'.7.

7.3 and 9.0°

1835.7	240.3	10.±	h	2 n
1877.7	236.7	10.8	C. G. A.	4
1887.7	237.9	10.4	Pollock	2

No. 95. h. 4981. Lac. 7437. 7.5
17^h 43^m 10^s — 50° 15'.6.

Both = 8.3

1834.5	205.9	1.5±	h	1 n
1882.6	198.2	2.23	Hargrave	1

Combined mag. in C. P. D. = 8.6.

No. 96. Harvard. ι_2 Scorpii. 4.9
17^h 43^m 11^s — 40° 3'.5.

1891 Double within 30" Arequipa -n
(*Harvard Circular*, No. 18.)

No. 97. β 824. Lal. 32,516. 8.7
17^h 43^m 42^s — 1° 50'.2.

9.4 and 9.5

1881.4	350.9	0.67	β	3 n
1888.5	349.4	0.69	Washburn	3

SOUTHERN DOUBLE STARS.

17hrs.

179A

No. 98. Harvard. Piazzì 17 h. 236. ^{MAG.} 6.5
 17^h 44^m 31^s — 40° 44'.5.
 1891 Double within 30" Arequipa -n
 See *Harvard Circular*, No. 18.
 C. P. D. mag. = 8.0

No. 99. Howe. C. Z. 17 h. 2997. ^{MAG.} 8.4
 17^h 45^m 54^s — 28° 27'.1.

A = 8.7 B = 10.5 C = 10.9

A and B (+C)

1877.6	11.3	6.26	Cinc.	1 n
1880.4	8.7	6.54	"	2
1889.4	9.6	6.46	β	3
1897.6	10.4	6.41	Aitken	2

B and C = [β 1122]

1889.4	175.2	1.31	β	3 n
1897.6	170.6	1.47	Aitken	3
1898.3	171.3	1.80	See	1

The first measure of B and C is by β , who registers it as a new pair; but the duplicity seems to have been known at Cinc. in 1877. See Observations for that year, page 41.

Aitken measures a 12th mag. star N. 12".3, and See another in the same direction at 20".

No. 100. β 1123. Bris. 6236. ^{MAG.} 6.3
 17^h 46^m 40^s — 34° 42'.2.

6.9 and 7.3

1889.5	212.8	0.58	β	3 n
1897.6	220.4	0.27	See	2

In a large cluster. See also the next star.

No. 101. λ 342. Piazzì 17 h. 254. ^{MAG.} 5.7
 17^h 46^m 43^s — 34° 52'.3.

6.2 and 6.8

1897.6	284.6	0.42	See	1 n
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C. P. D. mag. = 7.4

No. 102. Hough 422. W.B. 17 h. 893. ^{MAG.} 8.8
 17^h 47^m 15^s — 5° 17'.7.

9.2 and 10.0

1893.6	19.8	0.48	Hough	3 n
1896.6	18.7	0.49	"	2-1

The pr. and faintest star of a small triangle.

No. 103. Washington. Ö.A. 17,320. ^{MAG.} 8.1
 17^h 47^m 28^s — 28° 40'.0.

8.5 and 9.5

1880.5	2.2	2.01	Cinc.	1 n
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No. 104. Σ 3128. Lal. 32,664. ^{MAG.} 7.5
 17^h 47^m 33^s — 7° 53'.3.

Comes = 10.5

1831.4	31.4	1.51	Σ	1 n
1835.6	24.0	1.52	"	2
1867.7	27.4	1.53	Dembowski	4
1878.3	35.0	1.25	β	1
1879.5	32.0	1.51	Cinc.	1
1886.3	26.0	1.19	L. McC.	1

Fixed, but with a common p.m. of 0".234 towards 206°.4.

Σ 2234, a 17" pair, is 15 secs. pr. 2' S.

No. 105. h. 4992. C. P. D.—57°, ^{MAG.} 8.0
 8803.

17^h 48^m 52^s — 57° 38'.6.

8.5 and 9.2, both yellow

1835.9	3.0	5.±	h	2 n
1872.6	5.4	5.18	Russell	1
1879.7	11.2	4.31	Hargrave	1

No. 106. Cape 18. Lac. 7472. ^{MAG.} 7.0
 17^h 48^m 53^s — 55° 21'.8.

7.4 and 8.2

1874.5	Dpl. c.	C. G. A.	5 n
1875.5	Close, star f.	Cape	3
1880.6	82.5 2".72	Russell	1
1890.7	88.8 2.01	Sellers	2
1891.6	89.6 2.13	"	1
1894.7	89.0 2.14	"	1

No certain change.

Published in 1877 in the volume of *Cape Results* for 1875; also registered as Russell 304.

No. 107. Washburn 139. Piazzì ^{MAG.} 6.8
 17 h. 276.

17^h 49^m 21^s — 11° 36'.8.

Comes = 11.0

1888.6	154.2	3.71	Washburn	3 n
1890.6	155.1	3.56	Hough	1

180A

17hrs.

REFERENCE CATALOGUE OF

- No. 108. Innes 109. C. Z. 17 h. 3241. ^{MAG.} 9.3
 17^h 49^m 24^s — 28° 3'.6.
 9.7 and 10.5
 1896.5 S.pr. 2.5 ± Innes 3 n
- No. 109. Cordoba [50]. C. Z. 17 h. 3258. ^{MAG.} 7.3
 17^h 49^m 52^s — 39° 55'.0.
 7.5 and 9.1
 1880.6 120.6 3.99 C. G. A. 3 n
- No. 110. Russell 306. Lac. 7510. ^{MAG.} 7.1
 17^h 51^m 12^s — 35° 59'.7.
 7.3 and 9.1
 1880.8 14.8 2.59 Russell 1 n
 1896.7 15.2 2.89 See 3-2
 Prof. See also notes a 13th mag. star 11" f. = λ 343.
- No. 111. h. 4996. C. Z. 17 h. 3314. ^{MAG.} 8.2
 17^h 51^m 22^s — 62° 9'.0.
 8.6 and 9.6
 1836.5 247.6 3. ± h 1 n
 1887.7 248.7 6.08 Pollock 3-1
 The companion was not found by Mr Russell in 1871 (one night).
 Both components have been observed on the meridian at Cordoba.
- No. 112. Innes 110. Lac. 7503. ^{MAG.} 7.5
 17^h 51^m 52^s — 47° 45'.8.
 7.7 and 9.7
 1896.7 125. ± 1.5 ± Innes 2 n
 Followed by Lac. 7505, mag. 7.2, and Bris. 6266, mag. 8.3.
- No. 113. λ 344. Yarnall, 7669. ^{MAG.} 8.5
 17^h 52^m 4^s — 36° 51'.1.
 Comes = 12.6
 1896.7 156.9 1.47 See 2 n
 Lac. 7513, mag. 6.3, is 4 secs. f.

- No. 114. h. 5000. Lac. 7516. ^{MAG.} 7.3
 17^h 52^m 26^s — 36° 55'.7.
 Comes = 9.5
 1837.0 107.3 6.84 h 2 n
 1851.0 108.1 6.92 Jacob 2-1
 1896.7 105.8 7.52 See 4

Perhaps only remarkable as the 5000th new pair recorded by Sir John Herschel, and yet his double star work was only a portion of what he did for astronomy.

- No. 115. h. 5003. Piazzzi 17 h. 294. ^{MAG.} 5.1
 17^h 52^m 40^s — 30° 14'.6.
 5.3 orange, and 7.0 blue
 1836.8 107.1 6.20 h 2 n
 1877.5 105.6 5.56 Cinc. 3
 1882.7 105.1 4.79 Hargrave 1
 1890.4 105.5 5.17 Glasenapp 2
 1893.0 103.6 5.47 Scott 4
 1897.8 [88.7] 5.95 Lowell 2

Common p.m. of about 0".06.

C. P. D. mag. = 8.0.

Noted as triple at Arequipa in 1891 (see *Harvard Circular*, No. 18), the third star being 27" S.pr. according to a measure by Prof. See.

- No. 116. Innes 230. C. P. D.—37°, ^{MAG.} 8.6
 7765.
 17^h 53^m 41^s — 37° 41'.6.
 9.0 and 9.8
 1897.4 145. ± 4. ± Innes 2 n
 C. P. D.—37°, 7766, mag. 9.4, is 60" S.f.
 These stars are not contained in the Cor. D.M.

- No. 117. Washburn 140. Bruxelles ^{MAG.} 8.2
 7286.
 17^h 55^m 7^s — 20° 47'.7.
 8.5 and 9.7
 1888.7 265.6 2.19 Washburn 3 n
 An 8.0 mag. star is 12' S.pr.

SOUTHERN DOUBLE STARS.

17hrs.

181A

No. 118. Ormond Stone. $\ddot{O}.A.$ MAG.
17,488. 8.3
17^h 55^m 46^s — 27° 30'.7.

8.8 and 9.3

1876.5	162.6	2.99	Cinc.	2 n
1877.6	164.5	3.34	"	2-1
1897.7	162.9	3.38	See	2

No. 119. β 283. Mayer 728. 5.8
17^h 55^m 51^s — 22° 46'.7.

Comes = 12.2

1878.7	239.3	8.12	β	5 n
1892.4	238.6	8.17	"	2
1895.5	237.7	8.45	Lick	3

Probably fixed.

A 14th mag. star is 14" away.

No. 120. β 47. Lal. 32,978. 7.6
17^h 55^m 59^s — 10° 13'.7.

Comes = 10.5

1875.7	268.3	1.84	Dembowski	4 n
1891.6	273.8	1.37	β	3
1895.6	277.1	1.46	Lick	3
1896.6	273.2	1.64	Leavenworth	3

"Probably some change":— β .

No. 121. The Trifid Nebula.
17^h 56^m 19^s — 23° 1'.7.

Herschel, β , and other astronomers have measured some stars here. β remarks:—"Relatively fixed; uninteresting."A 9th mag. star, with a comes = 10.5, distant 2", is the closest pair in the region measured so far.

No. 122. Harvard. Lac. 7473. 5.6
17^h 57^m 16^s — 75° 53'.5.

1891 Double within 30" Arequipa - n
(*Harvard Circular*, No. 18.)

C. P. D. mag. = 7.8.

No. 123. H. I. 88. τ Ophiuchi. 4.9
17^h 57^m 38^s — 8° 10'.8.

5.4 and 6.0, both yellow

1783.3	331.6	.....	H	1 n
1803.6	360. \pm	.....	"	2
1825.7	Single		Σ	3
1836.7	199.9	0.43	"	5
1841.7	225.7	0.79	Dawes	1
1846.6	230.0	0.70	Cinc.	6
1852.6	239.5	1.10	Jacob	2
1879.3	247.9	1.63	β	2
1892.6	254.6	1.78	Comstock	4
1896.4	256.2	2.02	Hussey	3

Other measures.

Binary.

The period, according to Dr Doberck, is 218 years.

The p.m. is small.

Equal to Σ 2262.

There is a 9.5 mag. star 100" away.

See also:—

1897. Burnham, S.W., "Orbits," *Popular Astronomy*, vol. iv. pp. 347-351.

No. 124. Cinc. C. P. D. — 25°, 6276. 8.7
17^h 57^m 49^s — 25° 28'.7.

9.4 and 9.6

1880.6 15.9 4.46 Cinc. 1 n
Discovered by Prof. H. V. Egbert.

No. 125. Harvard. Lac. 7542. 6.4
17^h 58^m 6^s — 35° 54'.2.

1891 Double within 30" Arequipa - n
(*Harvard Circular*, No. 18.)

No. 126. Triple. Yarnall, 7743. 9.5
17^h 58^m 7^s — 24° 14'.8.

A = 10.2 B = 11.0 C = 11.1

A and B = β 1126

1889.4 55.6 0.63 β 4 n
[contd.]

182A

17hrs.

REFERENCE CATALOGUE OF

A and B + C = ζ 5009

1837.7	20.8	2.±	ζ	1 n
1880.0	20.0	3.92	Cinc.	2
1889.4	23.3	4.05	β	4

In the cluster Messier 8, ζ 5010 is closely S.f., see next star.

The mag. from the Cor. D.M. is fully one mag. less than recorded by the double star observers; the C. P. D. gives 8.4.

No. 127. h. 5010. C. P. D.—24°, MAG.
6186. 9.2
17^h 58^m 34^s — 24° 21'.1

9.7 and 10.2

1836.1	351.2	3.±	ζ	2 n
1879.5	348.0	3.79	Cinc.	3
1897.7	349.9	3.65	See	1

No. 126 is N.pr. in the same field.

No. 128. Howe 50. Lac. 7551. 7.7
17^h 58^m 58^s — 36° 35'.0

7.9 and 9.4

1876.3	360.0	1.3±	Howe	1 n
1876.7	N.	5.0±	C. G. A.	1
1896.6	3.5	3.20	See	4
1896.6	2.9	2.94	A. G. Clark	1

The last measure is from Prof. See's list.

No. 129. h. 5014. Piazzzi 17h. 341. MAG.
17^h 59^m 36^s — 43° 25'.8

Both = 6.0

1836.7	69.1	0.67	ζ	2-1 n
1856.7	312.3	0.5±	Jacob	1
1857.7	317.2	0.6±	"	1
1878.7	268.0	1.38	Melbourne	1
1880.5	264.4	0.6±	Cruls	2
1880.5	259.3	0.81	Russell	1
1886.6	254.8	1.27	Pollock	1
1887.8	253.0	1.38	"	3-2
1893.6	248.1	1.02	Sellors	3
1895.6	247.3	1.47	"	3
1896.6	245.6	1.49	"	3
1897.4	243.4	1.72	Lowell	3

180° has been added to all the angles since 1878. The components are very nearly equal in mag., but on several occasions the writer has thought the small star precedes.

A binary pair in which half the angular orbit has been described in fifty-three years.

One of ζ 's measures is set against ζ 5013, and his identification of the pair as Bris. 6308 is erroneous. Common p.m. of 0".14 towards 208°.6.

Papers:—

1897. Innes, *M. N. R. A. S.*, vol. lviii. p. 48.

No. 130. Harvard. Lac. 7507. 6.0
17^h 59^m 52^s — 73° 40'.7

6.1 and 9.1

1898.4	240.±	1.5±	Innes	1 n
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(*Harvard Circular*, No. 18.)

SOUTHERN DOUBLE STARS.

18hrs.

183A

No. 1. h. 5015. Piazzzi 17h. 348. ^{MAG.} 7.0
18^h 1^m 5^s — 45° 46'.7.

Comes = 10.8

1836.5	263.9	3." ±	h	1 n
1891.6	258.9	3.19	Sellors	2
1897.2	256.3	4.07	See	2

No. 2. Harvard. Lac. 7540. ^{MAG.} 6.5
18^h 1^m 8^s — 59° 3'.2.

1891 Double Arequipa -n
C. P. D. mag. = 7.8.

No. 3. β 243. Ö.A. 17,669. ^{MAG.} 8.4
18^h 2^m 7^s — 22° 17'.2.

8.9 and 9.6

1874.5	111.6	1.2 ±	β	3 n
1877.6	125.8	0.80	Cinc.	1
1879.6	125.2	0.88	"	1
1881.6	123.3	0.76	β	3
1897.7	124.1	0.52	See	1

Cor. D.M. - 22°, 12,594, mag. 9.7, is 40" distant.

No. 4. β 244. Lal. 33,188. ^{MAG.} 7.5
18^h 2^m 17^s — 27° 52'.6.

7.7 and 9.9

1874.5	253.4	2." ±	β	3 n
1878.6	259.2	2.03	Cinc.	2
1881.6	258.2	2.03	β	3
1892.5	257.9	2.04	Haverford	2
1897.6	257.6	2.38	See	3

Other measures.

The pr. of three stars in the finder.

No. 5. h. 5021. Lac. 7564. ^{MAG.} 7.0
18^h 3^m 23^s — 56° 25'.2.

Comes = 13.0

1836.4	317.3	3." ±	h	1 n
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"Most difficult" — h.

C. P. D. — 56°, 8652, mag. 9.8, which is marked double in the C. P. D., is 35 secs. pr., and Lac. 7566, mag. 7.7, is closely S.f.

No. 6. β 245. Mayer 736. ^{MAG.} 5.6
18^h 3^m 39^s — 30° 44'.6.

5.8 and 7.9

1868.7	6.6	4.17	Harvard	1 n
1874.5	354.8	.....	β	4
1877.5	353.8	3.89	Cinc.	1
1888.5	1.9	4.12	Haverford	1
1890.6	351.8	2.99	Sellors	2
1892.5	353.3	3.98	Haverford	2
1893.7	350.4	3.87	Sellors	3
1897.5	353.6	4.67	See	1

It is doubtful if the great changes or jumps shown by the above measures can be real.

At Cordoba in 1878 the comes was observed N.f. 100" has been added to the Haverford angle of 1892.5.

Also registered as Harvard 149.

C. P. D. mag. = 7.4.

No. 7. h. 5023. Bris. 6327. ^{MAG.} 8.0
18^h 3^m 47^s — 40° 26'.9.

8.6 and 8.9

1836.5	275.8	9.76	h	2 n
1837.5	276.5	8.99	"	1
1879.3	276.3	10.42	C. G. A.	4
1880.7	277.5	5.85	Hargrave	1

The distance of this very easy pair seems to be ill determined.

No. 8. Harvard. ε Telescopii. ^{MAG.} 4.5
18^h 3^m 48^s — 45° 58'.3.

Comes = 14.0

1891	Double	Arequipa	-n	
1897.2	228".1	21".2	See	1

C. P. D. mag. = 6.7.

No. 9. Hough 428. C. Z. 18 h. 163. ^{MAG.} 7.9
18^h 3^m 56^s — 29° 13'.9.

Both = 8.7

1893.54	80.3	0.74	Hough	1 n
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184A

18hrs.

REFERENCE CATALOGUE OF

No. 10. Triple. Yarnall, 7811. MAG. 8.2
 $18^{\text{h}} 5^{\text{m}} 13^{\text{s}}$ — $39^{\circ} 21'.9$.

A=9.3 B=9.6 C=9.5

A and B = β 759

1879.7	118.1	1.20	β	1
1886.6	121.7	2.17	Pollock	1
1887.7	122.2	2.12	"	2
1889.4	121.4	1.81	β	3
1896.7	119.7	1.76	See	2-3

A and C = ζ 5028

1835.8	151.7	17.±	ζ	2 n
1879.7	149.2	14.8	β	1
1886.6	148.7	15.3	Pollock	1
1889.4	147.3	14.9	β	3
1896.7	149.7	15.4	See	1

Lac. 7598 is 20 secs. f., and is erroneously identified with the above triple by Prof. See.

No. 11. λ 347. C. Z. 18 h. 244. 8.7
 $18^{\text{h}} 5^{\text{m}} 18^{\text{s}}$ — $37^{\circ} 3'.7$.

9.3 and 9.6

1896.7	53.6	0.51	See	2 n
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C. Z. 18 h. 249, mag. 9.5, is closely N.f.

No. 12. β 132. Lal. 33,327. 6.7
 $18^{\text{h}} 5^{\text{m}} 19^{\text{s}}$ — $19^{\circ} 51'.6$.

7.4 and 7.5

1875.0	240.1	0.78	Dembowski	4 n
1875.9	238.9	0.90	Schiaparelli	4-1
1877.4	233.2*	0.55±	Cinc.	2
1880.1	239.2*	1.03	"	3-2
1881.6	237.0*	0.79	β	3
1887.6	228.8	0.64	Schiaparelli	2
1888.5	233.2	1.01	Haverford	2
1891.5	230.5	0.83	β	3
1892.5	227.8	0.89	Haverford	2
1895.5	222.4	0.77	Lick	3
1896.5	224.5	0.94	Leavenworth	3
1898.5	224.3	1.25	See	1

A binary system in which the angle is decreasing nearly 1° per annum.

No. 13. Hargrave 128. C. Z. 18 h. 243. 9.0
 $18^{\text{h}} 5^{\text{m}} 29^{\text{s}}$ — $49^{\circ} 56'.4$.

Both = 9.8

1882.7	4.±	2.±	Hargrave	1 n
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No. 14. h. 5027. C. Z. 18 h. 234. 8.3
 $18^{\text{h}} 5^{\text{m}} 32^{\text{s}}$ — $54^{\circ} 23'.6$.

Comes = 9.0

1834.5	60.2	15.±	ζ	1 n
1871.5	84.7	13.0	Russell	1
1882.2	94.1	11.9	Hargrave	2
1886.6	95.2	12.9	Pollock	1
1887.8	97.4	11.8	Tebbutt	3
1889.7	98.5	12.3	Pollock	3
1891.6	98.7	12.1	Sellors	1
1896.6	102.8	12.0	"	3

The measures are discordant.

The change is probably due to a p.m. in one or other of the stars of about $0''.17$. If this is so, the minimum distance has now been attained.

No. 15. Hough 429. Ö.A. 17,804. 8.0
 $18^{\text{h}} 6^{\text{m}} 6^{\text{s}}$ — $15^{\circ} 42'.1$.

Comes = 12.0

1889.7	24.0	3.26	Hough	2 n
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An 8.7 mag. star is $7'$ N.pr.

No. 16. h. 5029. Lac. 7584. 7.2
 $18^{\text{h}} 6^{\text{m}} 28^{\text{s}}$ — $57^{\circ} 52'.6$.

Both = 8.0

1836.5	121.7	2.±	ζ	1 n
1871.6	113.2	2.93	Russell	1
1879.7	112.3	1.99	Hargrave	1

Separately observed on the meridian at Cordoba.

No. 17. h. 5032. Bris. 6342. 7.2
 $18^{\text{h}} 6^{\text{m}} 36^{\text{s}}$ — $43^{\circ} 13'.7$.

7.3 and 10.3

1837.7	335.8	1.5±	ζ	1 n
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ζ :—"Positively verified."

Looked for on two occasions in 1856 by Jacob, when no companion was seen; nor seen by Cruls in 1880.

SOUTHERN DOUBLE STARS.

18hrs.

185A

No. 18. h. 5031. C. Z. 18 h. 354. ^{MAG.} 8.0
 18^h 7^m 6^s — 47° 23'.7.

C. Z. 18 h. 357 = 9.5

1834.5	100.9	18.±	h	1 n
1882.7	87.0	23.3	Hargrave	1

Separately observed at Cordoba about 1874, when the *comes* was 0".7 S.

No. 19. Innes 111. Lac. 7593. 7.2
 18^h 7^m 37^s — 56° 40'.7.

7.3 and 9.8

1896.5	310.±	1.±	Innes	2 n
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No. 20. h. 2822. μ Sagittarii. 4.1
 18^h 7^m 47^s — 21° 5'.1.

Comes = 10.4

1831.±	262.5	12.±	h	1 n
1836.5	259.9	16.1	Munich	—
1878.7	258.5	16.8	β	2
1892.6	258.6	17.1	Haverford	2
1897.7	258.1	17.2	See	3

Several more distant stars.

The p.m. of μ Sagittarii is 0".022 towards 270°.

Also registered as h 5035.

Other measures.

Probably identical with H. V. 7.

No. 21. β 131. Lal. 33,443. 7.5
 18^h 7^m 51^s — 15° 37'.4.

7.7 and 9.2

1875.0	278.5	2.71	Dembowski	4 n
1877.4	277.8	2.60	Cinc.	1
1880.6	279.6	2.71	"	1
1888.5	278.0	2.63	Haverford	1
1892.5	280.2	2.76	"	2

Another *comes*, mag. 11.6, 7".13 distant in the same direction has been noted by β .

No. 22. Washburn 141. Ö.A. 17,868. 8.9
 18^h 8^m 14^s — 23° 41'.8.

9.3 and 10.3

1888.7	26.4	1.57	Washburn	3 n
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No. 23. h. 5034. Lac. 7620. ^{MAG.} 7.7
 18^h 8^m 46^s — 46° 3'.3.

8.1 and 9.2

1836.9	90.1	1.92	h	3 n
1856.7	93.0	2.32	Jacob	3
1882.7	102.1	2.37	Hargrave	1
1891.6	92.5	1.67	Sellers	1
1897.2	94.4	2.56	Lowell	2

Probably fixed.

No. 24. λ 348. Piazz 18 h. 12. 8.3
 18^h 8^m 59^s — 24° 1'.6.

8.7 and 9.7

1897.7	310.1	0.67	Cogshall	1 n
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Found by Mr Cogshall.

No. 25. Washburn 142. Lal. 33,492. 8.5
 18^h 9^m 5^s — 11° 15'.7.

9.2 and 9.4

1888.7	243.2	1.18	Washburn	3 n
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No. 26. Russell 307. C. Z. 18 h. 504. 7.5
 18^h 9^m 7^s — 35° 40'.0.

7.9 and 8.9

1880.8	355.7	1.71	Russell	1 n
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No. 27. β 286. 16 Sagittarii. 6.2
 18^h 9^m 16^s — 20° 25'.1.

Comes = 12.1

1878.6	218.5	5.67	β	3 n
1891.6	216.0	6.03	"	2
1897.7	217.2	6.22	See	1

No. 28. Innes 249. Lac. 7601. 6.4
 18^h 10^m 0^s — 63° 54'.8.

Comes = 11.0

1897.8	5.±	5.±	Innes	1 n
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Difficult with a 7-inch telescope.
 Distance a guess.

2 A

186A

18^{hrs.}

REFERENCE CATALOGUE OF

No. 29. Σ 2296. 1st Munich 15,767. 7.5
 18^h 10^m 27^s — 3° 23'.3

Comes = 10.1

				MAG.
1829.5	7.0	3.33	Σ	3 n
1848.6	4.5	3.36	Mitchel	1
1867.2	8.1	2.95	Dembowski	4
1879.3	7.3	3.10	Cinc.	1

Fixed.

No. 30. β 285a. Ö.A. 17,953. 8.6
 18^h 10^m 40^s — 25° 2'.5

9.0 and 10.0

				MAG.
1874.7	317.2	.....	β	1 n
1877.6	316.4	1.34	Cinc.	1
1880.5	315.7	1.75	β	1
1893.5	319.1	1.57	Goodsell Obs.	1
1897.7	321.4	1.49	See	1

See also the next pair which is 60" S.f.

No. 31. β 285b. Ö.A. 17,954. 9.3
 18^h 10^m 43^s — 25° 3'.3

9.7 and 10.7

				MAG.
1880.5	20.7	1.65	β	1 n
1897.7	21.7	1.31	See	1

See also the preceding pair.

No. 32. β 760. η Sagittarii. 3.0
 18^h 10^m 52^s — 36° 47'.5

Comes = 10.3

				MAG.
1879.7	99.9	2.85	β	5 n
1886.7	99.5	4.36	Pollock	1
1889.4	107.0	3.51	β	3
1895.7	99.2	3.60	Sellors	3
1896.5	101.2	3.65	Aitken	3
1897.4	105.3	3.87	See	2

Common p.m. of $\alpha^{\circ}.231$ towards $225^{\circ}.2$.

C. P. D. mag. = 6.6.

Aitken measures a 13th mag. star at 33". β has noted a star 93" distant.In the list of double stars in *Harvard Circular*, No. 18.

No. 33. β 246. Piazzii 18 h. 26. 7.6
 18^h 11^m 45^s — 19° 42'.5

8.3 and 8.4

				MAG.
1875.5	108.7	0.42	Dembowski 5-3	n
1877.6	101.4	0.4 \pm	Cinc.	1
1878.5	106.5	0.45	"	1
1881.6	110.0	0.47	β	3
1891.6	105.6	0.51	"	2

A star, 7.8 mag., is 12' N.pr.

 h 2827, a faint wide pair in a nebula, is S.pr.

No. 34. β 463. 1st Munich 15,828. 9.3
 18^h 11^m 53^s — 16° 53'.6

9.9 and 10.2

				MAG.
1877. \pm	.....	1.3 \pm	β	1 n
1896.5	101.3	2.22	Leavenworth 4-3	

No. 35. β 639. Lal. 33,642. 7.3
 18^h 12^m 51^s — 18° 39'.5

7.8 and 8.3

				MAG.
1878.62	147.0	0.76	β	1 n
1878.70	163.6	0.38	"	1
1883.12	137.9	0.35 \pm	Schiaparelli	2
1891.65	Single		β	1
1892.36	"	"	"	1

Ö.A. 18,017, mag. 9.0, is 17" N.f., and has a 13.5 mag. comes at 8" observed as β 300.This system is the subject of a short paper by β in the *Astronomical Journal*, vol. xii. No. 271, 1892.The two principal stars have been measured as South and h 264.

No. 36. λ Lal. 33,682. 8.5
 18^h 13^m 39^s — 19° 46'.3

9.1 and 9.4

				MAG.
1897.7	226.4	0.98	See	1 n

The discovery of this pair is credited to Argelander by Prof. See. This is an error; Argelander observed the star as single on two nights, and both places being recorded (as Ö.A. 18,039 and 18,040), at first glance these might be taken for observations of separate stars.

SOUTHERN DOUBLE STARS.

18hrs.

187A

1911AnCap...2A...11

No. 37. Gale. ξ Pavonis. ^{MAG.} 4.2
Ruddy
18^h 14^m 1^s — 61° 32'.4

Comes = 10.0

1895.7 150.7 3.07 Sellors 2-1 n
The p.m. of the chief star is 0".04 towards 284°.5.
C. P. D. mag. = 5.9.

No. 38. Schjellerup, 24. W.B. 18 h.
262. 7.5
18^h 14^m 28^s — 5° 0'.4

7.9 and 8.8

1874.5	192.8	2.28	Dembowski	3 n
1875.7	195.5	2.56	Schiaparelli	4-3
1879.1	194.2	2.34	Cinc.	2
1888.5	196.2	2.33	Haverford	3
1890.6	199.4	2.97	Glasenapp	2

No. 39. λ 350. δ Sagittarii. 2.7
18^h 14^m 36^s — 29° 52'.2.

Comes = 14.5

1896.7 276.4 25.8 See 1 n
The p.m. of the chief star is 0".035 towards 155°.1.
In the C. P. D. its mag. is 6.2.
Prof. See also measures two more distant stars.
All found by Mr Cogshall.

No. 40. South. Lal. 33,731. 6.5
18^h 14^m 39^s — 8° 1'.4.

Comes = 9.6

1825.2	213.0	.....	South	- n
1831.2	216.4	3.22	Σ	5
1848.6	219.9	3.22	Mitchel	1
1855.6	222.9	3.56	Morton	1
1865.6	224.0	3.08	Dembowski	2
1866.7	222.3	3.40	Harvard	2
1877.5	222.4	2.79	Cinc.	2
1880.6	222.5	2.98	Pritchett	4
1887.6	223.3	2.91	Hall	3
1890.5	229.2	3.11	Glasenapp	2
1896.6	224.2	2.37	Pritchett	1

Also known as Σ 2303.
Other measures.

No. 41. β 48. Lal. 33,729. ^{MAG.} 7.8
18^h 15^m 6^s — 19° 41'.8.

8.4 and 8.8

1871.6	19.±	2.75±	β	1 n
1874.9	0.0	2.33	Dembowski	3
1877.6	1.7	2.04	Cinc.	1
1880.6	0.6	2.36	"	1
1886.3	358.8	2.51	L. McC.	1
1892.6	0.2	2.17	Haverford	1

Two faint *comites* pr. have been noted by β .

No. 42. Cordoba [51]. Moesta 1720. 7.9
18^h 16^m 8^s — 42° 49'.5.

8.5 and 8.8

1889.5 137.0 3.61 Pollock 2 n
Both stars were observed on the meridian at
Cordoba in 1880.

No. 43. Mitchel. Lal. 33,796. 8.2
18^h 16^m 30^s — 15° 8'.3.

8.8 and 9.2

1848.6	63.8	0.56	Mitchel	1 n
1865.2	64.3	0.82±	Dembowski	6
1877.5	63.8	0.95	Cinc.	2-1
1879.6	64.4	1.27	"	1
1884.6	67.6	1.02	Hall	2
1888.6	68.2	0.78	"	2
1896.6	66.2	0.82	Pritchett	2

Other measures.

Lal. 33,797, mag. 7.5, is 11".8 N.f., and with the
above pair is equal to Σ 2306.

No. 44. β 1252. Lal. 33,818. 8.3
18^h 17^m 2^s — 11° 54'.4.

8.8 and 9.5

1876.7	182.4	1.21	Dembowski	2 n
1891.5	182.7	1.23	β	3

No. 45. Hough. Lal. 33,806. 7.9
18^h 17^m 21^s — 26° 13'.1.

8.5 and 8.9

1889.7	140.±	0.5±	Hough	1 n
1896.5	155.8	0.3±	"	1
1897.6	140.5	0.51	See	1

188A

18hrs.

REFERENCE CATALOGUE OF

No. 46. λ 351. ϵ Sagittarii. MAG. 1.9
 $18^h 17^m 32^s$ — $34^\circ 25'.9$.

Comes = 13.3

1896.7 295.1 32.5 See 2 n
 The p.m. of the chief star is $0''.15$ towards $203^\circ.3$.
 C. P. D. mag. = 3.9.

No. 47. h. 5041. Lac. 7675. 7.1
 $18^h 17^m 41^s$ — $53^\circ 41'.7$.

7.2 and 9.7

1837.4	261.8	2.±	h	1 n
1872.6	256.8	3.19	Russell	2
1878.8	255.5	3.05	Melbourne	1
1880.7	264.9	1.82	Hargrave	1
1886.6	258.9	2.64	Pollock	1
1889.7	260.6	2.55	"	4
1890.6	258.1	2.64	Sellers	1
1897.2	258.9	2.83	See	1

Separately observed on the meridian at Cordoba.
 Stationary.

No. 48. Pollock [6]. C. Z. 18 h. 1074. 9.0
 $18^h 18^m 41^s$ — $36^\circ 47'.2$.

Comes = 10.5

1886.7	228.7	3.33	Pollock	1 n
1887.7	225.2	3.52	"	2

There is an 8.7 mag. star 40 secs. pr. 1' N.

No. 49. λ 352. Ö.A. 18,174. 8.4
 $18^h 19^m 12^s$ — $30^\circ 16'.2$.

Comes = 13.9

1897.7	72.3	2.96	See	1 n
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No. 50. Lalande 141. Lal. 33,938. 7.0
 $18^h 19^m 21^s$ — $6^\circ 39'.4$.

7.4 and 8.5

1832.2	199.0	6.13	Σ	3 n
1848.6	197.5	6.79	Mitchel	1
1867.9	199.3	6.10	Dembowski	4
1890.5	198.8	5.87	Glaserapp	2

The comes is Radcliffe 1890, 4822.

This pair is also registered as Σ 2313.

Fixed.

No. 51. Jacob [10]. 21 Sagittarii. MAG. 4.9
 $18^h 19^m 24^s$ — $20^\circ 35'.7$.

Comes = 8.5

1846.2	297.4	1.8 ±	Jacob	1 n
1851.2	297.6	2.05	"	2
1853.7	292.7	2.45	Dawes	2
1873.3	292.6	2.11	Dembowski	5
1877.4	292.6	2.06	Cinc.	1
1878.7	294.0	1.95	Schiaparelli	5
1879.1	292.7	1.91	Cinc.	3
1880.6	295.4	2.15	"	1-2
1891.7	291.0	2.08	Haverford	1
1897.7	288.3	1.82	See	1

Change doubtful.

Also registered as Alvan Clark 10.

C. P. D. mag. = 7.0.

Washburn 144, a 3" pair of 9th mag. stars, is about
 20' S.f.

No. 52. Alvan Clark 11. Lal. 33,959. 6.5
 $18^h 19^m 46^s$ — $1^\circ 38'.0$.

7.2 and 7.3

1854.7	178.1	0.42 ±	Dawes	2 n
1874.2	173.3	0.35 ±	Dembowski	5
1875.6	172.1	0.33 ±	Schiaparelli	5
1878.9	163.1	0.35 ±	Cinc.	3
1880.6	170.8	0.3 ±	Pritchett	1
1887.6	178.7	0.28	A. Hall	1

A very close pair, but it is doubtful if there has
 been any change.

No. 53. β 965. B. D.—17°, 5197. 8.5
 $18^h 21^m 17^s$ — $17^\circ 23'.1$.

Comes = 12.2

1880.6	105.6	1.57	β	3 n
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Identification not quite certain.

No. 54. Harvard. Lac. 7696. 5.8
 $18^h 21^m 20^s$ — $57^\circ 35'.0$.

1891	Double	Arequipa	- n
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C. P. D. mag. = 7.2.

SOUTHERN DOUBLE STARS.

18hrs.

189A

No. 55. β 133. Lac. 7722. ^{MAG.} 6.8
 $18^{\text{h}} 21^{\text{m}} 30^{\text{s}}$ — $26^{\circ} 41'.6$.

7.5 and 7.7, both white

1875.7	265.3	1.80	Schiaparelli	4 n
1878.5	262.6	1.76	Cinc.	3
1888.5	264.7	1.80	Haverford	2
1890.5	267.5	2.07	Glasenapp	2
1893.6	260.6	1.38	Sellors	2
1895.5	260.5	2.10	Barnard	1
1897.7	258.7	1.74	See	2

Also noted as double at Cordoba.

No. 56. H. N. 125. Piazzzi 18 h. 68. 7.4
 $18^{\text{h}} 22^{\text{m}} 47^{\text{s}}$ — $25^{\circ} 6'.3$.

8.0 and 8.3

1878.7	105.0	3.10	C. G. A.	3 n
1889.8	99.0	1.62	Hough	1
1897.7	101.8	3.14	See	2

No. 57. h. 5045. Lac. (7715). 7.2
 $18^{\text{h}} 23^{\text{m}} 22^{\text{s}}$ — $48^{\circ} 4'.8$.

Comes = 11.0

1836.5	25.1	6. ±	<i>h</i>	1 n
1897.2	25.1	7.99	See	1

No. 58. Melbourne [5]. Lac. 7697. 7.1
 $18^{\text{h}} 24^{\text{m}} 5^{\text{s}}$ — $66^{\circ} 21'.0$.

7.3 orange, and 9.1 blue

1873.6	295.2	5.02	Russell	1 n
1879.2	291.9	4.00	"	2
1881.5	296.0	4.96	"	2
1891.6	290.2	3.80	Sellors	1

Found at Melbourne in 1869.

Also noted at Cordoba, and measured at Sydney as Russell 308.

No. 59. Triple. Piazzzi 18 h. 79. ^{MAG.} 5.5
 $18^{\text{h}} 24^{\text{m}} 32^{\text{s}}$ — $33^{\circ} 3'.3$.

A = 6.3 B = 6.3 C = 11.3

A and B = λ 353.

1897.7 265. ± 0.18 ± See 1 n

A + B and C = Howe

1877.5 207.6 2.28 Cinc. 1 n

1889.4 198.6 3.17 β 3

1892.6 201.0 Haverford 1

1897.7 197.9 3.70 See 2

The p.m. of the chief star is about 0".07 towards 180°.

Howe's *comes* is also registered as β 1128, and the chief star is to be found in the list of new pairs found at Arequipa in 1891 as a double star (only).

Prof. See also measures a star at 29".

No. 60. Hough 435. B. D.—14°, 5096. 9.8
 $18^{\text{h}} 26^{\text{m}} 29^{\text{s}}$ — $14^{\circ} 4'.5$.

Both = 10.6

1893.6 41.7 0.89 Hough 3 n

There are several faint stars within 30".

An 8.5 mag. star is 12 secs. pr.

No. 61. Dunlop 222. κ Coronæ Australis. 5.7
 $18^{\text{h}} 26^{\text{m}} 29^{\text{s}}$ — $38^{\circ} 47'.9$.

6.3 and 6.7

1836.6 359.3 21.8 *h* 3 n

1856.7 358.9 21.5 Jacob 3

1887.1 359.2 21.7 Tebbutt 3

1890.5 358.8 21.2 Glasenapp 2

1896.6 357.0 21.7 Scott 1

No. 62. β 966. 1st Munich 16,525. 9.6
 $18^{\text{h}} 26^{\text{m}} 32^{\text{s}}$ — $19^{\circ} 3'.0$.

10.1 and 10.6

1880.6 120.2 0.62 β 3 n

Piazzzi 18 h. 95, mag. 8.0, is 66" N.f.

In Messier 25.

190A

18hrs.

REFERENCE CATALOGUE OF

No. 63. β 419. Lal. 34,259. 7.9
 $18^{\text{h}} 26^{\text{m}} 47^{\text{s}}$ — $7^{\circ} 53'.9$.

8.1 and 9.8

1876.0	$40. \pm$	$1.5 \pm$	β	1 n
1877.0	57.7	1.22	Dembowski	3
1888.5	56.6	1.32	Haverford	2

No. 64. Ormond Stone. Lac. 7763. 7.1
 $18^{\text{h}} 27^{\text{m}} 48^{\text{s}}$ — $34^{\circ} 53'.5$.

7.6 and 8.3

1876.6	139.7	1.78	Cinc.	1 n
1877.6	139.8	2.01	"	2
1896.7	136.9	1.73	See	2

Also noted as double at Cordoba in 1875, when both stars were observed on the meridian.

No. 65. Hough 567. Lal. 34,399. 7.3
 $18^{\text{h}} 30^{\text{m}} 44^{\text{s}}$ — $20^{\circ} 23'.7$.

Comes = 10.4

1895.6	160.1	1.19	Hough	2-1 n
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O. A. 18,445, mag. 9.0, is closely S.f.

No. 66. Hough 436. Lac. 7804. 8.0
 $18^{\text{h}} 32^{\text{m}} 5^{\text{s}}$ — $25^{\circ} 30'.4$.

Comes = 11.1

1889.7	177.1	4.15	Hough	1 n
1895.6	175.7	4.52	"	1

The f. star of a triangle.

No. 67. β 135. Lal. 34,476. 7.0
 $18^{\text{h}} 32^{\text{m}} 24^{\text{s}}$ — $14^{\circ} 5'.4$.

Comes = 11.8

1875.1	184.0	2.45	Dembowski	4 n
1878.5	187.0	$1.9 \pm$	Cinc.	1
1879.6	183.9	[1.45]	β	1
1882.5	187.3	2.49	Cinc.	1
1886.4	185.8	.....	L. McC.	1
1892.5	187.1	.....	Haverford	1
1893.5	187.6	2.24	Leavenworth	2

Discovered with a 6-inch refractor.

No. 68. Σ 2347. Lal. 34,516. 8.2
 $18^{\text{h}} 32^{\text{m}} 48^{\text{s}}$ — $0^{\circ} 28'.4$.

8.4 and 9.8

1829.8	259.3	3.17	Σ	5 n
1866.3	257.9	3.29	Dembowski	3
1878.6	256.8	3.20	Cinc.	3
1886.5	258.6	3.18	L. McC.	2
1891.6	258.2	3.02	Glazenapp	5-4

S.f. ϵ Serpentis, mag. 5.8.

No. 69. Innes 250. Lac. 7807. 7.5
 $18^{\text{h}} 34^{\text{m}} 6^{\text{s}}$ — $42^{\circ} 15'.5$.

7.9 and 8.9

1897.7	$130. \pm$	$0.9 \pm$	Innes	1 n
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The brightest star of a group N.f. Lac. 7790, mag. 5.1, yellow.

No. 70. Russell 309. Bris. 6455. 8.0
 $18^{\text{h}} 34^{\text{m}} 15^{\text{s}}$ — $55^{\circ} 58'.9$.

8.5 and 9.2

1871.5	216.9	3.21	Russell	1 n
1886.6	218.7	3.41	Pollock	1
1890.7	217.5	2.59	Sellors	3

Separately observed on the meridian at Cordoba.

Mr Russell's measure is also set down against λ 5053, a star too wide for inclusion here. It is Lac. 7799, mag. 7.2, and is somewhat N.f. the above pair. λ 5053, in its turn, seems to have been measured as Russell 310 in 1871.

No. 71. β 967. 1st Munich 17,004. 8.3
 Red

 $18^{\text{h}} 35^{\text{m}} 14^{\text{s}}$ — $14^{\circ} 35'.6$.

Comes = 11.5

1880.5	195.8	2.44	β	4 n
1888.5	196.9	$2.4 \pm$	Haverford	1
1893.5	191.1	2.33	Leavenworth	3

No. 72. Harvard. λ Coronæ
 Australis. 5.2

 $18^{\text{h}} 36^{\text{m}} 55^{\text{s}}$ — $38^{\circ} 25'.2$.

1891.	Double	Arequipa	-n
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SOUTHERN DOUBLE STARS.

18hrs.

191A

No.	Star	Mag.	Other	Mag.
No. 73.	Washburn 145. Ö.A. 18,579.	8.9		
	18 ^h 37 ^m 2 ^s — 15° 29'.1.			
	9.5 and 9.8			
1888.8	58.9 1.07 Washburn	3 n		
No. 74.	h. 5057. C. P. D.—54°, 9055.	9.2		
	18 ^h 37 ^m 23 ^s — 54° 1'.8.			
	Both = 10.0			
1836.5	75.7 8.± h	1 n		
1881.8	130.9 2.30 Hargrave	1		
The change seems considerable for so faint a pair; it is due, probably, to p.m.				
C. Z. 18 h. 2002, mag. 9.2, is 42 secs. pr.; it is called "dpl. I." by Gould.				
No. 75.	Russell 314. Lac. 7771.	6.2		
	18 ^h 37 ^m 25 ^s — 73° 6'.0.			
	6.4 and 8.4			
1880.8	260.3 1.02 Russell	1 n		
1890.8	265.6 1.78 Sellors	2		
1891.7	260.0 1.40 "	1		
The p.m. of the chief star is 0".04 towards 284°.3.				
Registered as a new pair at Arequipa. See <i>Harvard Circular</i> , No. 18.				
No. 76.	λ 357. Ö.A. 18,594.	8.3		
	18 ^h 38 ^m 0 ^s — 29° 31'.7.			
	A = 8.4 B = 11.6 C = 11.4			
	A and B			
1896.7	174.2 2.30 See	1 n		
	A and C			
1896.7	290.9 13.20 See	2 n		
λ 356, a faint 4" pair is S. pr.				
No. 77.	Ormond Stone. 1st Munich 17,168.	8.3		
	18 ^h 38 ^m 2 ^s — 19° 59'.6.			
	9.0 and 9.1			
1877.7	285.2* 1.69 Cinc.	1 n		
1886.7	283.7 2.03 L. McC.	1		
1891.7	287.0* 1.78 Haverford	2		
1897.7	285.5 1.93 See	1		

No.	Star	Mag.	Other	Mag.
No. 78.	λ 358. Ö.A. 18,606.	7.8		
	18 ^h 38 ^m 33 ^s — 25° 53'.7.			
	8.2 and 9.1			
1897.7	29.9 1.62 Lowell	2 n		
No. 79.	λ 359. Bris. 6479.	7.7		
	18 ^h 39 ^m 34 ^s — 43° 53'.4.			
	8.2 and 8.7			
1897.4	16.9 0.58 See	1 n		
No. 80.	β 1254. W.B. 18 h. 935.	7.8		
	18 ^h 39 ^m 59 ^s — 13° 46'.4.			
	Comes = 10.6			
1889.7	74.5 2.43 Hough	2 n		
1891.5	78.2 2.67 β	6		
1897.6	73.7 2.35 Aitken	3		
Registered as Hough 438.				
Discovered by β in 1875.				
No. 81.	Lalande 145. Lal. 34,784.	7.0		
	18 ^h 40 ^m 19 ^s — 10° 35'.8.			
	7.4 and 8.4			
1832.4	339.1 4.20 Σ	4 n		
1848.6	338.0 4.56 Mitchel	1		
1879.3	336.3 4.12 Cinc.	2		
1890.9	338.2 3.93 Glasenapp	6		
Distance decreasing?				
Also registered as Σ 2373.				
No. 82.	η III. 33. 5 Aquilae.	5.8		
	18 ^h 41 ^m 19 ^s — 1° 4'.0.			
	6.0 and 7.7			
1796.6	121.5 11.2 η	1 n		
1848.6	120.4 12.9 Mitchel	1		
1877.7	121.2 13.4 Cinc.	2		
1890.9	120.7 13.0 Glasenapp	6		
1898.5	119.1 12.9 Solá	2		
Fixed.				
The p.m. of 5 Aquilae is small.				
There is another comes 27½" distant.				
Also recorded as Σ 2379 and η N. 9.				

192A

18hrs.

REFERENCE CATALOGUE OF

No.	Star Name	Coordinates	MAG.	Notes
No. 83.	Innes 251. Lac. 7868.	18 ^h 43 ^m 7 ^s — 33° 42'.5	7.7	Both = 8.5 1897.6 227.1 1.13 See 1 n The pr. star of a right-angled triangle. This is λ 361 by priority of discovery.
No. 84.	Hough 439. Lal. 34,936.	18 ^h 43 ^m 42 ^s — 11° 5'.2	8.0	Comes = 11.7 1891.7 152.7 2.71 Hough 2 n
No. 85.	Washburn 147. Ö A. 18,713.	18 ^h 43 ^m 49 ^s — 17° 1'.1	8.1	8.3 and 10.0 1888.7 295.6 1.81 Washburn 3-2 n
No. 86.	h. 5066. Lac. 7869.	18 ^h 43 ^m 57 ^s — 41° 10'.6	6.7	Comes = 9.0 1835.5 89.1 10.± h 2 n 1881.7 86.5 9.3 Hargrave 1 1896.6 83.8 10.1 See 2 The stars were separately observed on the meridian at Cordoba in 1874.
No. 87.	h. 5067. C. P. D.—51°, 11,043.	18 ^h 45 ^m 2 ^s — 51° 3'.8	8.8	9.2 and 10.0 1835.2 275.7 1.8± h 3 n 1880.8 276.4 2.43 Hargrave 1 An 11th mag. star f.
No. 88.	β 970. B.D.—8°, 4729.	18 ^h 45 ^m 20 ^s — 8° 6'.3	8.8	9.0 and 10.7 1880.6 107.3 1.43 β 4 n 1892.4 107.9 1.54 " 1 S.f. β 969, a red star of the 7.1 mag., with an 11.8 mag. comes at 14".
No. 89.	Innes 112. Lac. 7889.	18 ^h 46 ^m 33 ^s — 47° 23'.7	6.7	6.8 and 10.0 1896.5 S. 2.± Innes 3 n A very pretty pair. Lac. 7891, mag. 7.1, is closely N.f.
No. 90.	h. 5069. Bris. 6512.	18 ^h 47 ^m 12 ^s — 61° 56'.7	7.5	8.2 and 8.4 1836.7 81.9 0.8± h 1 n 1871.6 88.± 0.5± Russell 1 1878.7 100.0 0.95 Melbourne 1 1881.7 88.1 0.65 Hargrave 1 1897.0 92.± Innes 1 There is a distant 11 th mag. companion in the same direction.
No. 91.	Gilliss 248. C. Z. 18 h. 2545.	18 ^h 48 ^m 18 ^s — 66° 2'.0	8.0	8.4 and 9.4 1890.7 128.3 4.32 Sellors 1 n
No. 92.	β 1033. ν_2 Sagittarii.	18 ^h 49 ^m 4 ^s — 22° 47'.8	5.2	Comes = 10.7 1888.7 104.0 1.37 β 1 n 1897.6 99.5 2.36 See 2 C. P. D. mag. = 6.6. The p.m. is small. ν_1 Sagittarii S.pr. has a distant companion observed as h 5073. Prof. See remarks that β 1033 is really = ν_1 Sagittarii, β having misidentified the pair.
No. 93.	λ 364. Lal. 35,172.	18 ^h 49 ^m 42 ^s — 28° 15'.4	7.5	7.9 and 8.8 1897.6 96.4 0.41 See 1 n

SOUTHERN DOUBLE STARS.

18hrs.

193A

No. 94. h. 2845. Lal. 35,207. 8.4
 18^h 50^m 5^s — 17° 42'.5.

8.6 and 10.1

1831.±	4.0	4.±	h	1 n
1878.6	5.0	3.84	Cinc.	3
1886.6	5.9	5.13	L. McC.	1

Two unimportant pairs, h 2843 and h 2844, are a little way pr.

No. 95. β 972. Schj. 7042. 8.8
 18^h 51^m 1^s — 0° 41'.8.

9.3 and 10.0

1880.4	4.7	1.09	β	5 n
1892.7	5.3	.....	Hough	1
1893.5	5.4	0.94	Goodsell	2

A third star = 9.3 mag. is 74" away.

No. 96. Innes 113. Bris. 6535. 6.9
 18^h 51^m 18^s — 48° 38'.4.

Comes = 11.0

1896.5	225.±	3.±	Innes	2 n
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No. 97. Brisbane. Lac. 7947. 6.4
 18^h 54^m 18^s — 37° 12'.0.

7.1 and 7.2

1837.7	282.5	13.0	h	1 n
1853.7	282.0	Powell	3
1856.7	282.3	12.5	Jacob	3-2
1888.7	281.9	12.7	Tebbutt	3
1890.5	282.6	11.6	Glasenapp	2

Separately observed on the meridian at the Cape and Cordoba.

No. 98. Cordoba [52]. Moesta 1842. 8.0
 18^h 54^m 26^s — 44° 14'.9.

Both = 8.8

1896.7	163.0	2.91	Sellers	3 n
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Both were observed on the meridian at Cordoba in 1879.

No. 99. h. 5075. Lac. 7924. 6.9
 18^h 54^m 35^s — 63° 55'.6.

7.6 and 7.7

1835.5	108.6	1.86	h	2 n
1856.6	110.3	1.82	Jacob	3-2
1871.6	110.1	2.05	Russell	1
1880.2	107.9	1.59	Hargrave	2
1886.6	111.4	2.13	Tebbutt	3
1890.6	113.1	1.25	Sellers	1
1893.6	110.5	1.21	"	1

1871. "Looks like oval nebula, with two star points," Russell.

1879. "Blurred," Hargrave.

1885. "Hazy," Tebbutt.

1887. "Haziness not now seen," Tebbutt.

1896. "No nebulosity seen," Innes.

See also the note to Russell (311) in the *Mem. R. A. S.*, vol. xlvii. p. 165, which seems to be an observation of this pair when the magnitudes were estimated as 6 and 11.

No. 100. Innes 252. Cor. D.M.— 7.7
 34°, 13,321.
 18^h 54^m 51^s — 34° 38'.5.

8.3 and 8.6

1897.7	10.±	1.2±	Innes	2 n
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See also No. 109.

No. 101. Cordoba [53]. Lac. 7952. 7.5
 18^h 55^m 3^s — 40° 48'.2.

7.6 and 9.8

1880.7	178.2	3.60	C. G. A.	1 n
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No. 102. Pollock [7]. C. Z. 18 h. 2894. 8.5
 18^h 55^m 35^s — 42° 24'.6.

9.2 and 9.4

1886.7	180.5*	2.01	Pollock	1 n
1889.6	181.1	2.19	"	2
1897.8	179.1	2.34	See	1

This star was noted as double by Mr A. Cochrane at the Cape Transit Circle, and is very probably the star observed by Mr Pollock at Sydney, who, however, identifies it as C. Z. 18 h. 2928.

Also registered as λ 366.

194A

18hrs.

REFERENCE CATALOGUE OF

No. 103. Triple. Lac. 7954. ^{MAG.} 7.1
 18^h 55^m 45^s — 45° 51'.2.

A = 8.2 B = 8.8 C = 8.3

A and B = Hargrave [317]

Year	Mag.	Dist.	Observer	Notes
1881.7	287.3	1.00	Hargrave	1 n
1886.6	275.3	1.80	Pollock	1
1889.6	278.9	1.47	"	1

A (+ B) and C = *h* 5078

Year	Mag.	Dist.	Observer	Notes
1834.5	315.1	15.±	<i>h</i>	1 n
1875.7	211.6	19.1	C. G. A.	3
1881.7	212.8	18.5	Hargrave	1
1886.6	212.3	18.9	Pollock	1

h's angle looks like a misprint for 215°.1.

No. 104. h. 5080. Lac. 7960. ^{MAG.} 7.5
 18^h 56^m 1^s — 36° 14'.3.

7.8 and 9.0

Year	Mag.	Dist.	Observer	Notes
1834.5	249.2	5.±	<i>h</i>	1 n
1877.7	246.3	4.89	Cinc.	1
1879.7	248.2	4.88	Hargrave	1
1890.5	247.4	6.47	Glazenapp	2

Separately observed on the meridian at Cordoba.

No. 105. Harvard. Lac. 7949. ^{MAG.} 6.0
 18^h 56^m 10^s — 51° 9'.4.

1891 Triple Arequipa - n

No. 106. Washburn 33. Moesta 1850. ^{MAG.} 7.6
 18^h 56^m 14^s — 28° 47'.0.

8.1 and 8.6

Year	Mag.	Dist.	Observer	Notes
1881.5	59.1	2.42	Washburn	3 n
1886.7	60.2	2.62	L. McC.	1
1888.6	60.6	2.60	Washburn	3
1897.6	57.9	2.74	See	1

Moesta 1848, mag. 8.1, is 18 secs. pr., and was marked as Class I. at Cordoba in 1874; but this pair is, no doubt, the one there referred to.

Both components of Moesta 1850 were observed on the meridian at Cordoba in 1880.

No. 107. Harvard 150. ζ Sagittarii. ^{MAG.} 2.7
 18^h 56^m 15^s — 30° 1'.4.

3.4 and 3.6

Year	Mag.	Dist.	Observer	Notes
1867.60	264.6	0.68	Harvard	4-2 n
1867.78	260.8	0.48	Newcomb	2-1
1878.70	84.2	0.42	β	1
1880.62	62.1	0.55	"	2
1881.61	36.1	0.31	"	2
1886.62	271.3	0.65	Hall	4
1887.64	265.3	.....	Pollock	5
1889.41	255.1	0.81	β	5
1891.57	253.7	0.57	Haverford	1
1892.39	245.1	0.60	β	3
1895.62	193.6	0.13	Barnard	2
1897.72	109.3	0.25	Lowell	6

Other measures.

A particularly interesting short period binary with a common p.m. of 0".051 towards 278°.9.

Discovered by Prof. Winlock at the Harvard Observatory in 1867, and, curiously enough, registered there again as a new pair in 1897 after two revolutions had been practically accomplished. See *Harvard Circular*, No. 18.

The latest orbit is by Prof. See. He finds:—

P = 18.85 years $i = 67°.32$
 T = 1878.8 $\Omega = 69°.3$
 a = 0".69 $\lambda = 328°.1$
 e = 0.279

Motion retrograde.

There are two apparent minima and maxima in distance, viz. :—

0".19

0.23

and

0".49

0.82

As a wide pair, this is the chief star of H. V. 78.

See:—

1880. Burnham, S.W., "Measures," *Astr. Nachr.*, No. 2338.

No. 108. h. 5082. Lal. 35,497. ^{MAG.} 5.9
 18^h 57^m 11^s — 19° 23'.3.

Comes = 8.5

Year	Mag.	Dist.	Observer	Notes
1836.6	91.0	6.±	<i>h</i>	1 n
1878.6	88.6	7.37	Cinc.	2
1890.5	88.3	6.98	Glazenapp	2
1897.7	89.2	7.35	See	1

C. P. D. mag. = 7.3.

h also noted a 9.8 mag. star 20" S.f.

Lal. 35,499, mag. 7.0, is 9" N.f.

SOUTHERN DOUBLE STARS.

18hrs.

195A

No. 109. λ 367. C. Z. 18 h. 2979. ^{MAG.} 8.0
 18^h 57^m 29^s — 34° 31'.0.

8.4 and 9.4

1897.7 9.6 0.80 See 1 n
 A 10th mag. star is 4 secs. f.
 See also No. 100.

No. 110. Σ 2434. Piazzii 18 h. 274. ^{MAG.} 8.5
 18^h 57^m 36^s — 0° 51'.1.

8.8 and 10.0

1831.6	80.5	1.93	Σ	3
1848.1	72.3	1.54	Mitchel	2
1864.7	69.6	1.79	Dembowski	2
1868.5	68.9	1.80	"	2
1877.7	63.3	1.58	Cinc.	2-1
1878.6	64.1	1.53	β	1
1880.6	64.9	1.46	"	3
1886.4	61.8	1.32	L. McC.	1
1896.5	59.4	1.32	Leavenworth	3
1896.5	53.8	1.12	Lick	3

Piazzii 18h. 275, mag. 8.5, is S.f., and has been measured on several occasions; some are:—

1823.5	148.8	26.02	S. and h	2 n
1831.6	147.0	25.56	Σ	4
1848.6	141.3	25.77	Mitchel	1
1880.6	131.8	23.84	β	1
1896.5	126.3	23.59	Lick	3
1898.5	126.1	22.77	Solá	1

The close pair is a binary system; the change in the more distant star is due to the difference of p.m., viz. :—

Piazzii 18 h. 274	^a —0 ^s .004	^{δ} —0 ^s .20
" " 275	—0.000	—0.08

No. 111. \mathbb{H} . N. 129. Lac. 7983. ^{MAG.} 7.8
 18^h 58^m 12^s — 23° 2'.6.

8.0 and 9.5

1867.6	305.8	8.11	Harvard	1
1890.5	307.4	7.47	Glazenapp	2
1896.6	307.7	8.14	Aitken	1

Noted as double by Argelander, and also registered as Harvard 151.

Other measures.

No. 112. \mathbb{H} . N. 126. Lal. 35,540. ^{MAG.} 7.0
 18^h 58^m 21^s — 21° 40'.6.

7.7 and 7.8

1873.	40. \pm	0.7 \pm	β	1 n
1879.53	22.4	0.83	Cinc.	2
1890.48	353.2	0.58	β	3
1891.51	349.3	0.48	"	3
1895.61	331.6	0.35	Barnard	6
1896.73	317.5	0.44	Aitken	2
1897.75	310.7	0.56	See	1

Common p.m. of 0".114 towards 150°.9.

The credit of having revived this very evident binary belongs to β , as it had not been observed by anyone since its discovery by \mathbb{H} .

\mathbb{H} gave no particulars except "Class I."

No other measures found.

No. 113. h. 5084. γ Coronae Australis. ^{MAG.} 4.3

18^h 59^m 40^s — 37° 12'.4.

Both = 5.1

1834.5	37.1	3. \pm	h	1 n
1836.4	34.5	3.67	"	1
1847.3	14.1	2.30	Jacob	1
1852.5	2.4*	1.91	Maclear	2
1854.1	356.6	1.80	Jacob	2
1858.2	343.4	1.53	"	3
1863.8	318.1	.....	Powell	4
1871.2	281.9	.....	"	1
1875.6	257.4	1.45	Schiaparelli	4
1876.7	.....	1.29	Melbourne	2
1877.7	248.0*	1.31	"	3
1878.8	240.7*	2.00	"	2-1
1886.6	200.3	1.37	Pollock	6
1891.7	176.7	1.54	Tebbutt	9-4
1895.7	161.9	1.59	See	1-2
1896.6	157.3	1.70	Scott	5
1897.5	156.8	1.95	Lehman	2
1897.6	151.6	1.37	Aitken	3
1897.8	140.7	2.04	See	1

Some of the above measures have not been published before. More complete lists of measures will be found in the *M. N. R. A. S.*, vol. lii. p. 503 (Gore), and in *Evolution of Stellar Systems*, pp. 226-7 (See).

[contd.]

196A

18hrs.

REFERENCE CATALOGUE OF

This well-known binary system has a common p.m. of $0''.312$ towards $164^\circ.4$.

Many orbits have been computed; the latest is by Prof. See, who finds:—

$$P = 152.7 \text{ years}$$

$$T = 1876.8$$

$$a = 2''.45$$

$$e = 0.42$$

$$i = 34^\circ.0$$

$$\Omega = 72^\circ.3$$

$$\lambda = 180^\circ.2$$

Motion retrograde.

The distance will increase slowly until 1953, when the maximum of about $3''.5$ will be attained.

C. P. D. mag. = 5.5.

No. 114. Cordoba [54]. Cape 1880,^{MAG.}
10,375. 8.3

$18^h 59^m 43^s$ — $38^\circ 16'.7$.

8.5 and 10.0

1880.7	185.4	5.01	C. G. A.	2 n
1896.7	197.4	5.09	See	3

No. 115. β 974. Schj. 7133. 8.8

$18^h 59^m 57^s$ — $6^\circ 19'.5$.

9.4 and 9.7

1880.6	87.8	0.72	β	3 n
1891.4	84.4	0.96	"	2

There is a 12th mag. star $25''$ distant.

No. 1. South 710. Lal. 35,693. MAG. 5.8
 19^h 1^m 7^s — 16° 22'.9.

Comes = 8.9

1877.6 1.7 6.27 Cinc. 3 n
 1888.6 0.7 6.26 Haverford 1

Separately observed on the meridian at Cordoba in 1878.

No. 2. Hough 441. B.D.—12°, 5283. 9.5
 19^h 1^m 40^s — 12° 51'.5.

Both = 10.3

1888.6 200.7 1.31 Hough 2 n
 Hough 96, mag. 9.4, 38 secs. f. and 5' S., is a faint 3" pair (= B.D.—12°, 5288) with a 9.6 mag. star S.f.

No. 3. h. 5085. Lac. 7977. 7.5
 19^h 1^m 48^s — 60° 12'.2.

7.7 and 9.2

1835.6 239.9 2.3 ± h 3 n
 1857.8 250.6 2.7 ± Jacob 3
 1872.6 239.4 3.30 Russell 1
 1880.6 247.9 3.51 Cruls 1
 1886.6 240.9 3.06 Pollock 2

Jacob's observations, although fairly consistent, were taken under bad conditions.

Both stars have been observed on the meridian at Cordoba.

Closely S.pr. the fine cluster, Lac. 7980.

No. 4. λ 370. C. Z. 19 h. 18. 8.9
 19^h 2^m 4^s — 35° 34'.7.

Comes = 10.9

1896.8 91.3 1.88 See 1 n

Prof. See also measures stars at 7" and 12".

No. 5. Gale. Lac. 7997. 5.6
 19^h 7^m 9^s — 66° 50'.0.

5.8 and 7.8

1895.1 40. ± 0.5 ± Gale 3 n
 1896.8 45. ± 0.7 ± Innes 1

Common p.m. of 0".026 towards 293°.0.

This is in the list of stars discovered at Arequipa in 1891 (see *Harvard Circular*, No. 18), and was discovered independently at Sydney in 1895. Publication in both cases was in 1897; the discovery by Mr Gale was communicated to several astronomers in 1895.

No. 6. β 138. Lal. 36,013. MAG. 7.8
 19^h 7^m 45^s — 14° 36'.9.

8.0 and 10.3

1875.1 278.3 1.54 Dembowski 4 n
 1879.1 280.9 1.14 Cinc. 2
 1892.6 280.5 0.79 Hough 1

No. 7. Harvard 152. Yarnall, 8354. 8.2
 19^h 8^m 8^s — 29° 26'.5.

8.4 and 10.4

1867.6 263.6 1. ± Harvard 1 n
 1896.8 264.8 0.59 See 2
 1897.7 265. ± 1.5 ± Innes 2

Prof. See's distance seems somewhat small.

Lac. 8043, mag. 7.6, is 13 secs. f. 2' N.

No. 8. Cordoba [55]. Ö 9,272. 8.5
 19^h 8^m 26^s — 27° 29'.5.

9.1 and 9.4

1879.7 322.6 4.16 C. G. A. 1 n
 1897.7 328.3 1.99 See 1

Two degrees N.f. are two wide faint pairs, one noted by Prof. Howe, the other = h 5101 = Ö.A. 19,310.

No. 9. Innes 114. Bris. (6605). 7.8
 19^h 10^m 32^s — 63° 4'.5.

8.2 and 9.0

1896.6 280. ± 0.7 ± Innes 1 n
 An 8.5 star is 27 secs. pr.

No. 10. h. 596. Lal. 36,205. 6.8
 19^h 11^m 56^s — 16° 8'.7.

7.3 and 7.8

1830.0 14.5 9.18 South and h - n
 1880.8 15.0 8.29 Cinc. 4
 1888.5 14.1 8.14 Haverford 1

Also recorded as South 715 in h's General Catalogue of 10,300 double stars.

Other measures.

Both pr. and f. will be found wide pairs, one noted by Prof. Howe, the other = h 1381.

198A

19hrs.

REFERENCE CATALOGUE OF

No. 11. Innes 253. Lac. (8066). ^{MAG.} 7.5
 19^h 12^m 29^s — 33° 27'.3.

8.2 and 8.3, both yellow

1897.7 135.5 0.43 See 2 n
 Found independently by Prof. See= λ 392.
 The brightest star of a triangle.

No. 12. Σ 2490. W.B. 19 h. 235. 9.0
 19^h 12^m 45^s — 3° 39'.2.

9.3 and 10.6

1828.1 249.2 3.24 Σ 3 n
 1848.6 245.6 3.30 Mitchel 1
 1886.6 247.3 3.52 L. McC. 2
 1891.7 247.4 3.25 Haverford 1

Also registered as Hough 103.

No. 13. Dunlop 226. β_1 Sagittarii. 4.1
 19^h 15^m 27^s — 44° 38'.8.

Comes = 7.2

1835.0 78.6 29.1 h 3 n
 1855.8 78.3 Powell 1
 1877.7 78.0 28.0 Cape M. O. 3
 1892.5 76.7 27.8 Scott 1
 1897.8 76.8 28.5 See 1

The change shown arises from the p.m. of the chief star, viz. :—0".038 towards 238°.0.

One measure of this pair will be found in the Sydney lists, but it is there credited to h 5107, a star some 11° distant.

No. 14. h. 5103. Gilliss P. Z. 13,844. 8.8
 19^h 15^m 31^s — 71° 58'.2.

Comes = 12.5

1835.6 240.8 7.± h 1 n
 1872.0 Not seen Russell 2

No. 15. Washburn 149. B.D. 9.0
 —18°, 5331.
 19^h 16^m 26^s — 18° 35'.2.

9.7 and 9.8

1888.8 184.7 1.29 Washburn 3 n

Identified at the Washburn Observatory as B.D. —18°, 5330, but the position given is that of the star above.

No. 16. Innes 115. Melbourne I. 983. ^{MAG.} 8.0
 19^h 16^m 37^s — 62° 22'.5.

Comes = 11.0

1896.6 315.± 3.± Innes 1 n

No. 17. Innes 116. C. Z. 19 h. 647. 8.4
 19^h 16^m 43^s — 46° 8'.0.

8.7 and 10.0

1896.8 170.± 1.7± Innes 1 n
 C. Z. 19 h. 648, mag. 8.6, is 17" S.

No. 18. Howe. Ö.A. 19,458. 8.5
 19^h 17^m 6^s — 18° 10'.8.

9.2 and 9.3

1877.7 83.3 2.17 Cinc. 1 n
 1880.5 81.8 2.56 " 2
 1886.7 81.5 2.46 L. McC. 2

No. 19. Σ 2503. B.D.—7°, 4938. 8.7
 19^h 17^m 20^s — 7° 19'.2.

9.1 and 10.1

1829.4 280.2 2.55 Σ 3 n
 1848.6 279.9 2.23 Mitchel 1
 1866.6 282.8 2.32 Harvard 1
 1872.7 281.1 2.49 Dembowski 1

No. 20. Washburn 35. B.D.—18°, 5342. 9.0

19^h 18^m 2^s — 18° 41'.2.

9.7 and 9.9

1881.6 191.2 1.40 Washburn 3 n
 1888.7 190.0 1.63 " 6

Also registered as Washburn 151, or, at least, both have been identified there as B.D.—18°, 5342.

No. 21. Ormond Stone. Cor. D.M. 8.0
 —32°, 15,154.

19^h 18^m 40^s — 32° 25'.7.

8.4 and 9.4

1877.6 292.3 1.74 Cinc. 1 n
 1897.7 296.7 1.73 See 1

Identified as C. Z. 19 h. 895, mag. 9.0, by Prof. See, and registered as a new pair= λ 377. R.A. = 19^h 22^m 14^s Dec. —32° 30'.5.

SOUTHERN DOUBLE STARS.

19^{hrs.}

199A

No. 22. h. 5113. Lac. 8098. ^{MAG.} 6.1
19^h 18^m 46^s — 29° 30'.1.

Comes = 9.2

1837.5	121.9	25." ±	h	1 n
1867.6	172.4	17.7	Harvard	1
1877.7	170.2	16.6	Cinc.	1
1879.6	170.1	16.8	"	1
1897.7	168.7	16.0	See	1

h's angle seems irreconcilable. (171°.9?)

Other measures.

C. P. D. combined mag. = 7.7.

No. 23. λ 373. C. Z. 19 h. 766. ^{MAG.} 9.0
19^h 19^m 18^s — 42° 5'.1.

9.3 and 10.6

1897.8	28.6	1.15	See	1 n
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No. 24. h. 5114. Lac. 8091. ^{MAG.} 5.4
19^h 19^m 46^s — 54° 31'.5. Yellow

Comes = 10.0

1837.7	130.9	1.7 ±	h	1 n
1856.6	248.6	1.3 ±	Jacob	3
1857.8	260.0	1.5 ±	"	3
1880.5	Impossible dédoublet		Cruls	1
1897.7	Not seen		Innes	2

A short period binary pair, in all probability, but it has been neglected for some forty years.

The p.m. of the chief star is 0°.081 towards 284°.3.

Preceded by C. Z. 19 h. 774, mag. 8.1, which has been measured as follows:—

h 5114 and C. Z. 19 h. 774.

1837.7	270.6	69." ±	h	1 n
1857.2	266.0	66.4	Jacob	4-1
1873.7	262.5	67.8	Russell	1
1880.5	260.0	65.9	Cruls	1

Mr Russell makes no mention of the nearer companion, which was then, as now, doubtless, too close to be seen; he measured a faint star 71" f.

No. 25. λ 376. C. Z. 19 h. 848. ^{MAG.} 8.6
19^h 21^m 10^s — 31° 34'.9.

9.3 and 9.5

1897.7	116.9	0.70	See	1 n
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No. 26. h. 5117. Lac. 8105. ^{MAG.} 7.5
19^h 21^m 15^s — 44° 5'.0.

7.8 and 9.0

1836.6	265.1	6.03	h	3 n
1851.5	265.0	6.32	Jacob	4-3
1857.8	265.6	6.07	"	2
1879.7	265.3	5.61	Hargrave	1
1890.7	261.8	6.11	Sellers	1

Both stars have been observed on the meridian at Cordoba.

No. 27. β 423. O.A. 19,560. ^{MAG.} 8.0
19^h 21^m 33^s — 29° 42'.0.

8.4 and 9.2

1877.6	125.0	1.25	Cinc.	1
1879.7	119.6	1.19	"	1
1886.8	124.3	1.27	L. McC.	1
1893.7	125.4	1.09	Sellers	2
1897.7	124.9	1.31	See	1

No. 28. Schjellerup, 30. Lal. 36,712. ^{MAG.} 7.3
19^h 22^m 37^s — 12° 20'.7.

8.0 and 8.1

1874.1	317.7	1.38	Dembowski	5-4 n
1878.9	319.6	1.37	Cinc.	2
1879.2	319.5	1.58	Schiaparelli	4
1882.5	324.4	1.68	Cinc.	2
1886.5	327.6	1.68	L. McC.	1
1888.5	328.3	1.60	Haverford	3
1893.5	330.8	1.53	Goodsell	3
1896.5	333.8	1.56	Leavenworth	2

The angle is increasing.

Also registered as β 142.

No. 29. Hough 106. W.B. 19 h. 494. ^{MAG.} 8.3
19^h 22^m 56^s — 3° 15'.1.

Comes = 10.3

1883.8	214.5	1.08	Hough	2 n
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e Aquilæ mag. 5.2, is N.f.

200A

19hrs.

REFERENCE CATALOGUE OF

No. 30. Innes 254. C. Z. 19 h. 916. ^{MAG.} 8.0
 19^h 23^m 4^s — 48° 38'.5

8.7 and 8.8

1897.8 225.± 1.5± Innes 1 n
 The N.f. and brightest of three stars in the finder.

No. 31. h. 5120. Ö.A. 19,598. 8.3
 19^h 23^m 6^s — 29° 54'.7

8.6 and 9.7

1834.6	171.9	2.±	h	1 n
1877.7	173.7	3.86	Cinc.	1
1897.7	169.1	4.42	See	1

No. 32. Innes 117. Lac. 8102. 6.9
 19^h 23^m 26^s — 60° 28'.6

7.3 and 8.3

1896.7	180.±	1.±	Innes	1 n
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No. 33. H. N. 119. Mayer 808. 5.6
 19^h 23^m 41^s — 27° 11'.4

Comes = 8.7

1798.7	S.f.	Class I.	H	1 n
1877.6	140°.2	8".17	Cinc.	3

C. P. D. mag. = 6.8.
 The chief star has a p.m. of 0".06 towards 180°.
 This is perhaps Harvard 153.

No. 34. Innes 118. Lac. 8124. 7.0
 19^h 25^m 32^s — 46° 59'.0

7.1 and 9.4

1896.9	137.±	1.±	Innes	3 n
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No. 35. Innes 255. C. P. D. = 48°, 10,191. 8.6
 19^h 25^m 41^s — 48° 55'.0

9.0 and 10.0

1897.8	180.±	2.±	Innes	1 n
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A brighter star 1^m f., a little N.

No. 36. λ 380. C. Z. 19 h. 1045. ^{MAG.} 8.6
 19^h 25^m 53^s — 38° 21'.8

9.0 and 10.0

1896.7	29.9	6".90	See	3 n
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C. P. D. mag. = 10.2.

The pr. star of a triangle.

There is a fainter pair 14' N.f. seen at the Cape whilst looking at C. Z. 19 h. 1134, mag. 8.7, which was noted as double Class I., at Cordoba in 1874, but here it was found single. (1 n.)

No. 37. λ 381. Ö.A. 19,662. 9.1
 19^h 26^m 0^s — 27° 57'.6

9.8 and 10.0

1897.7	13.1	1".55	See	1 n
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No. 38. Dembowski 21. Lal. 36,902. 7.3
 19^h 26^m 4^s — 2° 19'.2

7.8 and 8.5

1865.8	70.0	1".22	Dembowski	2 n
1871.7	69.1	1.18	"	4
1879.6	70.1	1.02	Cinc.	5-4
1880.6	71.0	1.17	β	1
1890.7	66.9	1.04	"	3

A 9.0 mag. star is 27" N.pr., and with A+B has been measured as Σ 2535.

Lal. 36,894, mag. 7.7, is a little way pr.

No. 39. λ 382. C. Z. 19 h. 1130. 8.0
 19^h 28^m 13^s — 41° 38'.1

8.5 and 9.2

1897.8	293.1	2".10	See	1 n
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No. 40. λ 384. Piazzini 19 h. 165. 6.0
 19^h 29^m 38^s — 23° 31'.7

Comes = 11.5

1897.7	167.0	6".11	See	1 n
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C. P. D. mag. = 7.7.

SOUTHERN DOUBLE STARS.

19hrs.

201A

No. 41. β 654. h_2 Sagittarii. 4.4
 19^h 30^m 37^s — 25° 6'.3.

Comes = 10.5

1878.6	160.8	2.93	β	3 n
1878.7	163.2	2.64	Cinc.	1
1889.4	159.1	3.00	β	4
1897.7	164.3	2.89	See	3

The p.m. of the chief star is 0".033 towards 116°.7.

No. 42. λ 385. Porter 3257. 8.3
 19^h 31^m 8^s — 21° 51'.1.

Comes = 14.9

1897.7	6.9	3.88	See	1 n
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Prof. See also measures an 11th mag. star 28" N.p.r.

No. 43. Σ 2541. Piazz1 19 h. 185. 8.3
 19^h 31^m 17^s — 10° 39'.5.

8.5 and 10.0

1831.0	340.0	2.84	Σ	3
1848.2	336.3	3.02	Mitchel	2
1851.9	338.4	3.61	W. Σ	2
1867.9	331.5	3.42	Dembowski	4
1880.6	332.4	3.74	Pritchett	3
1886.8	332.8	4.08	Miss Lamb	4

Other measures.

This pair has a common p.m. of 0".391 towards 227°.3.

Near H_1 I. 13, which has, on several occasions, been confused with the above pair. See No. 47.

No. 44. λ 387. Lac. 8167. 6.7
 19^h 32^m 31^s — 45° 30'.3.

7.4 and 7.5

1897.8	358.7	0.42	See	1 n
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No. 45. λ 388. C. Z. 19 h. 1338. 7.5
 19^h 32^m 53^s — 39° 58'.3.

Comes = 10.5

1897.8	177.0	2.83	See	1 n
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No. 46. β 761. Lac. 8174. 6.8
 19^h 33^m 7^s — 39° 39'.6.

Comes = 9.8

1879.7	197.4	[1.92]	β	3-2 n
1886.7	198.7	2.55	Pollock	1
1889.4	198.2	2.45	β	3
1896.6	196.0	2.33	See	3

See also No. 45.

No. 47. H_1 I. 13. Lal. 37,207. 7.1
 19^h 33^m 14^s — 10° 22'.9.

A = 7.3 B = 9.1 C = 12.0

A and B

1782.8	307.3	.....	H_1	2 n
1802.8	314.8	.....	"	1
1825.6	316.1	4.49	South	4
1829.1	315.2	3.52	Σ	5
1846.0	317.1	3.35	Jacob	1
1847.3	319.0	3.16	Mitchel	3
1862.8	317.6	3.68	Knott	2
1877.6	319.0	3.70	Cinc.	2
1880.6	320.9	3.68	"	2
1886.7	316.4	3.62	Hall	3
1890.5	320.9	3.91	Glasenapp	2
1896.6	322.1	3.70	Hussey	1

B and C

1879.6	282.7	3.82	Cinc.	1 n
1888.5	282.8	4.21	Haverford	1

C strangely enough was invisible to Σ and others although seen by H_1 with a 6 $\frac{1}{2}$ -inch reflector. There is an interesting note on the subject, by Dawes, in the *Mems. R. A. S.*, vol. xxxv. p. 495.

See also a paper by George Hunt, *M. N. R. A. S.*, vol. xxxii. pp. 90-92.

There is another star of 10th mag. 28" away.Also recorded as Σ 2545. Σ 2547, a wide pair, is 13' S.f.

No. 48. λ 389. 53 Sagittarii. 6.2
 19^h 33^m 49^s — 23° 39'.3.

6.7 and 7.2

1897.7	331.9	0.17	See	3-1 n
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Common p.m. of about 0".07.

2 c

202A

19hrs.

REFERENCE CATALOGUE OF

No. 49. Innes 119. Lac. 8163. ^{MAG.} 7.5 19 ^h 34 ^m 0 ^s — 59° 14'.2	No. 55. λ 394. Lal. 37,491. ^{MAG.} 7.6 19 ^h 40 ^m 22 ^s — 25° 7'.3
7.8 and 9.1	8.1 and 8.6
1896.7 175.± 1.2± Innes 1 n	1897.7 293.6 0.37 See 2 n
No. 50. Russell 319. Anon. 8.6 19 ^h 34 ^m 0 ^s — 73° 11'.0	No. 56. h. 5140. Lac. 8190. 7.3 19 ^h 40 ^m 24 ^s — 65° 9'.4
9.0 and 10.0	8.0 and 8.1
1871.6 54.4 3.56 Russell 1 n See note.	1836.9 89.6 1.78 h 3 n
No. 51. Cordoba [56]. Lac. 8173. 7.0 19 ^h 34 ^m 27 ^s — 53° 10'.8	1872.6 84.0 2.36 Russell 2
7.4 and 8.2	1878.8 84.5 2.39 Melbourne 1
1875.7 65.1 2.38 C. G. A. 4 n	1880.2 84.2 1.64 Hargrave 2
1886.8 54.9 3.54 Pollock 1	1891.7 84.2 2.± Sellors 1
1887.7 48.7 3.46 " 4-2	No. 57. β 467. Lal. 37,507. 7.3 19 ^h 40 ^m 35 ^s — 21° 46'.1
1891.7 49.4 3.± Sellors 2	7.4 yellow and 9.9 orange
No. 52. λ 393. Lal. 37,399. 7.8 19 ^h 38 ^m 11 ^s — 27° 52'.8	1879.6 135.1 2.64 Cinc. 2 n
Both = 8.6	1886.7 131.2 3.04 L. McC. 3
1897.7 211.2 0.18 See 1 n	1892.5 134.2 3.13 Haverford 1
No. 53. β 827. Lal. 37,470. 8.2 19 ^h 39 ^m 13 ^s — 11° 25'.7	1897.7 136.7 3.27 See 1
8.6 and 9.5	No. 58. β 146. Lal. 37,544. 8.3 19 ^h 41 ^m 16 ^s — 20° 7'.5
1881.6 268.0 0.87 β 3 n	8.7 and 9.6
1888.0 269.9 0.98 Washburn 3	1879.6 301.8 0.91 β 1 n
1891.7 251.8 1.34 Haverford 2	1879.6 295.8 0.98 Cinc. 1
Two 8.5 mag. stars are N.pr.	1891.7 308.4 0.91 β 3
No. 54. Triple. Lac. 8194. 7.0 19 ^h 40 ^m 14 ^s — 62° 3'.4	1897.7 305.8 1.09 Aitken 3
A = 7.5 B = 8.0 C = 9.6	In a low power field with f Sagittarii, mag. 5.1.
A and B = Innes 120	No. 59. Ormond Stone. Ö.A. 19,956. 8.0 19 ^h 41 ^m 34 ^s — 22° 4'.4
1896.6 185.± 0.8± Innes 1 n	8.3 and 9.7
A + B and C = h 5141	1879.6 9.2 1.66 Cinc. 2 n
1836.6 344.0 1.5± h 1 n	1886.7 9.2 1.71 L. McC. 1
1872.7 344.6 1.3 Russell 1	1891.6 3.9 1.62 Haverford 1
1896.6 340.± Innes 1	1894.7 5.5 1.04 Sellors 2
	1897.7 6.0 1.62 See 1-2

Note to No. 50.—Identification has not been made out. There is no star in the C. P. D. in the position given by Mr Russell, and a search here on one night was unsuccessful.

No. 60. λ 395. O.A. 19,960. ^{MAG.} 8.6
 19^h 42^m 12^s — 26° 54'.3

9.3 and 9.5

1897.7 106.1 2.01 See 1 n

No. 61. Innes 121. Lac. 8207. 5.5
 19^h 42^m 16^s — 59° 26'.6

5.7 and 7.7

1896.6 80.± 0.7± Innes 1 n
 The p.m. is very small.

No. 62. Innes 122. Piazz 19 h. 266. 7.6
 19^h 43^m 45^s — 42° 6'.6

Comes = 10.5

1896.8 330.± 4.± Innes 1 n

No. 63. Σ 2582. W.B. 19 h. 1069. 8.2
 19^h 44^m 35^s — 4° 10'.4

8.5 and 9.8 yellowish

1829.9 264.8 2.35 Σ 4-5 n
 1866.4 261.0 2.45 Dembowski 3
 1886.7 260.9 2.57 L. McC. 1
 1890.5 263.1 2.42 Glasenapp 2

Other measures.

No. 64. Dunlop 227. Lac. 8227. 5.3
 19^h 44^m 40^s — 55° 13'.5

5.6 yellow and 6.9 greenish

1835.0 150.6 23.1 $\frac{h}{z}$ 3 n
 1871.8 147.1 22.7 Russell 1
 1875.7 148.9 23.0 Cape M. O. 3

No. 65. β 148. Lal. 37,779. 7.3
 19^h 46^m 32^s — 10° 36'.4

7.9 and 8.3

1875.3 333.2 0.91 Dembowski 4-3 n
 1879.2 331.2 0.87 Cinc. 3-1
 1888.5 326.6 0.79 Haverford 1
 1891.6 323.3 0.78 β 2

Slow change.

A third star, 13.5 mag., is 26" distant.

No. 66. h. 5152. Ö.A. 20,036. ^{MAG.} 8.1
 19^h 47^m 9^s — 30° 31'.5

8.6 and 9.1

1835.2 153.6 3.± $\frac{h}{z}$ 2 n
 1877.6 154.9 6.19 Cinc. 2-3

No. 67. h. 2904. Lal. 37,813. 6.4
 19^h 48^m 18^s — 24° 11'.4

6.4 and 9.8

1830.6 173.5 20.± $\frac{h}{z}$ 1 n
 1834.6 170.6 20.± ,, 1
 1878.7 140.8 18.4 β 1
 1885.6 133.0 16.3 Wilson 1
 1886.6 129.2 16.6 Hall 3

The change is due to the rectilinear motion of the large star. The nearest approach, some 14", will occur about 1911.

See:—

1886. Wilson, H. C., *Sidereal Messenger*, vol. v. p. 30.
 1886. Burnham, S. W., *Sidereal Messenger*, vol. v. p. 56.
 1886. Sadler, Herbert, *Sidereal Messenger*, vol. v. p. 93.

No. 68. Washburn 36. 1st Munich 8.3
 22,205.
 19^h 49^m 19^s — 20° 36'.3

8.8 and 9.3

1881.7 214.3 1.03 Washburn 3 n
 1888.6 213.2 1.24 ,, 3

No. 69. Σ 2597. Lal. 37,901. 6.3
 19^h 49^m 58^s — 6° 59'.7

6.8 and 7.3 white

1826.5 92.1 1.92 Σ 4 n
 1848.7 86.4 1.40 Mitchel 1
 1880.8 88.6 1.23 β 1
 1888.5 89.1 1.46 Haverford 1
 1890.1 92.6 1.83 Glasenapp 4-2
 1898.5 87.2 1.63 Solá 1

Although virtually stationary this pair has a common p.m. of 0'.124 towards 193°.9.

204A

19hrs.

REFERENCE CATALOGUE OF

No. 70. β 830. Lal. 37,916. MAG. 8.5
 $19^{\text{h}} 50^{\text{m}} 2^{\text{s}}$ — $1^{\circ} 6' 3''$.

Comes = 11.7

1881.7	106.4	2.72	β	2 n
1886.9	105.6	2.90	Miss Lamb	2
1887.8	106.0	2.81	Washburn	3

No. 71. λ 399. Cor. D.M.— 36° , 13,788. 8.5
 $19^{\text{h}} 50^{\text{m}} 18^{\text{s}}$ — $36^{\circ} 38' 6''$.

Comes = 13.2

1896.8	32.4	4.40	See	2 n
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No. 72. Alvan Clark 12. Lal. 38,059. 7.5
 $19^{\text{h}} 53^{\text{m}} 11^{\text{s}}$ — $2^{\circ} 30' 1''$.

8.0 and 8.6, both yellow

1854.7	333.8	0.86	Dawes	1 n
1859.6	335.0	0.81	Secchi	1
1866.6	332.5	.....	Harvard	3
1873.2	332.4	0.93	Dembowski	4
1878.2	324.9	1.03	Schiaparelli	5-4
1879.0	327.1	1.01	Cinc.	7
1881.1	325.9	1.17	"	3
1886.6	326.4	1.08	L. McC.	2
1888.5	323.7	1.18	Haverford	3
1891.7	324.2	1.32	"	2

Slow change.

An observation by Secchi, 1857.8, is omitted, as it must evidently belong to another pair, or is erroneous.

No. 73. Innes 256. Lac. 8289. 6.9
 $19^{\text{h}} 54^{\text{m}} 11^{\text{s}}$ — $47^{\circ} 40' 3''$.

7.0 and 9.5

1897.7	160. \pm	0.8 \pm	Innes	1 n
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No. 74. λ 400. O.A. 20,138. 8.1
 $19^{\text{h}} 54^{\text{m}} 21^{\text{s}}$ — $24^{\circ} 13' 7''$.

8.3 and 10.4

1897.7	30.4	1.38	See	1 n
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No. 75. h. 5163. Lac. 8283. MAG. 7.8
 $19^{\text{h}} 56^{\text{m}} 13^{\text{s}}$ — $63^{\circ} 20' 3''$.

8.2 and 9.0

1836.5	252.5	1.4 \pm	h	2 n
1857.9	250.3	2. \pm	Jacob	2
1871.6	247.8	1.57	Russell	1
1873.7	245.8	2.15	"	1
1890.7	249.4	1.49	Sellers	2

Both stars have been observed on the meridian at Cordoba.

No. 76. H. I. 93. Piazzzi 19 h. 365. 7.5
 $19^{\text{h}} 56^{\text{m}} 31^{\text{s}}$ — $0^{\circ} 28' 5''$.

7.9 and 8.6

1793.2	286.2	.....	H	2 n
1876.7	293.8	2.11	Dembowski	4

The angle is probably increasing.

No. 77. λ 403. Lac. 8317. 7.2
 $19^{\text{h}} 57^{\text{m}} 10^{\text{s}}$ — $36^{\circ} 20' 4''$.

A = 7.8 B = 8.1 C = 12.0

A and B

1896.7	116.9	0.61	See	3 n
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A and C

1896.7	24.8	7.58	See	1 n
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No. 78. λ 404. Piazzzi 19 h. 374. 6.6
 $19^{\text{h}} 59^{\text{m}} 9^{\text{s}}$ — $33^{\circ} 17' 0''$.

6.8 and 8.8

1897.7	65.3	0.49	See	1 n
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Prof. See also measures a 13.3 mag. star $22''$ S.

No. 79. β 56. Lal. 38,342. 7.3
 $19^{\text{h}} 59^{\text{m}} 50^{\text{s}}$ — $4^{\circ} 35' 6''$.

7.5 white and 9.3 orange

1875.4	162.2	1.61	Dembowski	4 n
1879.3	164.3	1.57	Cinc.	3
1886.7	165.0	1.65	L. McC.	3
1888.6	165.6	1.70	Haverford	1
1892.7	168.2	2.43	Glaserapp	2-1
1896.5	165.7	1.55	Leavenworth	3

SOUTHERN DOUBLE STARS.

20 hrs.

205A

No. 1. Washburn 154. W.B. 19 h. ^{MAG.}
 1440. 8.7
 20^h 0^m 5^s — 14° 37'.3

Both = 9.5

1888.8 40.7 1.28 Washburn 4-3 n

No. 2. λ 405. Ö.A. 20,228. 8.0
 20^h 0^m 30^s — 28° 39'.4

8.6 and 9.0

1897.7 233.4 0.48 See 1 n

No. 3. Washburn 155. W.B. 19 h. ^{MAG.}
 1463. 8.8
 20^h 0^m 51^s — 13° 39'.3

9.3 and 9.8

1888.7 275.7 1.83 Washburn 3 n

No. 4. λ 406. Lal. 38,398. 7.8
 20^h 1^m 32^s — 19° 51'.6

7.9 and 10.8

1897.8 1.2 2.73 See 1 n

No. 5. β 832. 1st Munich 23,011. 8.5
 20^h 1^m 37^s — 10° 59'.2

9.2 and 9.4

1881.7 101.8 1.34 β 3 n
 1886.9 104.0 1.36 Washburn 2
 1888.5 100.2 1.34 Haverford 1

No. 6. λ 407. Yarnall, 8898. 8.5
 20^h 2^m 21^s — 39° 0'.8

9.2 and 9.4

1896.7 261.4 3.13 See 3 n

No. 7. h. 5167. Bris. 6800. ^{MAG.} 7.3
 20^h 2^m 53^s — 63° 54'.6

7.7 and 8.6

1836.0 35.7 7.27 h 3-1 n
 1873.7 34.6 7.61 Russell 1
 1877.7 34.2 7.62 C. G. A. 3-4
 1880.7 33.8 6.40 Hargrave 2

No. 8. Innes 123. Lac. 8352. 7.1
 20^h 3^m 30^s — 47° 1'.6

Comes = 11.0

1896.8 177.± 6.± Innes 1 n

No. 9. h. 5173. Piazz19 h. 411. 5.4
 20^h 4^m 38^s — 36° 21'.2
 Orange

Comes = 11.3

1834.7 117.9 15.± h 1 n
 1896.7 119.2 9.20 See 2
 Common p.m. of 1".646 towards 166°.4.
 C. P. D. mag. of the chief star = 6.6.

No. 10. β 833. W.B. 20 h. 66. 9.0
 20^h 6^m 23^s — 6° 26'.0

Comes = 11.9

1881.7 63.7 2.30 β 2 n
 1886.9 76.0 2.52 Miss Lamb 1
 1888.1 59.2 2.45 Washburn 4-3
 Lal. 38,625, mag. 8.5, is 119" S.pr.

No. 11. β 1205. Lal. 38,649. 7.0
 20^h 6^m 51^s — 8° 23'.4

7.2 and 9.1

1890.6 50.0 0.56 β 3 n
 1897.7 46.6 0.70 Aitken 3

No. 12. h. 5177. Lac. 8363. 8.1
 20^h 6^m 54^s — 57° 16'.5

C. Z. 20 h. 169 = 8.2

1835.9 29.3 8.05 h 3 n
 1876.6 27.8 7.67 Sydney 2

Separately observed on the meridian at the Cape
 and Cordoba.

206A

20 hrs.

REFERENCE CATALOGUE OF

No. 13. h. 5178. Lac. 8373. MAG. 6.9
 20^h 7^m 17^s — 34° 25'.1.

7.0 and 9.2

1834.7	12.1	2.5 ±	h	2 n
1856.7	8.8	2.73	Jacob	2
1876.7	11.5	2.89	Cinc.	2
1877.7	10.0	2.61	„	2
1879.7	9.4	1.58	β	3-2
1881.7	7.4	2.09	Hargrave	1
1891.5	11.9	2.84	β	3
1896.8	9.6	2.88	See	2

Both stars have been observed on the meridian at Cordoba.

Cor. D. M. - 34°, 14,221, mag. 9.7, 90" distant, was observed by Jacob.

Misidentified by Prof. See, and registered as λ 410, a "splendid system."

No. 14. Innes 299. C. Z. 20 h. 200. 8.5
 20^h 7^m 20^s — 36° 20'.4.

8.9 and 9.9

1897.8 210. ± 0.6 ± Innes 1 n

A fainter star some distance away in the same direction.

Nearly 3 mins. f. the fine pair h 5173.

Prof. See measures Innes 299 as follows:—λ 410, 1896.8 9°.6 2".88 on 2 n. Mags. 6.5 and 10.2.

This measure has been transferred to h 5178, to which it evidently belongs. See No. 13.

No. 15. Σ 2643. Lal. 38,698. 6.5
 20^h 7^m 34^s — 3° 17'.8.

6.6 and 9.1

1830.9	70.6	3.21	Σ	6 n
1848.7	68.3	3.26	Mitchel	1
1866.3	71.8	3.02	Dembowski	3

No. 16. λ 411. Ö.A. 20,331. 8.5
 20^h 8^m 21^s — 20° 32'.4.

Comes = 13.9

1897.7 4.9 2.57 See 1 n

No. 17. Innes 124. Bris. 6817. MAG. 7.7
 20^h 9^m 30^s — 63° 28'.0.

Comes = 10.4

1896.6 45. ± 2. ± Innes 1 n
 Lac. 8368, mag. 6.7, is closely S.f.

No. 18. Innes 125. C. Z. 20 h. 252. 8.2
 20^h 9^m 32^s — 46° 12'.8.

8.6 and 9.4

1896.8 40. ± 1. ± Innes 2 n
 C. Z. 20 h. 287, mag. 8.5, is 68 secs. f. 3' S.

No. 19. Ormond Stone. Lac. 8392. 7.3
 20^h 10^m 35^s — 32° 55'.0.

7.8 and 8.3

1876.2	301.5	3.54	C. G. A.	3-4 n
1876.7	302.9	2.87	Cinc.	1
1879.7	[301.7]	3.10	β	2
1885.6	304.5	2.43	Cinc.	1
1887.7	303.8	2.78	Pollock	4-2
1891.5	303.3	2.36	β	3
1893.7	303.1	2.25	Sellers	1
1896.7	301.7	2.33	See	5

The measure of 1879.7 is the mean of two plus 270°.

Also registered as β 762.

Distance decreasing?

Other measures.

No. 20. Dunlop 230. Lac. 8390. 6.8
 20^h 11^m 8^s — 40° 29'.6.

7.4 and 7.7

1836.6	114.9	11.10	h	3 n
1879.8	109.7	9.38	Hargrave	1
1887.8	114.0	9.43	Pollock	1
1896.6	113.2*	9.63	Scott	1

Both stars have been observed on the meridian at Cordoba.

SOUTHERN DOUBLE STARS.

20 hrs.

207A

No. 21. Triple. α_2 Capricorni. MAG. 3.8
 20^h 12^m 30^s — 12° 51'.3.

A = 3.8 B = 11.3 C = 11.5

A and B + C = \hbar 608

1846.7	144.2*	6.62	Mitchel	4 n
1878.5	150.2	7.41	β	3
1889.5	146.8	7.75	"	3
1896.7	152.8	7.44	See	3

B and C = A. G. Clark 12.

1874.6	238.1*	1.48	Holden	2 n
1875.7	245.2	1.14	Hall	1
1878.5	241.2*	1.06	β	2
1878.7	242.4	1. \pm	Cinc.	2
1880.1	239.6	0.96	β	2
1886.7	241.2	1.26	Hall	2
1889.5	239.0	1.19	β	3
1896.7	239.1*	1.16	See	2

\hbar 608 is probably equal to H₁ N. 127, but H₁'s description is too vague to determine the question.

No. 22. Cordoba [57]. Bris. 6835. 7.8
 20^h 13^m 57^s — 55° 7'.4.

8.0 and 10.0

1890.7	2.7	4.30	Sellors	2 n
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No. 23. h. 5188. Lac. 8409. 6.4
 20^h 14^m 18^s — 29° 30'.7.

6.5 and 9.2

1834.6	70.5	4 \pm	\hbar	3 n
1877.0	63.7	4.81	Cinc.	3
1896.8	58.8	4.11	See	2

Some change in angle.

C.P.D. combined mag. = 7.6.

Ö.A. 20,404, mag. 8.3, is about 26" N.pr.

There is a neat 5" pair to the N. of the above pair, which has been measured by Ormond Stone, H. A. Howe, and others = Ö.A. 20,398.

No. 24. λ 414. C. Z. 20 h. 417. 8.6
 20^h 14^m 22^s — 27° 29'.7.

9.1 and 9.7

1897.7	51.9	2.41	See	1 n
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No. 25. Barnard. Brad. 2607. MAG. 7.0
 20^h 15^m 9^s — 15° 6'.0.

Comes = 10.9

1884.6	105.8	0.85	β	3 n
1886.7	109.6	0.83	Hough	2
1886.8	106.2	1.07	L. McC.	2
1888.7	105.9	0.84	β	4
1891.6	108.0	0.91	"	3
1893.4	102.6	1.12	Barnard	9-7

Preceding β Capricorni, 3.4 mag., by 14 secs.

Discovered in 1883 by Prof. Barnard during an occultation by the moon.

See:—

1884. Barnard, E. E., "Duplicity," *Astr. Nachr.*, Nos. 2588 and 2625.

\hbar 2948 a faint wide pair is near, and forms the subject of a paper by Burnham in *Astronomy and Astrophysics*, 1892, pp. 173, 174.

No. 26. β 662. Ö.A. 20,419. 9.0
 20^h 15^m 10^s — 19° 57'.4.

9.4 and 10.4

1878.5	300. \pm	1.7 \pm	β	1 n
--------	------------	-----------	---------	-----

A 7.5 mag. star is 29 secs. pr.

No. 27. h. 5189. C. G. A. 27,871. 8.4
 20^h 15^m 17^s — 37° 13'.0.

C. G. A. 27,870 = 9.3

1835.6	296.2	4 \pm	\hbar	2 n
1881.7	292.6	9.17	C. G. A.	4
1896.8	296.1	7.33	Sellors	3

Probably fixed.

No. 28. Innes 126. C. Z. 20 h. 438. 9.0
 20^h 15^m 19^s — 57° 25'.6.

9.5 and 10.0

1894.8	.....	0.9 \pm	Innes	1 n
1896.6	pr.	1. \pm	"	1

About 40' S.pr. α Pavonis 2.1 mag.

The most northern of a small triangle of 9th mag. stars.

208A

20hrs.

REFERENCE CATALOGUE OF

- No. 29. Schjellerup 33. Lal. 39,053. 8.0 ^{MAG.}
 20^h 15^m 25^s — 8° 3'.4
- 8.5 and 9.2
- | | | | | |
|--------|-------|------|-----------|-----|
| 1875.5 | 219.9 | 2.72 | Dembowski | 4 n |
| 1879.5 | 218.0 | 2.80 | Cinc. | 2 |
| 1886.6 | 217.8 | 2.93 | L. McC. | 2 |
| 1888.7 | 219.3 | 2.85 | Haverford | 1 |
- Hough 277, an 8.7 mag. star with a faint companion, is 53^s f. 1' S.
- No. 30. h. 5190. κ_1 Sagittarii. 5.7
 20^h 15^m 40^s — 42° 21'.9
- Comes = 13.0
- | | | | | |
|--------|-------|------|---|-----|
| 1834.6 | 301.3 | 15.± | h | 1 n |
|--------|-------|------|---|-----|
- The chief star has a p.m. of 0".118 towards 154°.4
- No. 31. λ 416. Ö.A. 20,435. 8.7
 20^h 16^m 19^s — 28° 2'.7
- Both = 9.5
- | | | | | |
|--------|------|------|-----|-----|
| 1897.7 | 63.3 | 1.00 | See | 1 n |
|--------|------|------|-----|-----|
- Prof. See also measures a 13th mag. star 27" S.pr.
- No. 32. β 763. κ_2 Sagittarii. 5.7
 20^h 17^m 5^s — 42° 44'.6
- 5.9 and 7.9
- | | | | | |
|--------|-------|------|---------|-----|
| 1879.7 | 204.2 | 1.24 | β | 2 n |
| 1887.4 | 213.3 | 0.93 | Pollock | 3-1 |
| 1889.5 | 211.2 | 1.33 | β | 4 |
| 1891.7 | 214.7 | 0.88 | Sellors | 1 |
| 1894.7 | 213.4 | 0.73 | " | 2 |
| 1897.8 | 195.1 | 1.40 | See | 1 |
- A fine pair, but showing no signs of motion.
 Registered as a new double star at Arequipa in 1891 (*Harvard Circular*, No. 18). Prof. See also measures a distant faint star.
- No. 33. λ 417. Cor. D.M.—35°, 14,087. 9.5
 20^h 17^m 23^s — 35° 42'.4
- Comes = 11.7
- | | | | | |
|--------|-------|------|-----|-----|
| 1896.7 | 140.6 | 3.42 | See | 4 n |
|--------|-------|------|-----|-----|
- No. 34. λ . . . Lal. 39,116. 7.5 ^{MAG.}
 20^h 17^m 24^s — 18° 39'.7
- 8.0 and 8.6
- | | | | | |
|--------|-------|------|-----|-----|
| 1897.7 | 108.8 | 2.43 | See | 2 n |
|--------|-------|------|-----|-----|
- No. 35. H. N. 138. Ö.A. 20,475. 8.5
 20^h 18^m 50^s — 17° 20'.0
- 8.9 and 9.8
- | | | | | |
|--------|----------|------|---------|---|
| 1780 | Class I. | H | 1 n | |
| 1866.5 | 331.8 | 4".0 | Peters | 1 |
| 1878.7 | 330.6 | 2.93 | β | 1 |
| 1878.7 | 331.6 | 3.00 | Cinc. | 1 |
- Identification after β , who differs from H and Cinc.
 Peters's measure is in the *Astr. Nachr.*, 1635.
- No. 36. Russell 321. Piazz1 20 h. 111. 6.7
 20^h 20^m 25^s — 37° 43'.6
- 6.9 and 8.6
- | | | | | |
|--------|------|------|---------|-----|
| 1880.9 | 97.0 | 1.07 | Russell | 1 n |
| 1890.7 | 96.0 | 1.08 | Sellors | 1 |
| 1896.7 | 99.7 | 0.78 | See | 3 |
- No. 37. h. 5194. Lac. 8412. 7.2
 20^h 20^m 26^s — 69° 23'.9
- Comes = 11.3
- | | | | | |
|--------|-------|------|---------|-----|
| 1835.5 | 250.9 | 3.± | h | 2 n |
| 1871.7 | 249.0 | 4.29 | Russell | 1 |
| 1880.6 | 261.2 | 2.78 | Cruls | 1 |
- No. 38. Howe. Ö.A. 20,494. 8.0
 20^h 20^m 29^s — 26° 57'.1
- 8.7 and 8.9
- | | | | | |
|--------|------|------|-------|-----|
| 1881.7 | 54.5 | 2.92 | Howe | 2 n |
| 1889.7 | 54.5 | 2.59 | Hough | 2 |
| 1897.2 | 52.1 | 2.87 | See | 3 |
- Noted as double at Cordoba in 1878.
 At Cincinnati two coarse double stars are registered about 10' S. of the above pair.

SOUTHERN DOUBLE STARS.

20 hrs.

209A

No. 39. Mitchel. π Capricorni. ^{MAG.} 5.2
 20^h 21^m 36^s — 18° 32'.4.

Comes = 8.8

1846.7	145.6	2.74	Mitchel	4 n
1847.7	143.0	3.28	"	1
1871.8	144.9	3.15	Knott	3-2
1875.0	145.2	3.27	Dembowski	4
1876.6	146.2	3.47	Cinc.	3
1888.6	146.2	3.49	Haverford	6
1889.7	145.1	3.43	Hall	2
1897.7	146.5	3.45	See	2

The distance has perhaps increased.

The p.m. is very small.

Also registered as β 60.A few other measures; measured at Sydney in 1872 as ρ Capricorni.

No. 40. μ . II. 51. ρ Capricorni. ^{MAG.} 5.0
 20^h 23^m 9^s — 18° 8'.6.

5.1 and 7.6

1783.5	174.0	.....	μ	1 n
1846.8	176.2	2.96	Mitchel	6
1856.8	174.7	3.01	Jacob	2
1869.0	174.1	2.83	Dembowski	4
1871.8	174.3	3.41	Knott	1
1879.7	172.1	3.14	Cinc.	1
1886.8	173.1	2.93	L. McC.	1
1888.7	173.6	2.77	Haverford	1

The p.m. is small.

Other measures.

Both stars have been observed on the meridian at the Radcliffe Observatory.

Followed by a faint star first noted as β 61, and by another of the 7.5 mag.

No. 41. Washburn 38. Schj. 8070. ^{MAG.} 8.9
 20^h 23^m 53^s — 8° 21'.5.

9.0 and 11.3

1881.7	297.8	2.66	Washburn	3 n
1888.3	294.6	2.56	"	3

No. 42. Washburn 159. B.D.—12°, ^{MAG.} 9.3
 5743.
 20^h 24^m 13^s — 12° 35'.8.

9.9 and 10.2

1888.7	282.9	1.25	Washburn	3 n
--------	-------	------	----------	-----

No. 43. Gilliss 259. Lac. 8465. ^{MAG.} 7.5
 20^h 25^m 12^s — 41° 14'.0.

Both = 8.3

1876.7	156.3	2.85	Cinc.	1
1887.8	152.2	2.71	Pollock	3-1
1889.7	152.5	3.23	"	3
1891.2	154.1	2.88	Sellers	2
1896.6	152.4	2.85	See	3

Separately observed on the meridian at Cordoba.

No. 44. h. 5204. C. Z. 20 h. 781. ^{MAG.} 8.1
 20^h 25^m 13^s — 45° 41'.5.

Comes = 9.0

1836.2	34.6	6.24	h	2 n
1879.7	31.3	5.42	Hargrave	1

No. 45. λ 420. Cor. D.M.—22°, ^{MAG.} 9.7
 14,788.
 20^h 26^m 42^s — 22° 1'.8.

Comes = 13.0

1897.7	88.3	1.52	See	1 n
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No. 46. λ Mayer 867. ^{MAG.} 7.0
 20^h 26^m 52^s — 16° 56'.9.

Both = 7.8

1897.7	299.8	0.38	See	1 n
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The discovery of this close pair is accorded to Lalande by Prof. See, but without adequate foundation. It is Prof. See's own discovery. See *Astr. Journal*, No. 441.

No. 47. β 668. Mayer 868. ^{MAG.} 5.2
 20^h 26^m 55^s — 10° 11'.7.

Comes = 10.8

1878.6	29.0	4.64	β	3 n
1881.7	26.1	4.99	"	4
1890.6	25.0	4.80	"	3
1891.5	27.8	4.64	"	3

Common p.m. of 0".286 towards 66°.7.

2 D

210A

20 hrs.

REFERENCE CATALOGUE OF

No. 48. Innes 127. C. P. D.—44°, 9839. 20 ^h 27 ^m 7 ^s — 44° 51'.0. 9.5 and 10.0 1896.8 100.± 0.6± Innes 2 n v Microscopii, mag. 5.1, is 65" ± S.pr.	MAG. 9.0	No. 53. h. 5209. a Indi. 3.2 20 ^h 30 ^m 32 ^s — 47° 38'.4. Comes = 12.0 1836.7 194.8 45.± h 1 n 1896.8 198.8 65.3 Sellors 3 Mr Sellors also notes a 14 th mag. companion at 347" ± 65" ±. The p.m. of the chief star is 0".079 towards 17°.9. In 1878 Mr Russell considered the chief star double, an idea he afterwards abandoned. See "An Astronomical Experiment on the Blue Mountains," <i>Proc. Roy. Soc. of N.S.W.</i> C. P. D. mag. = 5.8.	MAG. 3.2
No. 49. Jacob [11]. Lac. 8475. 20 ^h 27 ^m 8 ^s — 40° 53'.9. 7.6 and 8.5 1846.8 226.3 4.34 Jacob 1 n 1856.8 226.2 4.34 " 3 1879.6 225.8 4.7± Cruls 2 1887.7 225.1 4.09 Pollock 2 1891.7 224.5 4.34 Sellors 1 1896.8 222.2 4.32 See 3	7.2	No. 54. h. 1537. Lal. 39,671. 8.3 20 ^h 30 ^m 32 ^s — 15° 39'.5. 8.8 and 9.3 1829.± 14.8* 1.8± h 1 n 1879.5 21.0 3.43 Cinc. 1	
No. 50. Hough 133. W.B. 20 h. 612. 8.3 20 ^h 27 ^m 16 ^s — 13° 53'.2. 9.0 and 9.1 1885.2 182.1 0.83 Hough 2 n 1886.8 181.2 1.04 L. McC. 2 1888.7 180.9 1.15 Washburn 3 1894.7 180.3 0.93 Hough 1 Also recorded as Washburn 160.	8.3	No. 55. Ormond Stone. C. Z. 20 h. 1017. 8.9 20 ^h 32 ^m 14 ^s — 26° 49'.5. 9.5 and 9.8 1879.8 245.3 1.42 Cinc. 2-1 n 1882.6 245.5 1.78 " 2 1886.8 245.9 1.71 L. McC. 1	
No. 51. Innes 41. Lac. 8491. 7.0 20 ^h 29 ^m 35 ^s — 45° 54'.2. 7.4 and 8.2 1895.9 0.9 1.89 Sellors 2 n C. Z. 20 h. 928, mag. 8.5, is N.f.	7.0	No. 56. Russell 323. C. P. D.—63°, 4604. 8.4 20 ^h 32 ^m 43 ^s — 63° 2'.8. 8.8 and 9.7 1880.6 321.6 2.72 Russell 1 n 1891.7 312.9 2.89 Sellors 2 1894.8 313.9 2.51 " 3	
No. 52. Dunlop 232. μ ₂ Octantis. 6.5 20 ^h 29 ^m 49 ^s — 75° 41'.7. 6.9 and 7.9, both yellow 1836.2 17.2 18.7 h 3 n 1871.7 17.0 18.0 Russell 1 1872.7 15.6 18.4 Cape M. O. 3-2 1886.6 16.0 17.7 Tebbutt 2 Measured at Sydney as Russell 322.	6.5	No. 57. λ 422. C. Z. 20 h. 1050. 8.7 20 ^h 33 ^m 36 ^s — 39° 41'.0. Comes = 14.0 1897.8 225.1 18.80 See 1 n	

No. 58.	λ 423.	Ö.A. 20,698.	MAG. 8.2.
	20 ^h 34 ^m 4 ^s	— 29° 13'.4.	
		8.5 and 9.8	
1897.7	20.5	0.72	See 1 n
R. Microscopii, mag. 8.0 to 12.0 is 6s. pr., 4' N.			
No. 59.	β 1209.	B.D.—17°, 6055.	9.1
	20 ^h 35 ^m 17 ^s	— 17° 44'.4.	
		9.5 and 10.4	
1890.66	294.3	0.45	β 3 n
Lal. 39,888, mag. 7.5, is 22 ^s .4 f. 0'.4 N.			
No. 60.	Hough 135.	1st Munich	
	25,521.		7.9
	20 ^h 35 ^m 26 ^s	— 14° 51'.9.	
		Comes = 12.9	
1883.7	223.0	2.44	Hough 2 n
1894.2	217.2	2.41	" 2
No. 61.	Innes 128.	Bris. 6902.	8.0
	20 ^h 36 ^m 18 ^s	— 52° 9'.4.	
		8.1 and 10.4	
1896.7	325.±	2.3±	Innes 3 n
η Indi, mag. 4.7, is 25 secs. f. 7' S.			
No. 62.	β 267.	B.D.—4°, 5223.	9.4
	20 ^h 36 ^m 29 ^s	— 4° 44'.9.	
		10.0 and 10.3	
1878.7	241.9*	2.11	β 1 n
1879.3	240.0	2.22	Cinc. 5-3
1882.7	241.3	2.04	" 2-1
90° has been added to β 's angle.			
Near h 921 = B.D. - 4°, 5222, a coarse pair of 10 th mag. stars.			
No. 63.	Innes 17.	Lac. 8534.	7.2
	20 ^h 37 ^m 46 ^s	— 50° 50'.9.	
		7.9 and 8.1	
1895.8	41.1*	1.24	Sellers 2 n
After careful observation here in 1896, 180° has been added to the angle.			
The star, 1st Melbourne 1052, mag. 7.3, is about 100" S.f.			

No. 64.	h. 2992.	B.D.—20°, 6019.	MAG. 9.3
	20 ^h 38 ^m 35 ^s	— 20° 44'.2.	
		9.8 and 10.3	
1831.±	141.0	1.5±	h 1 n
1878.8	135.8	5.6±	Cinc. 1
No. 65.	Washburn 162.	Schj. 8240.	8.8
	20 ^h 38 ^m 41 ^s	— 14° 3'.8.	
		9.4 and 9.7	
1888.7	140.8	1.72	Washburn 3 n
No. 66.	λ 427.	Ö.A. 20,795.	8.8
	20 ^h 38 ^m 48 ^s	— 23° 33'.0.	
		Comes = 12.1	
1896.9	177.4	1.57	See 3 n
No. 67.	λ 428.	Yarnall, 9248.	6.7
	20 ^h 38 ^m 52 ^s	— 35° 31'.6.	
		Comes = 12.2	
1896.7	187.7	4.41	See 2 n
No. 68.	β 674.	Yarnall, 9252.	7.7
	20 ^h 39 ^m 3 ^s	— 21° 15'.2.	
		7.8 and 10.5	
1877.5	120.±	1.3±	β 1 n
1877.7	102.8	1.37	Cinc. 2
1879.8	103.4	1.35	" 2-1
1892.8	99.9	1.19	Hough 1
1897.8	103.1	1.69	See 2
No. 69.	h. 5218.	Lac. 8546.	6.9
	20 ^h 39 ^m 16 ^s	— 30° 50'.4.	
		Comes = 11.0	
1834.7	189.2	6.±	h 1 n
1835.6	191.0	7.±	" 2
1877.8	194.6	10.11	Cinc. 1
Seen on 1897.8.			

No. 70. Innes 300. Ö.A. 20,840. ^{MAG.} 8.5
20^h 40^m 53^s — 17° 3' 8.

9.0 and 9.5

1897.9 310.° ± 4.° ± Innes 1 n
The mag. (from Schönfeld) is underrated by 0.5.

No. 71. β 153. Lac. 8566. ^{MAG.} 7.3
20^h 41^m 22^s — 26° 46' 9.

7.6 and 8.9

1876.8	282.0	1.61	Cinc.	1 n
1877.7	282.7	1.27	"	1
1882.6	286.0	1.65	"	2
1894.7	280.0	0.89	Sellers	1
1896.8	280.0	1.49	See	2

h 5220=Lac. 8555, a wide pair, is 27 secs. pr.

No. 72. Rumker 26. Lac. 8550. ^{MAG.} 5.8
20^h 43^m 18^s — 62° 48' 0.

Both = 6.6 white

1835.1	101.4	3.23	h	2 n
1856.8	100.3	2.42	Jacob	2
1876.2	95.5	2.80	Sydney	2
1880.6	98.3	2.50	Cruls	1
1885.6	96.9	3.12	Tebbutt	1
1890.7	91.4	2.61	Sellers	4
1894.8	95.2	2.61	Tebbutt	3

The earlier Sydney measures are recorded against h 5222 erroneously.

Both stars have been observed on the meridian at Cordoba.

A probable slow decrease in angle.

No. 73. Hough 142. Lal. 40,169. ^{MAG.} 8.9
20^h 43^m 39^s — 2° 35' 9.

9.6 and 9.8

1885.7	5.8	0.62	Hough	2 n
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A faint star, 20" distant.

W.B. 20 h. 1004, mag. 6.8, is S.pr.

No 74. h. 5224. ^{MAG.} 5.0
20^h 43^m 43^s — 34° 9' 0.

C. G. A. 28,546 = 9.4

1835.6	164.5	21.7	h	1 n
1846.7	168.0	20.4	Jacob	2
1856.8	167.3	20.3	"	2
1875.7	164.8	20.3	C. G. A.	4
1879.8	165.5	20.0	Hargrave	1
1896.7	166.6	20.1	See	2

The p.m. of the chief star is 0".04 towards 180°.

No. 75. λ 429. C. Z. 20 h. 1442. ^{MAG.} 8.0
20^h 45^m 38^s — 38° 32' 2.

Comes = 14.0

1896.7	187.9	2.86	See	2 n
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No. 76. H. I. 44. 4 Aquarii. ^{MAG.} 6.5
20^h 46^m 8^s — 6° 0' 0.

6.8 greenish yellow, and 8.1 orange yellow

1783.4	351.5	0.5 ±	H	1 n
1802.6	28.9	.....	"	2
1825.6	27.5	0.80	Σ	2
1836.0	46.3	0.41	"	1
1840.7	65.5	0.6 ±	Dawes	2
1854.7	101.7	0.3 ±	"	1
1867.9	141.1	0.30	Newcomb	1
1877.1	148.7	0.56	Dembowski	3
1885.7	167.9	0.46	Hall	3
1890.8	178.2	0.49	Tarrant	2
1895.7	184.2	0.33	See	3
1897.8	185.3	0.25	"	1

A well-known binary pair.

Prof. See's latest orbit is as follows:—

P = 129 years

T = 1899.4

a = 0".732

e = 0.514

i = 72°.5

Ω = 177°.7

λ = 68°.6

Motion direct.

Ephemeris:—

1899.8	224.0	0.14
1900.8	244.1	0.12

From Prof. See's diagram of the orbit (*Evolution*)

SOUTHERN DOUBLE STARS.

20hrs.

213A

of *Stellar Systems*, vol. i.) it will be seen that there are two apparent periastra :—

$$\begin{array}{l} 260. \pm \quad \text{''} \\ 100. \pm \quad 0.11 \\ \quad \quad \quad 0.31 \end{array}$$

The greatest apparent distance is about 0".76.

The common p.m. is about 0".06.

Also registered as Σ 2729.

No. 77. h. 3003. Piazzini 20 h. 339. 6.6
20^h 47^m 9^s — 24° 9'.5.

6.8 yellow, and 8.9 greenish

					MAG.
1830.8	216.9	3 \pm	h	1	n
1876.6	216.5	2.32	Cinc.	2	
1886.6	216.1	2.38	L. McC.	3	
1897.7	217.3	2.37	See	2	

Other measures.

No. 78. β 154. Lal. 40,292. 8.0
20^h 47^m 13^s — 16° 32'.5.

8.4 and 9.2

1876.8	61.8	3.02	Cinc.	2-1	n
1879.7	59.8	2.88	"	1	
1886.8	60.9	2.87	L. McC.	2	
1888.6	64.9	2.73	Haverford	1	
1890.5	66.3	2.66	Glaserapp	1	

Separately observed on the meridian at Cordoba in 1880.

Other measures.

* No. 79. Washburn 42. Ö.A. 20,926. 9.1
20^h 47^m 38^s — 17° 41'.5.

9.8 and 9.9

1881.7	228.2	0.99	Washburn	3	n
1888.4	223.9	0.97	"	3	

Ö.A. 20,935, mag. 9.3, is a little way N.f.

No. 80. λ 431. Lal. 40,311. 6.5
20^h 47^m 50^s — 19° 29'.5.

Comes = 13.7

1897.8	341.7	2.63	See	1	n
C. P. D. mag. = 7.6.					
See also No. 82.					

No. 81. Innes 18. Lac. 8602. 7.4
20^h 47^m 53^s — 52° 29'.7.

Comes = 11.6

1895.8 2. \pm 4.6 \pm Innes 3 n
Originally wrongly identified as Lac. 8600.

No. 82. λ 432. Lal. 40,330. 7.3
20^h 48^m 24^s — 19° 22'.4.

Comes = 13.3

1897.8 324.1 2.27 See 1 n
See also No. 80.

No. 83. Innes 129. Rumker 529. 7.7
20^h 48^m 34^s — 59° 39'.2.

7.9 and 9.8

1896.7 30. \pm 1. \pm Innes 2 n
C. Z. 20 h. 1552, mag. 8.4, 15' N.f. is a neat double, first noted at Cordoba, 8.9 and 9.4, 5" \pm 265" \pm .
C. Z. 20 h. 1547, mag. 8.6, is S.f. in this field.

No. 84. Leavenworth. W.B. 20 h. 1179. 7.2
20^h 48^m 37^s — 11° 18'.2.

7.5 and 8.8

1886.7	299.4	1.39	L. McC.	2	n
1892.6	298.0	.....	Leavenworth	1	
1896.6	291.8	1.21	"	2	

No. 85. h. 5231. Lac. 8573. 7.0
20^h 48^m 57^s — 70° 48'.4.

7.7 and 7.8

1836.6	110.8	7.62	h	3	n
1873.7	113.9	7.82	Russell	1	

214A

20^hhrs.

REFERENCE CATALOGUE OF

<p>No. 86. β 1034. 7 Aquarii. 5.7 $20^{\text{h}} 51^{\text{m}} 30^{\text{s}}$ — $10^{\circ} 4'.9$.</p> <p style="text-align: center;"><i>Comes</i> = 11.4</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1888.7</td> <td style="text-align: right;">165.0</td> <td style="text-align: right;">2.09</td> <td style="text-align: center;">β</td> <td style="text-align: right;">5 n</td> </tr> <tr> <td style="text-align: left;">1897.7</td> <td style="text-align: right;">163.7</td> <td style="text-align: right;">2.05</td> <td style="text-align: center;">Aitken</td> <td style="text-align: right;">3-2</td> </tr> </table> <p>The p.m. of the chief star is small.</p>	1888.7	165.0	2.09	β	5 n	1897.7	163.7	2.05	Aitken	3-2	<p>No. 92. β 678. Lal. 40,636. 8.2 $20^{\text{h}} 55^{\text{m}} 25^{\text{s}}$ — $8^{\circ} 43'.8$.</p> <p style="text-align: center;"><i>Comes</i> = 11.5</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1878.1</td> <td style="text-align: right;">185.9</td> <td style="text-align: right;">2.32</td> <td style="text-align: center;">β</td> <td style="text-align: right;">2 n</td> </tr> <tr> <td style="text-align: left;">1879.6</td> <td style="text-align: right;">191.2</td> <td style="text-align: right;">2.32</td> <td style="text-align: center;">Cinc.</td> <td style="text-align: right;">2</td> </tr> <tr> <td style="text-align: left;">1886.7</td> <td style="text-align: right;">192.6</td> <td style="text-align: center;">.....</td> <td style="text-align: center;">L. McC.</td> <td style="text-align: right;">1</td> </tr> </table>	1878.1	185.9	2.32	β	2 n	1879.6	191.2	2.32	Cinc.	2	1886.7	192.6	L. McC.	1
1888.7	165.0	2.09	β	5 n																						
1897.7	163.7	2.05	Aitken	3-2																						
1878.1	185.9	2.32	β	2 n																						
1879.6	191.2	2.32	Cinc.	2																						
1886.7	192.6	L. McC.	1																						
<p>No. 87. Gilliss 263. Lac. 8535. 7.3 $20^{\text{h}} 51^{\text{m}} 42^{\text{s}}$ — $81^{\circ} 5'.1$.</p> <p style="text-align: center;">7.5 and 9.5</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1890.7</td> <td style="text-align: right;">246.7</td> <td style="text-align: right;">4.57</td> <td style="text-align: center;">Sellors</td> <td style="text-align: right;">1 n</td> </tr> </table> <p>Both stars have been observed on the meridian at Cordoba.</p>	1890.7	246.7	4.57	Sellors	1 n	<p>No. 93. Innes 257. Lac. 8614. 7.8 $20^{\text{h}} 56^{\text{m}} 55^{\text{s}}$ — $76^{\circ} 22'.6$.</p> <p style="text-align: center;">8.3 and 8.8</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1898.7</td> <td style="text-align: right;">288.8</td> <td style="text-align: right;">1.63</td> <td style="text-align: center;">Innes</td> <td style="text-align: right;">1 n</td> </tr> </table>	1898.7	288.8	1.63	Innes	1 n															
1890.7	246.7	4.57	Sellors	1 n																						
1898.7	288.8	1.63	Innes	1 n																						
<p>No. 88. β 764. W.B. 20h. 1301. 9.0 $20^{\text{h}} 53^{\text{m}} 27^{\text{s}}$ — $9^{\circ} 44'.2$.</p> <p style="text-align: center;">9.7 and 9.9</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1879.7</td> <td style="text-align: right;">350.6 ± [0.57]</td> <td style="text-align: center;">β</td> <td style="text-align: right;">3</td> </tr> <tr> <td style="text-align: left;">1880.5</td> <td style="text-align: right;">354.4</td> <td style="text-align: right;">0.90</td> <td style="text-align: center;">"</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="text-align: left;">1886.8</td> <td style="text-align: right;">353.2*</td> <td style="text-align: right;">0.64</td> <td style="text-align: center;">L. McC.</td> <td style="text-align: right;">2</td> </tr> </table> <p>"The pr. star of a small triangle" :—β.</p>	1879.7	350.6 ± [0.57]	β	3	1880.5	354.4	0.90	"	1	1886.8	353.2*	0.64	L. McC.	2	<p>No. 94. λ 435. Lac. 8660. 6.6 $20^{\text{h}} 57^{\text{m}} 12^{\text{s}}$ — $28^{\circ} 7'.5$.</p> <p style="text-align: center;">7.0 and 8.0</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1897.7</td> <td style="text-align: right;">289.7</td> <td style="text-align: right;">0.19</td> <td style="text-align: center;">See</td> <td style="text-align: right;">1 n</td> </tr> </table>	1897.7	289.7	0.19	See	1 n						
1879.7	350.6 ± [0.57]	β	3																							
1880.5	354.4	0.90	"	1																						
1886.8	353.2*	0.64	L. McC.	2																						
1897.7	289.7	0.19	See	1 n																						
<p>No. 89. β 765. Lac. 8632. 7.1 $20^{\text{h}} 54^{\text{m}} 24^{\text{s}}$ — $35^{\circ} 40'.7$.</p> <p style="text-align: center;"><i>Comes</i> = 12.0</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1879.7</td> <td style="text-align: right;">140. ±</td> <td style="text-align: right;">2. ±</td> <td style="text-align: center;">β</td> <td style="text-align: right;">1 n</td> </tr> <tr> <td style="text-align: left;">1891.8</td> <td style="text-align: right;">139.1</td> <td style="text-align: right;">2.06</td> <td style="text-align: center;">"</td> <td style="text-align: right;">3</td> </tr> <tr> <td style="text-align: left;">1891.8</td> <td style="text-align: right;">126.4</td> <td style="text-align: right;">2. ±</td> <td style="text-align: center;">Sellors</td> <td style="text-align: right;">1</td> </tr> </table>	1879.7	140. ±	2. ±	β	1 n	1891.8	139.1	2.06	"	3	1891.8	126.4	2. ±	Sellors	1	<p>No. 95. Innes 130. Lac. 8650. 7.0 $20^{\text{h}} 57^{\text{m}} 15^{\text{s}}$ — $48^{\circ} 21'.3$.</p> <p style="text-align: center;"><i>Comes</i> = 11.0</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1896.1</td> <td style="text-align: right;">313. ±</td> <td style="text-align: right;">3.2 ±</td> <td style="text-align: center;">Innes</td> <td style="text-align: right;">3 n</td> </tr> </table>	1896.1	313. ±	3.2 ±	Innes	3 n					
1879.7	140. ±	2. ±	β	1 n																						
1891.8	139.1	2.06	"	3																						
1891.8	126.4	2. ±	Sellors	1																						
1896.1	313. ±	3.2 ±	Innes	3 n																						
<p>No. 90. Washburn 165. Ö.A. 21,032. 9.0 $20^{\text{h}} 54^{\text{m}} 57^{\text{s}}$.. — $18^{\circ} 2'.9$.</p> <p style="text-align: center;">9.2 and 11.0</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1888.7</td> <td style="text-align: right;">161.3</td> <td style="text-align: right;">3.01</td> <td style="text-align: center;">Washburn</td> <td style="text-align: right;">3 n</td> </tr> </table>	1888.7	161.3	3.01	Washburn	3 n	<p>No. 96. h. 5233. Lac. 8528. 7.6 $20^{\text{h}} 57^{\text{m}} 28^{\text{s}}$ — $83^{\circ} 40'.4$.</p> <p style="text-align: center;"><i>Comes</i> = 12.5</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1837.9</td> <td style="text-align: right;">276.8</td> <td style="text-align: right;">15. ±</td> <td style="text-align: center;">h</td> <td style="text-align: right;">2 n</td> </tr> </table>	1837.9	276.8	15. ±	h	2 n															
1888.7	161.3	3.01	Washburn	3 n																						
1837.9	276.8	15. ±	h	2 n																						
<p>No. 91. Hough 461. B.D.—17°, 6149. 9.5 $20^{\text{h}} 54^{\text{m}} 58^{\text{s}}$ — $17^{\circ} 28'.3$.</p> <p style="text-align: center;">10.0 and 10.5</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1890.7</td> <td style="text-align: right;">224.7</td> <td style="text-align: right;">1.82</td> <td style="text-align: center;">Hough</td> <td style="text-align: right;">1 n</td> </tr> </table> <p>21 Capricorni, mag. 6.3, is 16 secs. f. 22' S.</p>	1890.7	224.7	1.82	Hough	1 n	<p>No. 97. λ 436. Lal. 40,721. 7.4 $20^{\text{h}} 57^{\text{m}} 58^{\text{s}}$ — $24^{\circ} 43'.0$.</p> <p style="text-align: center;">8.0 and 8.3</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">1897.7</td> <td style="text-align: right;">88.3</td> <td style="text-align: right;">0.23</td> <td style="text-align: center;">See</td> <td style="text-align: right;">2 n</td> </tr> </table>	1897.7	88.3	0.23	See	2 n															
1890.7	224.7	1.82	Hough	1 n																						
1897.7	88.3	0.23	See	2 n																						

SOUTHERN DOUBLE STARS.

20^{hrs.}

215A

No. 98. β 1211. Lal. 40,744. ^{MAG.} 8.0
 20^h 58^m 23^s — 18° 30'.4.

8.5 and 9.1

1890.6 344.7 0".58 β 3 n
 1897.8 349.0 0.52 See 1
 "The f. star of a small triangle" :— β .

No. 99. Σ 2745. 12 Aquarii. 5.8
 20^h 58^m 47^s — 6° 13'.1.

6.0 orange, 8.0 bluish

1831.3 189.6 2".67 Σ 4 n
 1846.8 191.0 2.96 Jacob 1
 1858.7 192.6 3.05 Morton 2
 1866.5 190.6 3.68 Harvard 3
 1879.4 190.3 2.94 Cinc. 5
 1886.8 191.0 2.86 Washburn 4

Other measures.

No. 100. Harvard. Lac. 8625. ^{MAG.} 5.9
 20^h 58^m 50^s — 73° 33'.6.

6.5 and 6.8

1898.0 350.± 0".9± Innes 1 n
 The p.m. of this fine pair is +0".11 in R.A. and
 -0".39 in Dec., or 0".606 towards 130°.1.

No. 101. Hough 462. Lal. 40,790. 8.5
 20^h 59^m 34^s — 11° 29'.1.

8.9 and 9.9

1892.8 215.7 2".90 Hough 1 n
 1896.1 216.7 2.14 " 3
 Lal. 40,765, an elliptical planetary nebula, is 49
 secs. pr. 16' S.

<p>No. 1. Innes 301. C. P. D.—37°, 8962. MAG. 9.0 21^h 0^m 35^s — 36° 54'.7. 9.5 and 10.0 1897.8 330. ± 2.5 ± Innes 1 n Two other small stars are in the field. A 9.3 mag. star is 24 secs. f.</p> <p>No. 2. h. 5235. Lac. 8511. MAG. 7.5 21^h 0^m 35^s — 84° 43'.3. 8.2 and 8.4, both white 1837.7 271.5* 2.8 ± h 4 n 1872.7 264.1 3.87 Russell 3 1880.4 266.6 3.24 Sydney 2 1888.6 263.3 3.45 " 2 Both components have been measured on the meridian at Cordoba. Mr Russell considers that this pair is identical with h 5245. h measured both in the same sweep (No. 799), when he made h 5245, 10^m f. and 20' S. of the above pair, distance 6" ±, angle nearer 180° than 270°.*</p> <p>No. 3. Σ 2752. Lal. 40,865. MAG. 7.2 21^h 1^m 37^s — 14° 19'.4. Comes = 11.2 1827.6 145.2 5.17 Σ 3 n 1848.7 145.3 5.61 Mitchel 1 1866.7 149.4 5.55 Dembowski 3 1878.6 151.9 5.60 β 3 Other measures. β also records a star of 12th mag. 21" away = β 157. The p.m. of the chief star, in which it is evident the Σ companion shares, is 0".308 towards 97°.5.</p> <p>No. 4. β 368. Lal. 40,892. MAG. 7.0 21^h 2^m 5^s — 8° 38'.2. 7.4 and 8.3 1875.8 99.4 0.53 Dembowski 2-1 n 1877.8 93.8 0.64 " 2 1877.8 91.1 Cinc. 1 1879.2 89.6 0.67 " 4-3 1881.6 90.4 0.63 β 3 1886.6 90.1 0.70 L. McC. 2 1888.6 93.3 0.66 Haverford 2 1890.6 88.7 0.58 β 3 A few other measures. Two 14th mag. stars 12" N.f. were measured by β in 1890.</p>	<p>No. 5. β 473. B.D.—10°, 5606. MAG. 8.0 21^h 2^m 28^s — 10° 36'.7. 8.3 and 9.6 1877.1 115.5 1.74 Dembowski 3 n 1893.5 114.9 1.88 Goodsell 2</p> <p>No. 6. Hough 149. W.B. 20 h. 1527. MAG. 9.0 21^h 2^m 31^s — 12° 5'.8. 9.7 and 9.9 1885.2 335.4* 0.51 Hough 2 n 1888.7 326.8 0.90 β 4-3 1892.7 326.8 0.57 Hough 2</p> <p>No. 7. h. 5246. Lac. 8687. MAG. 7.2 21^h 3^m 6^s — 54° 58'.7. 7.9 and 8.1 1836.5 116.1 1.5 ± h 1 n 1856.8 118.1 2.63 Jacob 3 1878.7 121.3 3.62 Russell 2-1 1880.6 126.3 2.30 Cruis 1 1885.6 122.5 3.65 Tebbutt 1 1889.7 123.6 3.17 Pollock 3 1893.8 122.7 2.84 Sellors 2 Some increase in angle, and the distance seems to have passed a maximum. Both components have been observed on the meridian at Cordoba. Other measures.</p> <p>No. 8. Innes 258. Lac. 8694. MAG. 7.7 21^h 4^m 48^s — 60° 27'.4. 8.0 and 9.2 1897.7 120. ± 0.7 ± Innes 1 n</p> <p>No. 9. β 251. Ö.A. 21,193. MAG. 7.2 21^h 6^m 6^s — 30° 59'.8. 7.4 and 8.9 1876.7 229.0 3.07 Cinc. 1 n 1877.7 234.8 2.58 " 1 1879.7 234.4 2.09 β 1 1896.7 231.3 3.08 See 3</p>
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* Note to No. 2. Neither the C. P. D. nor Gilliss's P. Z. Catalogue contain a star near the given position of h 5245.

No. 10. μ . I. 47. Ö.A. 21,208. 7.5
21^h 6^m 50^s — 15° 24'.5.

8.1 and 8.5

Year	Mag.	Dist.	Comp.	MAG.
1873.5	354.8	.....	μ	1 n
1802.7	336.8	.....	"	1
1836.1	328.0	2.12	h	2-1
1855.6	323.6*	2.87	Secchi	1
1856.8	323.6	2.75	Jacob	3
1877.7	321.8	3.00	Cinc.	2
1880.6	332.6	.....	Doberck	2
1884.7	318.7*	3.08	Hall	3
1892.8	320.6	3.03	Haverford	3

Other measures.

The change shown is probably due to slow orbital motion.

Also registered as h 5252, μ 's Dec. being about 7' in error.

No. 11. h . 3014. Lac. 8741. 8.0
21^h 8^m 54^s — 26° 19'.5.

8.7 and 8.8

Year	Mag.	Dist.	Comp.	MAG.
1831.±	300.3	2.8±	h	1-2 n
1856.8	294.8	2.13	Jacob	3
1877.2	296.0	2.27	Cinc.	4
1897.1	297.6	1.96	See	3

No. 12. λ 441. Cor. D.M.—25°,
15,323. 9.3
21^h 9^m 50^s — 24° 58'.7.

10.0 and 10.1

Year	Mag.	Dist.	Comp.	MAG.
1897.7	16.8	1.98	See	1 n

No. 13. Lalande 170. Lal. 41,284. 8.0
21^h 11^m 24^s — 8° 4'.3.

8.7 and 8.9

Year	Mag.	Dist.	Comp.	MAG.
1828.1	172.1	3.27	Σ	3 n
1879.0	169.5	3.13	Cinc.	5-4
1890.5	170.9	3.20	Glasnapp	2

Fixed.

Other measures.

Also recorded as Σ 2781.

* Note to No. 16. This star seems to have been measured before in confusion with No. 14. The measures are:

1878.7	276.8	2.55	Cinc.	1 n
1888.6	277.7	2.65	Haverford	1

On these occasions only a small difference of magnitude between the components was recorded.

No. 14. Ormond Stone. Ö.A. 21,272. 8.4
21^h 11^m 53^s — 27° 38'.7.

8.9 and 9.4

1876.7	236.9	7.56	Cinc.	2 n
1896.8	238.0	7.17	See	3

Both components are recorded in the *Cat. Gen. Arg.*

No. 15. h . 5258. θ Indi. 4.6
21^h 12^m 44^s — 53° 52'.1.

4.7 and 7.2

1834.5	307.0	3.67	h	4 n
1846.4	298.7	2.6±	Jacob	2
1851.3	299.0	3.60	"	5
1852.7	298.4	3.30	"	4
1857.9	297.7	3.59	"	4
1872.1	287.0	4.11	Russell	3
1878.3	292.2	4.25	Melbourne	2
1879.7	289.2	4.18	Sydney	2
1880.6	288.6	3.20	Cruls	2-1
1886.6	287.7	4.51	Tebbutt	2
1886.6	286.9	4.56	Pollock	1
1890.7	285.4	4.34	Sellers	4
1894.8	283.4	3.92	"	3
1895.8	282.4	3.98	"	3

Separately observed on the meridian at Cordoba.

Very evidently a binary, the greatest distance having apparently been passed about 1887.

No. 16. λ 443. Ö.A. 21,283. 7.9
21^h 12^m 56^s — 27° 2'.0.

Comes = 11.8

1897.6	275.7	2.03	See	1 n
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See note.*

No. 17. β 271. Lac. 8777. 6.7
21^h 13^m 59^s — 26° 45'.9.

6.8 and 9.8

1876.7	[226.6]	2.20	Cinc.	1 n
1877.7	234.2	2.07	"	1
1879.7	231.8	2.30	"	2
1886.8	237.5	2.77	L. McC.	1
1891.5	237.2	2.70	β	3
1897.2	241.6	3.16	See	5

Some change.

Common p.m. of 0".718 towards 241°.3.

No. 18.	β 252.	Lal. 41,364.	MAG. 8.0
	21 ^h 14 ^m 9 ^s	— 27° 43'.5.	
	8.7 and 8.9		
1876.7	99.8*	2.54	Cinc. 2 n
1877.7	97.7	2.45	" 2
1885.6	96.3	2.44	" 2
1891.7	99.2*	2.67	Haverford 1
1896.9	96.9*	2.59	See 2

Both components have been observed on the meridian at Cordoba.

No. 19.	Innes 131.	C. P. D.—52°	
	11,858.		MAG. 9.0
	21 ^h 14 ^m 47 ^s	— 52° 12'.3.	
	9.5 and 10.0		
1896.8	N.	1". ±	Innes 1 n

The f. of a group of four stars.

No. 20.	Innes 132.	Lac. 8779.	MAG. 7.5
	21 ^h 16 ^m 5 ^s	— 52° 22'.0.	
	Comes = 10.0		
1896.8	297. ±	1.5 ±	Innes 3 n

The S.f. of three stars in the finder.

No. 21.	H. N. 139.	Lal. 41,483.	MAG. 8.0
	21 ^h 16 ^m 45 ^s	— 15° 20'.5.	
	8.5 and 9.2		
1876.8	115.8	2.18	Cinc. 1 n
1878.7	112.8	1.97	" 3-2
1886.7	116.0	2.08	L. McC. 2
1891.8	113.3	1.79	β 3
1897.7	112.3	1.98	Aitken 3

H gave no measure, and his position was $3\frac{1}{2}$ mins. in error, hence this pair was recorded as β 1262. β mentions that the Dec. was originally printed with the wrong sign; it is, however, correctly printed in *H*'s list in the *Mem. Roy. Ast. Soc.*, vol. xxxv, as well as in his General Catalogue of 10,300 double stars.

No. 22.	β 766.	θ_2 Microscopii.	MAG. 5.9
	21 ^h 18 ^m 2 ^s	— 41° 26'.1.	
	6.2 and 7.4		
1879.7	314.2	0.84	β 2 n
1886.7	302.0	0.5 ±	Pollock 1
1889.4	307.1	1.06	β 1
1894.8	292.3	0.63	Sellors 3-2
1896.8	281.7	0.94	See 3
1897.8	272.7	0.98	Cogshall 2

A binary pair.

Recorded as a new pair at Arequipa. See *Harvard Circular*, No. 18.

No. 23.	β 1035.	Piazzi 21 h 96.	MAG. 7.8
	21 ^h 18 ^m 26 ^s	— 25° 59'.4.	
	Comes = 10.6		
1888.7	198.7	1.05	β 3 n

No. 24.	β 272.	Lal. 41,564.	MAG. 8.7
	21 ^h 18 ^m 55 ^s	— 13° 13'.1.	
	Comes = 11.9		

1876.2	253.8	4.52	Dembowski 3 n
1879.2	255.9	4.43	Cinc. 2

Closely N.f. 18 Aquarii, mag. 5.4 = β 5517, it having a faint comes 48" N.pr.

No. 25.	λ 445.	C. Z. 21 h 556.	MAG. 8.3
	21 ^h 19 ^m 25 ^s	— 39° 38'.4.	
	8.5 and 10.2		

1896.8	219.6	1.95	See 2 n
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Closely S.f. a pair of stars, mags. 9.3 and 10.0.

No. 26.	Hough 158.	W.B. 21 h 397.	MAG. 8.8
	21 ^h 19 ^m 56 ^s	— 10° 19'.8.	
	9.3 and 9.8		

1883.8	349.4	1.10	Hough 2 n
1895.2	348.9	0.98	" 2

19 Aquarii, mag. 5.7, is 10' N.pr.

SOUTHERN DOUBLE STARS.

21^{hrs.}

219A

No. 27. h. 5267. Lac. 8805. ^{MAG.} 7.2
21^h 20^m 1^s — 46° 29'.7.

Comes = 11.0

1834.5 56.7 5.00 h 1 n

Looked for by Mr Hargrave at Sydney in 1881, but at S. Dec. 45° 30', and consequently not found. Mr Hargrave saw, however, a more distant *comes* to this star noted by *h*. For an explanation of this anomaly, see the original note.

No. 28. Melbourne [6]. Piazzini ^{MAG.} 5.6
21^h 20^m 37^s — 42° 58'.9.

5.8 and 7.9

1879.7	146.1	4.05	β	3-2 n
1886.6	146.3	3.47	Pollock	1
1887.7	143.1	3.14	"	3
1891.8	141.0	2.46	Sellers	1

The angle and distance are decreasing.

Also recorded as β 767, and in the list of new double stars in the *Harvard Circular*, No. 18.

Noted as double at Melbourne in 1865.

No. 29. λ 446. ζ Capricorni. ^{MAG.} 3.8
21^h 20^m 57^s — 22° 50'.6.

Comes = 12.7

1896.8	14.0	21.59	See	1 n
1897.7	13.4	21.35	"	1

The p.m. of the chief star is 0".040 towards 301°.3.

C. P. D. mag. = 5.4.

No. 30. Howe. C. Z. 21 h. 615. ^{MAG.} 8.1
21^h 21^m 17^s — 32° 48'.3.

8.8 and 9.0

1876.8	295.2*	2.17	Cinc.	1 n
1877.7	295.5	2.08	"	4
1896.7	292.0	1.77	See	2

C. Z. 21 h. 616, mag. 8.4, is closely N.f.

No. 31. β 683. Piazzini 21 h. 123. ^{MAG.} 7.6
21^h 21^m 51^s — 20° 38'.6.

Comes = 10.7

1877.5	198.4	2.04	β	1 n
1878.8	198.9	2.5 ±	Cinc.	2
1892.8	193.2	2.89	Hough	1

The p.m. is about 0".13 towards 180°.

No. 32. h. 5271. Cor. D.M.—25°, ^{MAG.} 9.6
15,430.
21^h 21^m 54^s — 25° 18'.8.

10.0 and 11.0

1834.5	[40.7]	1.5 ±	<i>h</i>	1 n
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C. P. D. mag. = 11.2.

The N.f. star of a small triangle.

No. 33. Schjellerup, 35. Lal. 41,705. ^{MAG.} 8.6
21^h 22^m 27^s — 13° 52'.0.

9.1 and 9.8

1876.5	131.8	2.71	Dembowski	3 n
1879.6	133.5	2.86	Cinc.	2
1886.7	133.7	3.06	L. McC.	2
1891.8	133.4	2.92	Haverford	2

No. 34. Innes 133. C. Z. 21 h. 664. ^{MAG.} 8.5
21^h 23^m 4^s — 39° 15'.9.

Comes = 11.1

1896.6	24.4	7.54	See	5 n
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Also found independently by Prof. See and registered as λ 447.

No. 35. λ 448. Piazzini 21 h. 147. ^{MAG.} 8.3
21^h 24^m 38^s — 24° 51'.9.

Comes = 12.3

1897.7	249.1	1.29	See	2 n
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No. 36. β 72. W.B. 21 h. 511. 8.5
21^h 24^m 47^s — 5° 50'.3.

8.7 and 10.7

Year	RA	Dec	Mag.	Notes	In
1877.7	42.8	1.89	β		1 n
1878.7	37.0	1.74	Cinc.		1
1886.7	38.0	2.00	L. McC.		4
1890.7	42.2	1.84	β		3
1897.7	37.6	1.89	Aitken		3

Other measures, but probably fixed.

Near β 684 and β Aquarii, mag. 3.1. The latter star is identical with ζ 936, it having some faint distant comites.

No. 37. β 684. W.B. 21 h. 517. 9.1
21^h 24^m 57^s — 5° 55'.3.

9.8 and 10.0

Year	RA	Dec	Mag.	Notes	In
1878.6	133.9	1.11	β		1 n
1886.8	126.1	1.16	L. McC.		2
1890.7	126.7	1.12	β		3
1897.7	124.8	1.16	Aitken		3

In the field with No. 36.

No. 38. λ 449. Piazzzi 21 h. 158. 7.3
21^h 25^m 49^s — 19° 40'.6.

Comes = 12.8

Year	RA	Dec	Mag.	Notes	In
1897.7	197.0	1.82	See		1 n

This pair in angle, distance and magnitude resembles β 683, which is about 1° S.pr.

An 8.8 mag. star is closely S.pr.

No. 39. h. 5261. Lac. 8826. 7.8
21^h 28^m 34^s — 86° 17'.6.

8.5 and 8.7

Year	RA	Dec	Mag.	Notes	In
1837.8	27.0*	6.5 ±	ζ		2 n
1870.7	21.8*	5.60	Russell		1
1873.7	30.0	6.07	"		1
1879.8	23.7	4.18	Hargrave		1
1887.8	22.6	5.48	Pollock		3

Other measures, but no certain change.

Mr Russell's second observation will be found in his list of new double stars against Russell 333.

Both stars have been observed on the meridian at Cordoba, where the pr. star is made one mag. fainter than the other. If this is correct, 180° should be added to the above angles, but other observers have considered the magnitudes about equal.

No. 40. Russell 334. Bris. 7029. 10.0
21^h 30^m 10^s — 83° 14'.0.

Comes = 11.0

Year	RA	Dec	Mag.	Notes	In
1878.8	112.2	2.82	Russell		1 n

This star is not recorded in the C. P. D.

No. 41. Innes 302. Lal. 42,108. 9.0
21^h 32^m 46^s — 11° 21'.0.

Comes = 10.0

Year	RA	Dec	Mag.	Notes	In
1897.8	90. ±	2. ±	Innes		1 n

Noted whilst observing the occultation of a neighbouring star.

No. 42. Asaph Hall. 1st Munich
29,021. 8.3
21^h 33^m 4^s — 16° 2'.9.

Comes = 11.3

Year	RA	Dec	Mag.	Notes	In
1887.8	127.6	2.05	Hall		2 n

Identification somewhat doubtful.

No. 43. β 1212. 24 Aquarii. 7.3
21^h 34^m 22^s — 0° 30'.2.

7.8 and 8.3

Year	RA	Dec	Mag.	Notes	In
1890.75	254.5	0.45	β		3 n
1891.75	261.0	0.55	"		4
1897.81	263.5	0.65	Aitken		3

Common p.m. of 0".215 towards 81°.5

An 11.6 mag. star is 44".5 S.f.

No. 44. Cordoba [58]. C. G. A.
29,658. 9.0
21^h 34^m 37^s — 18° 53'.0.

C. G. A. 29,659 = 10.0

Year	RA	Dec	Mag.	Notes	In
1880.8	54.8	3.47	C. G. A.		3 n
1897.8	62.9	4.91	See		1

SOUTHERN DOUBLE STARS.

2 hrs.

221A

No. 45. h. 5278. λ Octantis. MAG. 5.4
 21^h 35^m 35^s — 83° 10' 7".

5.6 and 7.7, both yellow

1835.6	82.9	3.38	$\frac{1}{2}$	3 n
1871.8	81.4	3.13	Russell	1
1873.8	79.0	3.36	"	1
1877.9	74.9	2.90	Melbourne	2
1886.8	77.7	3.30	Russell	1
1891.8	76.0	2.73	Sellers	1
1893.8	75.3	2.78	"	1

The p.m. is insensible.

Both stars have been observed on the meridian at Melbourne and the Cape.

The chief star may be variable:—

Russell	1871 = 5.0
"	1873 = 6.5
Gould	1874 = 5.8
Cape	1875 = 7.0
Russell	1886 = 8.5
Innes	1895 = 5.8 (U. A. scale).

No. 46. λ 454. 41 Capricorni. MAG. 5.3
 21^h 36^m 19^s — 23° 42' 9".

Comes = 13.5

1897.8	198.0	5.17	See	1 n
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The p.m. of the chief star is 0".130 towards 144°.5.
 C. P. D. mag. = 7.2.

No. 47. λ 1st Munich 29,257. MAG. 8.5
 21^h 37^m 23^s — 20° 52' 1".

Comes = 10.7

1897.8	57.3	3.70	See	1 n
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No. 48. Washburn 167. B.D.—14°, 6111. MAG. 9.1

21^h 37^m 57^s — 14° 37' 6".

9.7 and 10.1

1888.7	288.4	1.86	Washburn	3 n
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No. 49. Leavenworth. W.B. 21 h. MAG. 8.7
 861.

21^h 38^m 11^s — 11° 35' 7".

9.0 and 10.2

1886.7	270.1	1.46	L. McC.	6 n
1888.7	270.8	1.27	Haverford	3
1891.8	269.9	1.40	"	3-2
1896.7	273.6	1.20	Leavenworth	3-2

No. 50. Howe. Lal. 42,311. MAG. 8.5
 21^h 38^m 13^s — 26° 58' 4".

8.8 and 10.3

1876.8	299.6	1.50	Cinc.	1 n
1872.2	301.3	1.75	"	2
1885.7	303.1	1.50	"	1
1897.2	299.2	1.56	See	4

Ö.A. 21,608, mag. 7.7, is 60 secs. f.

No. 51. λ 455. C. Z. 21 h. 1154. MAG. 7.9
 21^h 38^m 37^s — 36° 4' 3".

Comes = 12.0

1896.7	94.8	3.71	See	2 n
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No. 52. λ 456. Ö.A. 21,613. MAG. 9.0
 21^h 39^m 29^s — 20° 34' 2".

Comes = 11.7

1896.8	57.2	3.74	See	2 n
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No. 53. Innes 19. Bris. 7075. MAG. 7.0
 21^h 40^m 52^s — 65° 57' 9".

7.2 and 8.8

1896.8	345.±	1.±	Innes	4 n
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Another star = 11.3 mag. is about 15" pr.

No. 54. λ 458. Ö.A. 21,625. MAG. 9.3
 21^h 41^m 0^s — 27° 3' 1".

9.9 and 10.3

1897.6	92.6	0.41	See	1 n
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There is a wide pair 30' S.

222A

21^hhrs.

REFERENCE CATALOGUE OF

No. 55. Brisbane. Lac. 8912. ^{MAG.} 5.7
 21^h 41^m 45^s — 47° 45'.4.

5.8 and 8.8

1834.8	16.1	20.±	h	2 n
1836.8	14.2	30.3	"	2
1846.4	10.2	31.1	Jacob	1
1856.8	7.2	33.9	"	2
1886.6	2.0	42.3	Pollock	1
1896.5	359.8	45.0	Sellors	1

Many other measures.

The change is due to the p.m. of the larger star, and from all the measures it is found to be = 0".289 towards 158°.9, or

$$\Delta R.A. = +0^s.0103$$

$$\Delta \delta = -0^s.270.$$

From meridian observations Mr R. P. Sellors finds the p.m. of the chief star to be = 0".36 towards 153° (see *Astr. Nachr.*, 3423): a sufficiently satisfactory agreement.

Although probably only an accidental coincidence, it is worth noting that the above p.m. is nearly the same as that of δ Capricorni, mag. 2.8, a star some 31° to the north.

No. 56. h. 5296. θ Piscis Australis. 5.2
 21^h 41^m 52^s — 31° 21'.7.

Comes = 13.0

1835.1	335.2	28.±	h	3 n
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The p.m. of the chief star is 0".65 towards 278°.9

No. 57. Triple. W.B. 21 h. 950. 8.0
 21^h 42^m 2^s — 13° 35'.1.

A = 8.7 B = 9.8 C = 9.4

A and B = Howe

1879.8	105.5*	0.8±	Cinc.	1 n
1882.6	96.9	0.92	"	1
1886.8	106.7	0.95	L. McC.	1
1890.6	104.7	0.64	β	3

A + B and C = Σ 2826

1829.4	82.5	4.26	Σ	4 n
1848.7	81.6	4.31	Mitchel	1
1886.7	82.2	4.22	L. McC.	2
1890.6	81.9	4.28	β	3
1893.7	82.6	3.94	Glasenapp	2

No evidence of change.

No. 58. β 1036. Yarnall, 9789. ^{MAG.} 7.5
 21^h 42^m 5^s — 17° 45'.5.

Comes = 10.6

1888.7	205.9	4.53	β	3 n
1895.8	209.2	4.70	Lick	3
1897.7	205.1	4.76	Aitken	3

No. 59. Ormond Stone. Ö.A. 21,650. 8.8
 21^h 42^m 13^s — 27° 39'.8.

9.2 and 10.2

1876.8	177.6	3.08	Cinc.	1 n
1877.7	179.4	.....	"	1
1879.7	177.2	3.18	"	2
1885.7	186.1	3.±	"	1
1897.6	174.6	3.88	See	1

Prof. See identifies this pair as Cor. D.M.—27°, 15,615.

No. 60. λ 459. C. Z. 21 h. 1298. 8.9
 21^h 42^m 59^s — 32° 51'.9.

9.0 and 11.3

1896.7	167.9	1.31	See	3 n
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No. 61. Cordoba [59]. C. Z. 21 h. 1311. 9.2
 21^h 43^m 31^s — 54° 51'.9.

9.7 and 10.2

1880.8	131.8	3.0	C. G. A.	2 n
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No. 62. Cordoba [60]. C. Z. 21 h. 1337. 8.6
 21^h 44^m 2^s — 26° 6'.5.

9.0 and 10.0

1897.0	306.2	2.44	See	5 n
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No. 63. λ 460. Lal. 42,547. 8.0
 21^h 45^m 21^s — 20° 39'.3.

8.5 and 9.0

1897.7	113.4	0.45	See	1 n
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Prof. See's Dec. is 6' wrong.

No. 64. β 840. 1st Munich 29,706. 9.4
 $21^{\text{h}} 47^{\text{m}} 4^{\text{s}}$ — $2^{\circ} 10'.9$.

9.8 and 10.9

	α	δ		
1881.7	39.4	2.57	β	3 n
1886.8	39.1	2.92	Washburn	3
1887.8	36.9	2.94	"	3

No. 65. h. 5292. Gilliss P. Z. 15,382. 9.0
 $21^{\text{h}} 47^{\text{m}} 7^{\text{s}}$ — $85^{\circ} 12'.8$.

Comes = 9.5

	α	δ	h	
1837.8	$130. \pm$	$3. \pm$	h	1 n
1873.8	152.4	5.27	Russell	1
1896.8	$195. \pm$	.....	Innes	1

Identification doubtful; there is a brighter star about 6 mins. f. in the same field.

No. 66. β 168. Piazzì 21 h. 317. 8.1
 $21^{\text{h}} 48^{\text{m}} 12^{\text{s}}$ — $20^{\circ} 28'.9$.

8.4 and 9.6

	α	δ		
1868.9	73.6	6.10	Harvard	1 n
1876.7	75.5	5.50	Cinc.	2
1877.7	73.7	5.48	"	2
1896.6	74.0	5.59	Hussey	5

Also recorded as Harvard 168.

No. 67. λ 461. Ö.A. 21,742. 8.9
 $21^{\text{h}} 50^{\text{m}} 35^{\text{s}}$ — $27^{\circ} 45'.8$.

Comes = 12.2

	α	δ		
1896.8	62.7	3.44	See	2 n

No. 68. β 693. Lal. 42,730. 7.3
 $21^{\text{h}} 50^{\text{m}} 57^{\text{s}}$ — $7^{\circ} 27'.3$.

7.5 and 9.8

	α	δ		
1877.8	55.0	1.03	Cinc.	1 n
1877.8	50.7	0.97	β	1
1878.7	55.8	0.91	"	2
1879.2	54.4	1.03	Cinc.	4-2
1886.8	48.7	1.15	L. McC.	1
1894.7	49.8	1.06	Comstock	8-7

Some change?

No. 69. β 169. Ö.A. 21,760. 8.5
 $21^{\text{h}} 51^{\text{m}} 57^{\text{s}}$ — $21^{\circ} 37'.3$.

9.2 and 9.3

	α	δ		
1876.8	285.7	1.93	Cinc.	1 n
1877.7	276.0	1.88	"	2-1
1893.8	279.6	2.26	Sellers	1

The S.f. star of a .95" pair.

No. 70. Σ 2847. Lal. 42,810. 7.8
 $21^{\text{h}} 52^{\text{m}} 56^{\text{s}}$ — $3^{\circ} 58'.0$.

8.5 and 8.7

	α	δ		
1831.9	296.6	1.21	Σ	5 n
1847.2	300.5	1.09	O Σ	2
1848.7	303.6	0.83	Mitchel	1
1858.1	301.4	0.7 \pm	Dembowski	2
1879.2	302.3	1.09	Cinc.	7
1885.7	300.1	1.21	Hall	2
1892.7	300.6	1.44	Glazenapp	2

Other measures.

No. 71. h. 3074. 1st Munich 29,941. 8.4
 $21^{\text{h}} 53^{\text{m}} 9^{\text{s}}$ — $2^{\circ} 18'.2$.

8.9 and 9.4

	α	δ	h	
1831. \pm	291.7	1.5 \pm	h	1 n
1879.5	293.4	2.30	Cinc.	2
1886.8	293.4	2.33	L. McC.	2

No. 72. Cordoba [61]. C. Z. 21 h. 1657. 8.6
 $21^{\text{h}} 53^{\text{m}} 57^{\text{s}}$ — $30^{\circ} 27'.6$.

9.2 and 9.5

	α	δ		
1880.7	278.8	1.31	C. G. A.	4 n

No. 73. β 276. η Piscis Australis. 5.5
 $21^{\text{h}} 55^{\text{m}} 6^{\text{s}}$ — $28^{\circ} 56'.0$.

6.1 and 6.5

	α	δ		
1876.6	117.4	1.71	Howe	3 n
1877.7	115.5	1.73	Cinc.	3-2
1880.6	113.1	1.73	"	1
1885.9	118.1	1.81	Hall	2
1888.8	118.5	1.61	β	4-3
1892.7	112.4	1.16	Glazenapp	2
1897.0	117.2	1.81	See	3

Small common p.m.

Prof. Asaph Hall assigns the discovery of this pair to another astronomer. There seems, however, to be no record published earlier than β 's, in which case later claims are invalid.

A few other measures.

224A

21 hrs.

REFERENCE CATALOGUE OF

No. 74. Hough 468. Lal. 42,899. ^{MAG.} 8.2
 21^h 55^m 50^s — 17° 59'.8.

Comes = 10.7

1891.8	344.3	3.19	Hough	2 n
1897.8	345.0	3.97	See	1

No. 75. Howe. Lal. 42,909. ^{MAG.} 7.0
 21^h 56^m 6^s — 16° 5'.6.

Comes = 11.0

1877.8	270.3	9.09	Cinc.	1 n
1878.6	270.5	8.94	β	1

A 9th mag. star pr., with the chief star, form the old pair ζ 5524.

No. 76. South 802. 29 Aquarii. ^{MAG.} 6.8
 21^h 56^m 58^s — 17° 26'.8.

7.2 and 8.1

1831. \pm	242.0	4. \pm	ζ	1 n
1847.6	242.1*	4.19	Mitchel	1
1857.7	242.5	4.04	Morton	3
1877.7	242.4	4.10	β	1
1880.6	243.4	3.68	Cinc.	1
1890.6	244.1	3.81	Glazenapp	2
1896.7	243.6*	3.92	Hussey	2

Small common p.m.

Stationary.

Other measures.

No. 77. Hough 469. W.B. 21 h. ^{MAG.} 8.3
 1280. 8.3

21^h 57^m 40^s — 2° 57'.7.

8.7 and 9.7

1892.7 27.2 0.59 Hough 1 n
 o Aquarii, mag. 4.7, is 27 secs. pr. 35' N.

No. 78. λ 465. Lal. 42,967. ^{MAG.} 8.5
 21^h 58^m 13^s — 25° 19'.8.

Comes = 14.3

1897.7	189.6	2.70	See	1 n
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Lal. 42,966, mag. 8.6, is closely N.pr.

No. 79. λ 466. C.Z. 21 h. 1811. ^{MAG.} 8.5
 21^h 58^m 57^s — 40° 11'.2.

8.9 and 9.9

1896.6	264.7	1.35	See	3 n
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No. 1.	h. 5316.	Bris. 7121.		MAG.	
	22 ^h 0 ^m 3 ^s	— 59° 36'.9.		8.0	
		8.3 and 9.6			
1834.6	142.2	2.±	h	3 n	
1873.8	145.4	5.02	Russell	1	
1877.8	149.1	5.01	C. G. A.	4	
C. Z. 21 h. 1838 is 2'.5 S.pr.					
No. 2.	Howe.	Lal. 43,088.		MAG.	
	22 ^h 2 ^m 0 ^s	— 28° 32'.7.		8.0	
		8.3 and 9.5			
1876.8	152.4	3.09	Cinc.	1 n	
1877.7	151.7	2.39	"	2	
1885.7	153.2	2.52	"	2	
1896.8	150.3	2.63	See	1	
Identification after the Cincinnati observers. Prof.					
See has: — a 22 ^h 1 ^m 27 ^s , δ—28° 32'.					
No. 3.	λ 469.	Piazzi 21 h. 400.		MAG.	
	22 ^h 3 ^m 7 ^s	— 26° 15'.5.		7.3	
		7.9 and 8.2			
1897.7	308.3	0.2 ±	See	1 n	
No. 4.	β 170.	Lal. 43,158.		MAG.	
	22 ^h 3 ^m 37 ^s	— 18° 58'.3.		8.5	
		8.4 and 8.5			
1876.0	63.7	1.69	Dembowski	4 n	
1876.7	61.6	1.69	Cinc.	2	
1878.2	61.8	1.59	"	2	
1882.6	57.3	1.83	"	2	
1886.7	59.6	1.75	L. McC.	6	
1893.8	58.2	1.17	Sellers	3-2	
1896.7	59.0	1.42	Hussey	2	
1897.8	58.6	1.74	See	3	
Near 35 Aquarii, mag. 5.8.					
h 3092, a wide pair, is N.f., and a 3" pair measured by Prof. Hussey is 30' S.pr.					
No. 5.	λ 470.	Ö.A. 21,944.		MAG.	
	22 ^h 4 ^m 57 ^s	— 24° 2'.6.		8.5	
		8.9 and 9.7			
1897.8	32.2	1.81	See	2 n	

No. 6.	Leavenworth.	1st Munich		MAG.	
	30,345.			8.9	
	22 ^h 5 ^m 13 ^s	— 11° 33'.2.			
		9.6 and 9.8			
1886.8	164.6	0.93	Leavenworth	2 n	
1890.8	164.0	0.85	β	3	
Near ε ₁ and ε ₂ Aquarii.					
No. 7.	β 769.	Lac. 9046.		MAG.	
	22 ^h 5 ^m 47 ^s	— 34° 57'.4.		6.6	
		7.1 and 7.8			
1879.7	348.6	0.6 ±	β	1 n	
1891.8	351.6	0.91	"	3	
1897.8	342.4	0.46	See	1	

No. 8.	h. 5319.	Lac. 9047.		MAG.	
	22 ^h 6 ^m 6 ^s	— 38° 47'.6.		7.2	
		Both = 8.0 yellow.			
1836.1	110.4	1.72	h	4 n	
1851.9	116.4	2.30	Jacob	2	
1852.7	113.5	1.47	"	2	
1856.8	113.2	2.06	"	2	
1877.6	116.1	2.14	Cinc.	2	
1879.9	117.7	1.60	Hargrave	1	
1889.2	118.9	2.02	Pollock	2	
1891.8	117.4	1.85	Sellers	3	
1895.9	118.3	.....	Doberck	2	
1896.6	120.2	2.06	See	3	
Both stars have been observed on the meridian at Cordoba.					
The identity with h 5319 was overlooked in the 1889.2 measure.					
No. 9.	Cordoba [62].	Lac. 9048.		MAG.	
	22 ^h 6 ^m 41 ^s	— 49° 32'.9.		7.6	
		7.8 and 10.0			
1889.9	353.2	4.85	Pollock	3 n	

226A

22^{hrs.}

REFERENCE CATALOGUE OF

<p>No. 10. β 475. Lal. 43,305. MAG. 8.3 $22^{\text{h}} 7^{\text{m}} 19^{\text{s}}$ — $8^{\circ} 30'.4$ <i>Comes</i> = 11.2</p> <table border="0"> <tr><td>1879.8</td><td>$230^{\circ}.6$</td><td>" \pm</td><td>Cinc.</td><td>1 n</td></tr> <tr><td>1886.8</td><td>236.5</td><td>1.62</td><td>L. McC.</td><td>2</td></tr> <tr><td>1891.8</td><td>228.3</td><td>1.51</td><td>β</td><td>3</td></tr> <tr><td>1897.9</td><td>229.0</td><td>1.46</td><td>Hussey</td><td>3</td></tr> </table> <p>No. 11. β 1215. Rumker 9936. 9.0 $22^{\text{h}} 7^{\text{m}} 48^{\text{s}}$ — $11^{\circ} 40'.2$ 9.7 and 9.8</p> <table border="0"> <tr><td>1890.8</td><td>$90^{\circ}.2$</td><td>" 1.53</td><td>β</td><td>3 n</td></tr> <tr><td>1896.8</td><td>91.1</td><td>1.54</td><td>Aitken</td><td>3</td></tr> </table> <p>No. 12. \mathbb{H}. N. 56. 41 Aquarii. 5.5 $22^{\text{h}} 8^{\text{m}} 47^{\text{s}}$ — $21^{\circ} 34'.3$ 5.7 orange, and 7.7 blue</p> <table border="0"> <tr><td>1787.7</td><td>S.f.</td><td>.....</td><td>\mathbb{H}</td><td>1 n</td></tr> <tr><td>1847.6</td><td>$119^{\circ}.6$</td><td>4.22</td><td>Mitchel</td><td>2</td></tr> <tr><td>1876.7</td><td>118.0</td><td>5.22</td><td>Cinc.</td><td>2</td></tr> <tr><td>1877.7</td><td>116.6</td><td>5.03</td><td>"</td><td>3</td></tr> <tr><td>1882.7</td><td>118.0</td><td>5.44</td><td>"</td><td>1</td></tr> <tr><td>1886.7</td><td>115.7</td><td>5.01</td><td>Hall</td><td>3</td></tr> <tr><td>1890.6</td><td>116.0</td><td>4.61</td><td>Glasenapp</td><td>2</td></tr> <tr><td>1897.7</td><td>117.5</td><td>5.10</td><td>See</td><td>1</td></tr> </table> <p>Common p.m. of $0''.07$. Also registered as South and $\frac{1}{2}$ 339, and again as a new pair (No. 12) at Cincinnati in 1883. C. P. D. mag. = 6.6.</p> <p>No. 13. Hough 472. C. Z. 22 h. 270. 8.5 $22^{\text{h}} 10^{\text{m}} 19^{\text{s}}$ — $23^{\circ} 12'.5$ and</p> <table border="0"> <tr><td>1889.8</td><td>$244^{\circ}.8$</td><td>" 3.98</td><td>Hough</td><td>2 n</td></tr> </table> <p>Lac. 9078, mag. 7.3, is 14 secs. f. and 18' S.</p> <p>No. 14. Innes 20. Lac. 9067. 6.8 $22^{\text{h}} 10^{\text{m}} 58^{\text{s}}$ — $63^{\circ} 18'.6$ 7.3 and 7.8, both white</p> <table border="0"> <tr><td>1894.9</td><td>$340^{\circ}. \pm$</td><td>" $0.6 \pm$</td><td>Innes</td><td>2 n</td></tr> </table>	1879.8	$230^{\circ}.6$	" \pm	Cinc.	1 n	1886.8	236.5	1.62	L. McC.	2	1891.8	228.3	1.51	β	3	1897.9	229.0	1.46	Hussey	3	1890.8	$90^{\circ}.2$	" 1.53	β	3 n	1896.8	91.1	1.54	Aitken	3	1787.7	S.f.	\mathbb{H}	1 n	1847.6	$119^{\circ}.6$	4.22	Mitchel	2	1876.7	118.0	5.22	Cinc.	2	1877.7	116.6	5.03	"	3	1882.7	118.0	5.44	"	1	1886.7	115.7	5.01	Hall	3	1890.6	116.0	4.61	Glasenapp	2	1897.7	117.5	5.10	See	1	1889.8	$244^{\circ}.8$	" 3.98	Hough	2 n	1894.9	$340^{\circ}. \pm$	" $0.6 \pm$	Innes	2 n	<p>No. 15. Harvard. Lac. 9076. MAG. 5.4 $22^{\text{h}} 11^{\text{m}} 42^{\text{s}}$ — $54^{\circ} 6'.5$ 1891 Double Arequipa - n The chief star has a p.m. of $0''.80$ towards $147^{\circ}.3$.</p> <p>No. 16. Innes 303. Lac. 9084. 8.2 $22^{\text{h}} 12^{\text{m}} 20^{\text{s}}$ — $50^{\circ} 24'.2$ A = 8.2 B = 10.0 C = 10.0 A and B + C</p> <table border="0"> <tr><td>1897.8</td><td>$40^{\circ}. \pm$</td><td>" $20^{\circ}. \pm$</td><td>Innes</td><td>1 n</td></tr> </table> <p>B and C = C. P. D. - 50°, 11,683</p> <table border="0"> <tr><td>1897.8</td><td>$80^{\circ}. \pm$</td><td>" $1^{\circ}. \pm$</td><td>Innes</td><td>1 n</td></tr> </table> <p>No. 17. Innes 134. Lac. 9104. 7.7 $22^{\text{h}} 16^{\text{m}} 3^{\text{s}}$ — $56^{\circ} 39'.4$ 8.3 and 8.7</p> <table border="0"> <tr><td>1896.8</td><td>$300^{\circ}. \pm$</td><td>" $0.6 \pm$</td><td>Innes</td><td>1 n</td></tr> </table> <p>No. 18. Innes 135. π_1 Gruis. 6.7 Red $22^{\text{h}} 16^{\text{m}} 37^{\text{s}}$ — $46^{\circ} 27'.1$ <i>Comes</i> = 11.5</p> <table border="0"> <tr><td>1896.8</td><td>$190^{\circ}. \pm$</td><td>" $2.5 \pm$</td><td>Innes</td><td>1 n</td></tr> </table> <p>Requiring a steady night. The chief star has been thought variable. See <i>Catalogue of Magnitudes of 1081 Stars</i>, by A. Stanley Williams, p. 41, No. 1019.</p> <p>No. 19. β 172. 51 Aquarii. 5.8 $22^{\text{h}} 18^{\text{m}} 54^{\text{s}}$ — $5^{\circ} 20'.6$ 6.5 and 6.7</p> <table border="0"> <tr><td>1875.7</td><td>$20^{\circ}.4$</td><td>" 0.46</td><td>Dembowski</td><td>6-2 n</td></tr> <tr><td>1877.8</td><td>25.7</td><td>$0.5 \pm$</td><td>Cinc.</td><td>1</td></tr> <tr><td>1877.8</td><td>25.2</td><td>0.47</td><td>β</td><td>2</td></tr> <tr><td>1878.6</td><td>24.7</td><td>0.56</td><td>"</td><td>2-1</td></tr> <tr><td>1879.3</td><td>19.6</td><td>0.66</td><td>Cinc.</td><td>4-3</td></tr> <tr><td>1879.4</td><td>19.1</td><td>$0.5 \pm$</td><td>Schiaparelli</td><td>2</td></tr> <tr><td>1886.7</td><td>16.8</td><td>0.78</td><td>L. McC.</td><td>2</td></tr> <tr><td>1891.6</td><td>12.1</td><td>0.68</td><td>β</td><td>3</td></tr> <tr><td>1893.8</td><td>9.4</td><td>0.55</td><td>Comstock</td><td>3</td></tr> <tr><td>1895.8</td><td>7.3</td><td>0.57</td><td>Lick</td><td>3</td></tr> <tr><td>1895.8</td><td>6.2</td><td>0.06</td><td>Comstock</td><td>4</td></tr> <tr><td>1897.7</td><td>5.3</td><td>0.73</td><td>Aitken</td><td>3</td></tr> <tr><td>1897.9</td><td>10.4</td><td>0.67</td><td>Hussey</td><td>3</td></tr> </table> <p>A binary pair in slow motion. The p.m. is very small. Three distant companions make \mathbb{H} V. 95.</p>	1897.8	$40^{\circ}. \pm$	" $20^{\circ}. \pm$	Innes	1 n	1897.8	$80^{\circ}. \pm$	" $1^{\circ}. \pm$	Innes	1 n	1896.8	$300^{\circ}. \pm$	" $0.6 \pm$	Innes	1 n	1896.8	$190^{\circ}. \pm$	" $2.5 \pm$	Innes	1 n	1875.7	$20^{\circ}.4$	" 0.46	Dembowski	6-2 n	1877.8	25.7	$0.5 \pm$	Cinc.	1	1877.8	25.2	0.47	β	2	1878.6	24.7	0.56	"	2-1	1879.3	19.6	0.66	Cinc.	4-3	1879.4	19.1	$0.5 \pm$	Schiaparelli	2	1886.7	16.8	0.78	L. McC.	2	1891.6	12.1	0.68	β	3	1893.8	9.4	0.55	Comstock	3	1895.8	7.3	0.57	Lick	3	1895.8	6.2	0.06	Comstock	4	1897.7	5.3	0.73	Aitken	3	1897.9	10.4	0.67	Hussey	3
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SOUTHERN DOUBLE STARS.

22 hrs.

227A

No. 20. Innes 136. C. Z. 22 h. 554. ^{MAG.} 7.5
22^h 19^m 53^s — 45° 37'.2.

7.7 and 9.2

1896.8 265.± 1.8± Innes 1 n
C. Z. 22 h. 559, mag. 8.0, is 11.5 secs. f. 7' N.

No. 21. h. 5334. δ Toucani. 4.7
22^h 20^m 13^s — 65° 28'.5. ^{Yellow}

Comes = 9.2 greenish

1836.2 282.3 6.84 h 2 n
1872.8 284.9 6.77 Russell 2
1880.6 283.3 4.33 Cruis 1

The p.m. of the chief star is very small.

Both stars have been observed on the meridian at Cordoba,

The last distance is much too small.

No. 22. Innes 137. Lac. 9125. 6.9
22^h 20^m 46^s — 58° 30'.6.

Comes = 10.5

1896.8 315.± 1.5± Innes 1 n
C. Z. 22^h 587, mag. 7.6, is 20 secs. f.

No. 23. Bradley. f Aquarii. 5.6
22^h 21^m 8^s — 17° 15'.1.

6.3 and 6.5

1783.7 295.± H 1 n
1826.0 300.0 10.± h 1
1866.7 302.9 8.32 Harvard 2
1876.8 305.9 8.42 Cinc. 3
1882.7 306.5 7.99 " 3
1886.9 304.2 7.44 Hall 3
1890.6 306.4 6.73 Glasenapp 2
1895.8 309.4* 6.79 Doberck 3
1896.6 308.7 7.34 Hussey 3

Common p.m. of about 0".2 towards 91°.

Also registered as H N. 41, and South and h 345.
Other measures.

No. 24. C. Mayer. ζ Aquarii. ^{MAG.} 3.8
22^h 23^m 41^s — 0° 31'.9.

4.5 and 4.6

1779.8 18.9 4.77 H 2 n
1822.3 0.5 4.98 h 1
1839.8 350.4 3.85 OΣ 3
1862.8 339.3 3.53 Dembowski 9
1888.9 325.6 3.42 Maw 5
1894.0 321.2 3.07 Bigourdan 2
1896.7 321.2 3.33 Hussey 3

A binary pair in which the angle and distance are decreasing.

Many other measures.

Also called H II. 7, Σ 2909, and South and h 346.

See:—

1875. Doberck, W., "Orbit," *Astr. Nachr.*, No. 2050.1897. Burnham, S. W., "Motion," *Popular Astronomy*, vol. iv. pp. 474-475.

No. 25. λ 474. Lac. 9144. 7.5
22^h 23^m 49^s — 29° 10'.2.

8.0 and 8.6

1896.7 289.8 0.56 See 2 n
Yarnall, 10, 146, mag. 8.5, is 4' S.pr.

No. 26. β 478. 1st Munich 31,036. 9.1
22^h 24^m 11^s — 7° 50'.7.

9.3 and 11.3

1878.2 32.7 1.32 β 2 n
1886.8 32.2 1.38 L. McC. 1

A 9.3 mag. star 29" away, and a fainter one in the opposite quadrant, are noted by β.

No. 27. β 76. Lal. 43,906. 8.5
22^h 24^m 24^s — 0° 43'.0.

8.7 and 10.6

1867.9 332.1 1.50 Harvard 1 n
1876.2 335.3 1.47 Dembowski 4
1879.2 333.6 1.48 Cinc. 3
1888.9 338.2 1.24 Haverford 2

In a low power field with ζ Aquarii (No. 24.)

In the *Harvard Annals* this pair is called "Alvan Clark 22."

228A

22 hrs.

REFERENCE CATALOGUE OF

No. 28. β 1264. Lal. 43,933. ^{MAG.} 7.7
 22^h 25^m 3^s — 0° 22'.4.

Comes = 13.2

1891.7 21.7 3.85 β 3 n
 N.f. ζ Aquarii (No. 24).

No. 29. Washburn 169. Ö.A.
 22,195. 8.7

22^h 25^m 27^s — 19° 41'.8.

8.9 and 10.4

1886.7 172.8 1.39 L. McC. 2 n
 1896.5 169.8 1.38 Hussey 2

No. 30. Piazz. β Piscis Australis. 4.5
 22^h 25^m 49^s — 32° 51'.5.

Comes = 7.5

1836.2 173.3 29.1 h 2 n
 1876.6 171.0 30.2 C. G. A. 5

Also registered as Dunlop 240.

Common p.m. of 0".047 towards 167°.8.

No. 31. Melbourne [7]. 1st Melb.
 1144. 8.6

22^h 26^m 41^s — 61° 19'.9.

8.9 and 10.3

1891.8 124.3 2.1 Sellors 1 n
 1896.8 123.8 3.95 " 3

Separately observed on the meridian at Cordoba.

No. 32. λ 475. C. Z. 22 h. 767. 8.5
 22^h 27^m 25^s — 39° 15'.1.

9.1 and 9.5

1896.7 292.7 0.55 See 3 n

No. 33. β 77. B.D.—2°, 5780. 8.8
 22^h 28^m 53^s — 2° 18'.7.

9.2 and 10.0

1876.0 213.0 2.65 Dembowski 3 n
 1877.8 213.6 2.55 Cinc. 2
 1882.7 214.3 2.61 " 2
 1886.8 212.0 2.71 L. McC. 4
 1888.7 213.3 2.77 β 3

An 11.5 mag. star 29" distant.

60 Aquarii, mag. 5.9, is 12' N.f.

No. 34. β 770. Lal. 44,059. ^{MAG.} 7.6
 22^h 28^m 53^s — 23° 7'.1.

Comes = 10.9

1879.8 360.± 1.2± β 1 n
 1891.9 352.8 1.36 " 3 n

No other measures found.

No. 35. h. 5344. Lac. 9177. 7.9
 22^h 29^m 47^s — 39° 14'.5.

8.1 and 10.1

1836.8 173.3 4.± h 1 n
 1889.8 167.2 5.20 Pollock 2
 1896.7 169.3 4.65 See 5

Both stars have been observed on the meridian at Cordoba.

No. 36. β 771. Piazz. 22 h. 152. 5.7
 22^h 31^m 9^s — 41° 6'.5.

Comes = 10.3

1879.6 270.± 1.3± β 1 n
 1891.8 259.1 2.23 Sellors 2
 1891.9 263.1 2.46 β 3
 1897.0 265.1 2.38 See 3

The p.m. of the chief star is 0".096 towards 200°.6

Registered as a new pair at Arequipa in 1891.

Piazz. 22 h. 147, mag. 6.1, is 30 secs. pr.

No. 37. Innes 138. Lac. 9188. 6.6
 22^h 32^m 0^s — 40° 22'.6.

Comes = 11.3

1896.8 279.4 3.44 See 2 n

When discovered, the comes was considered to be certainly closer than that of β 771. See No. 36. This deception probably arises through the faintness of the small star.

No. 38. h. 5348. C. Z. 22 h. 944. 8.5
 22^h 32^m 41^s — 59° 19'.6.

8.7 and 10.7

1836.7 275.4 3.± h 1 n

No. 39. μ . N. 117. Bris. 7191. ^{MAG.} 7.5
 22^h 34^m 12^s — 28° 52'.1.

7.9 and 8.7

1834.5	59.2	2.±	ζ	1 n
1846.9	60.6	3.12	Jacob	1
1857.9	57.9	3.45	"	2
1877.7	59.9	3.38	Cinc.	2
1881.8	59.7	2.94	β	3
1897.7	61.8	3.37	See	3

Both stars have been observed on the meridian at Cordoba.

Also registered as ζ 5356.

Other measures.

Lac. 9204, mag. 6.3., is 87" N.pr., and with the above pair has been recorded as a double star by μ and Dunlop.

No. 40. Lalande 180. Lal. 44,276. 8.0
 22^h 34^m 15^s — 13° 7'.8.

8.7 and 8.8

1830.8	327.7	4.70	Σ	3 n
1848.7	324.2	4.09	Mitchel	1
1863.1	319.3	4.38	Dembowski	4
1866.2	319.1	4.33	"	2-1
1877.5	316.8	4.43	Cinc.	3
1880.8	317.1	4.49	Pritchett	3
1888.8	315.6*	4.15	Hall	3
1892.8	315.8	4.17	Haverford	5
1895.9	314.4	4.60	Doberck	4-2

Some change.

Common p.m. of α . 291 towards 118°.8.

Also called Σ 2928.

No. 41. β 709. B.D.—3°, 5487. 8.5
 22^h 36^m 28^s — 3° 4'.4.

8.8 and 10.0

1877.9	9.8	2.09	β	2 n
1878.8	7.0	1.94	"	1
1886.8	6.0	2.13	L. McC.	2
1888.9	5.1	1.50	Haverford	1
1893.7	14.1	1.6 ±	Glazenapp	2
1896.8	5.4	2.04	Leavenworth	3

No materials exist for a determination of p.m.

A probable decrease in angle.

No. 42. Cordoba [63.] Lac. 9210. ^{MAG.} 6.5
 22^h 36^m 39^s — 47° 43'.5.

Comes = 10.5

1879.5	124.9	8.22	C. G. A.	2 n
1894.9	140. ±	5. ±	Innes	1
1897.8	135.2	7.88	See	2

The p.m. of the chief star is α . 320 towards 181°.8.
 It is evident that it is common to the companion.

Thought to be new when the estimate was made in 1894.

Near β Gruis, mag. 2.1, orange yellow.

Called ζ 5362 in error by Prof. See, see No. 47.

No. 43. Ormond Stone. C. Z. 22 h.
 1093. 7.7

22^h 37^m 17^s — 32° 9'.2.

8.1 and 9.1

1876.7	34.8	3.38	Cinc.	1 n
1877.7	37.4	2.98	"	1
1885.7	34.3	2.98	"	1
1896.7	32.7	2.86	See	5

Noted as Class I. at Cordoba in 1874.

No. 44. μ . I. 50. Mayer 963. 7.0
 22^h 37^m 49^s — 8° 50'.1.

7.2 and 8.7

1782.7	311.2	.....	μ	1 n
1831.2	311.3	2.57	Σ	3
1846.6	311.5	2.58	Jacob	1
1866.1	311.2	2.59	Dembowski	3
1886.9	311.4	2.68	L. McC.	2
1892.8	310.0	2.69	Glazenapp	2-1

Also recorded as Σ 2935.

Both stars have been observed on the meridian at Cordoba.

Other measures.

Also recorded as μ . N. 128 and 133.

The p.m. is very small.

No. 45. Cruls. η Gruis. 4.9
 22^h 39^m 30^s — 54° 1'.6.

Comes = 12.0

1879.6	185.3	27.6	Cruls	1
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Also registered in error as a new pair = Innes 139.

No. 46. λ 476. Ö.A. 22,382. ^{MAG.} 8.6
 22^h 39^m 42^s — 23° 37'.6.

Comes = 13.5

1896.8 39.5 3.92 See 1 n
 Ö.A. 22,381, mag. 8.3, is 8' N.pr.

No. 47. h. 5362. Lac. 9237. 6.9
 22^h 40^m 48^s — 47° 28'.0.

C. G. A. 31,000 = 9.6

1836.7 139.1 8." ± h 1 n
 1856.8 141.5 10.65 Jacob 2-1
 1880.9 139.1 8.96 Hargrave 1
 1897.8 138.7 10.26 See 1

The components have been separately observed on the meridian at Cordoba.

Registered as λ 477 by Prof. See, who identified the chief star as Lac. 9229 which is about 25' N.pr.

No. 48. Innes 304. C. P. D.—48°, 8.0
 10,811.
 22^h 40^m 51^s — 48° 50'.6.

8.4 and 9.4

1897.8 N 4." ± Innes 1 n

No. 49. Innes 140. Lac. 9241. 8.3
 22^h 41^m 36^s — 55° 1'.5.

8.5 and 10.5

1896.8 270. ± 3." ± Innes 1 n

The following star of a group of three or more.

No. 50. H. II. 57. Bradley 3011. 7.0
 22^h 42^m 41^s — 4° 44'.9.

7.6 and 7.9

1792.7 243.1 H 2 n
 1822.9 245.6 4.35 South and h —
 1833.0 246.9 4.12 Σ 8
 1862.6 250.5 3.08 Dembowski 3
 1877.9 252.8 3.88 β 1
 1886.8 254.5 3.67 L. McC. 2
 1892.7 257.9 3.25 Glasenapp 2

Also called Σ 2944.

There are other somewhat discordant measures.

Common p.m. of 0".355 towards 219°.5, by which this pair is passing the 8.9 mag. star, Piazzini 22 h. 220, some measures being:—

1831.8	158°	56"	Σ
1862.7	146	51	Dembowski
1877.9	141	49	β
1892.7	134	47	Glasenapp

No. 51. Innes 141. Ö.A. 22,432. ^{MAG.} 9.1
 22^h 43^m 50^s — 20° 47'.3.

9.6 and 10.1

1896.5	N.pr.	2." ±	Innes	1 n
1897.9	319°.6	2.70	See	1

No. 52. Washburn 53. Rumker 9.0
 10,641.
 22^h 43^m 57^s — 7° 2'.4.

9.3 and 10.5

1881.7	2.3	1.51	Washburn	3 n
1886.8	1.5	1.73	L. McC.	3-4
1887.7	358.0	1.73	Washburn	3

No. 53. β 1219. W.B. 22 h. 885. 8.9
 22^h 44^m 30^s — 11° 35'.7.

9.4 and 10.1

1890.82	307.9	0.54	β	3 n
1896.84	299.3	0.48	Aitken	3

β 's R.A. is 1^m in error.

β notes a 6" pair about 5' N.pr. = B.D. - 11°, 5931, mag. 8.7.

No. 54. h. 5365. Lac. 9282. 7.0
 22^h 46^m 8^s — 36° 25'.1.

Comes = 11.6

1835.8	274.0	2.5 ±	h	1 n
1896.7	278.2	4.83	See	2

SOUTHERN DOUBLE STARS.

22^{hrs.}

231A

No. 55. γ Piscis Australis. 4.6
 22^h 46^m 58^s — 33° 24'.3.

Comes = 8.8

1835.5	276.8	3.59	<i>h</i>	2	n
1850.9	275.3	4.18	Jacob	2	
1853.3	274.5	4.19	"	6	
1856.9	275.3	4.39	"	2	
1876.8	269.4	4.13	Cinc.	2	
1877.8	271.7	4.17	"	2	
1879.7	271.6	3.47	β	2	
1885.3	272.4	4.05	Cinc.	3	
1890.8	269.2	3.6 ±	Sellers	2	
1892.6	271.7	3.60	Scott	2	
1894.8	268.6	3.51	Sellers	2	
1896.7	267.5	4.46	See	1	

Common p.m. of 0".065 towards 251°.1.
 Also measured by Secchi.

No. 56. β 177. Ö.A. 22,454. 8.0
 22^h 47^m 0^s — 22° 14'.3.

8.7 and 8.8

1867.9	276.6	3.07	Harvard	1	n
1877.7	278.7	2.79	Cinc.	2	
1888.8	277.1	2.63	Haverford	2	
1893.8	276.1	2.55	Sellers	3	

Equal to Harvard 173.
 Other measures.

No. 57. Innes 22. Lac. 9295. 6.8
 22^h 49^m 27^s — 49° 0'.0.

7.2 and 8.2

1894.9	200. ±	0.6 ±	Innes	4	n
1897.8	170. ±	0.6 ±	"	1	

τ_2 Gruis, mag. 6.5, is about 95" S.pr.

No. 58. β 178. Piazz 22 h. 250. 5.8
 22^h 50^m 0^s — 5° 31'.2.

6.0 and 7.8

1875.4	324.6	Obl.	Dembowski	3	n
1877.8	328.9	0".6 ±	Cinc.	2	
1879.6	319.9	0.66	"	1	
1886.8	322.1	0.86	L. McC.	3-2	
1888.9	322.2	0.70	Haverford	3-2	

No. 59. β 1010. Lal. 44,832. 9.0
 22^h 50^m 20^s — 6° 6'.8.

9.6 and 9.9

1881.8	136.5	1.21	β	2	n
1892.9	134.8	1.28	Hough	1	

The magnitude (from Schönfeld) is probably too faint.

Lal. 44,827, mag. 7.7, is about 7' S.pr.

No. 60. Howe. δ Piscis Australis. 4.1
 22^h 50^m 25^s — 33° 4'.1.

Comes = 9.7

1877.7	236.5	4.73	Cinc.	1	n
1879.7	238.4	5. ±	β	5	
1881.8	235.8	4.91	"	4-5	
1885.7	236.9	4.77	Cinc.	2	
1891.9	239.7	4.78	β	3	
1896.7	235.6	5.14	See	2	

P.m. of 0".09 towards 360°.

Also discovered independently as β 772. Both stars were observed on the meridian at Cordoba in 1878.

C. P. D. mag. = 5.8.

No. 61. λ 478. Fomalhaut. 1.3
 22^h 52^m 7^s — 30° 9'.1.

Comes = 14.0

1896.7	36.2	30.0	See	1	n

No. 62. Ormond Stone. 1st Munich
 31,829. 8.8

22^h 53^m 23^s — 8° 59'.3.

9.2 and 10.2

1880.6	132.5	2.46	Cinc.	2-1	n

No. 63. β 1011. Lac. 9343. 6.6
 22^h 57^m 0^s — 36° 57'.5.

6.7 and 9.7

1881.8	301.7	2.16	β	3	n
1886.9	301.2	2.26	Pollock	1	
1891.8	293.0	1.94	Sellers	1	
1896.7	291.5	1.61	See	4	

232A

22hrs.

REFERENCE CATALOGUE OF

No. 64. β 384. Lal. 45,047. ^{MAG.} 7.0
 22^h 57^m 18^s — 19° 4'.8.

7.2 and 9.3

1876.8	75.0	1.08	Cinc.	1 n
1877.1	72.2	1.27	Dembowski	3
1877.6	72.5	1.22	Cinc.	2
1886.8	70.4	1.27	L. McC.	1
1888.8	73.4*	1.03	Haverford	1
1897.7	69.1	1.37	See	1

No. 65. β 481. W.B. 22 h. 1162. ^{MAG.} 9.1
 22^h 57^m 27^s — 11° 46'.5.

9.6 and 10.1

1878.2	51.8	1.30	β	2 n
1891.9	53.1	1.19	"	3

In the field with Σ 2970, an 8" pair.

No. 66. Cordoba [64]. Lac. 9349. ^{MAG.} 8.1
 22^h 58^m 16^s — 46° 42'.4.

8.3 and 9.9

1889.8	108.6	3.05	Pollock	3 n
1894.3	107.6	2.79	Sellors	2
1897.8	105.5	3.55	See	1

No. 67. Innes 259. Lac. 9346. ^{MAG.} 7.5
 22^h 58^m 17^s — 55° 34'.0.

8.0 and 8.5

1897.7	100.±	0.9±	Innes	1 n
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No. 68. [Sellors .] Gilliss P. Z. ^{MAG.} 8.8
 16,143.
 22^h 58^m 52^s — 75° 18'.4.

8.9 and 11.4

1890.9 73.1 3.8± Sellors 2 n
 h 5381 = Gilliss P.Z. 16,161, mag. 9.3, a somewhat similar pair, is about 20' S.f.

No. 69. h. 5382. C. Z. 22 h. 1701. ^{MAG.} 8.2
 22^h 59^m 11^s — 51° 53'.6.

Both = 9.0 white

1836.3	49.8	7.5±	h	2 n
1876.8	49.3	7.28	Sydney	2

Fixed.

SOUTHERN DOUBLE STARS.

23^{hrs.}

233A

No. 1. h. 5381. Gilliss P. Z. 16,161. 9.3
23^h 0^m 14^s — 75° 33'.5.

10.0 and 10.2

1835.7	50.2	3.±	h	1 n
1880.9	52.8	3.11	Hargrave	1
1891.1	54.2	3.±	Sellors	1

Mr Hargrave's measure is recorded against h 5379.

A brighter pair of the same class will be found 20' N., a little pr.

No. 2. Howe. W. B. 22 h. 1223. 8.8
23^h 0^m 18^s — 4° 47'.3.

Comes = 11.3

1879.6	213.9	3.84	Howe	1 n
1885.7	212.3	4.22	Cinc.	1
1888.9	210.4	4.03	Haverford	1

No. 3. Jacob [12]. θ Gruis. 4.4
23^h 1^m 15^s — 44° 3'.6.

4.5 white and 8.2 bluish

1845.9	11.3	3.05	Jacob	2-1 n
1846.3	11.5	3.06	"	1
1851.9	10.6	2.91	"	4
1852.8	12.2	2.85	"	6
1870.7	13.2	2.30	Russell	2
1881.8	22.0	2.65	β	2
1887.7	22.1	2.33	Tebbutt	1
1891.8	23.1	1.28	Sellors	2
1891.9	26.1	2.08	β	3
1895.8	28.6	2.02	Sellors	3
1897.7	23.9	2.94	See	1

A fine pair in which an increased motion in angle is apparent. Distance decreasing.

Common p.m. of 0".098 towards 241°.9.

Identical with β 751.

C. P. D. mag. = 5.6

No. 4. Dunlop 246. Lac. 9367. 6.1
23^h 1^m 28^s — 51° 13'.6.

6.6 and 7.1, both yellow

1835.7	260.5	8.12	h	3 n
1872.1	258.3	8.42	Russell	3
1879.8	260.8	7.89	Hargrave	1
1887.7	258.9	8.33	Tebbutt	1

Both stars have been observed on the meridian at the Cape (in 1840) and elsewhere.

The p.m. is small.

No. 5. Σ 2980. Lal. 45,298. 8.1
23^h 4^m 0^s — 7° 51'.4.

8.2 and 10.7

1831.1	107.9	4.16	Σ	4 n
1866.4	111.5	4.41	Dembowski	3
1877.9	108.3	4.26	Cinc.	2
1886.9	109.7	4.68	L. McC.	2

Σ 2981, a pair of faint stars, 4" apart, is about 1° 30' S., a little f.

No. 6. Lalande 185. Lal. 45,379. 6.9
23^h 6^m 46^s — 12° 28'.6.

7.6 and 7.8

1830.9	281.0	3.73	Σ	3 n
1851.9	281.3	3.59	Jacob	2
1866.4	280.2	3.41	Dembowski	3
1882.7	281.3	3.82	Cinc.	2
1886.7	280.0	3.82	L. McC.	2
1892.7	278.4*	3.51	Glazenapp	2

Also recorded as South 824, and Σ 2988.

Separately observed on the meridian at several observatories.

Other measures.

No. 7. Washburn 170. B.D.—22°, 6088. 8.0
23^h 7^m 27^s — 22° 28'.9.

8.4 and 9.4

1888.7	277.7	1.46	Washburn	3 n
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No. 8. Howe. C. Z. 23 h. 160. 7.5
23^h 7^m 33^s — 32° 51'.6.

Comes = 10.6

1877.8	266.3	6.87	Cinc.	2 n
1896.7	266.4	7.23	See	2

Registered inadvertently as Innes 142.

2 G

234A

23 hrs.

REFERENCE CATALOGUE OF

No. 9. h. 5387. Lac. 9400. ^{MAG.} 7.7
 23^h 7^m 59^s — 41° 28'.8

8.0 and 9.2

1836.0	279.3	10.±	h	2 n
1880.9	277.9	7.43	Hargrave	1
1896.8	278.7	7.93	See	2

Both stars have been observed on the meridian at Cordoba.

No. 10. β 181. Lal. 45,443. ^{MAG.} 6.8
 23^h 8^m 34^s — 13° 56'.3

6.9 and 9.7

1876.3	309.2	1.51	Dembowski	4 n
1878.7	307.8	1.41	Cinc.	1
1885.8	312.5	1.42	"	3
1886.8	309.1	1.57	L. McC.	5-3
1888.8	305.3	1.31	Haverford	3-1

An 11.4 mag. star, 19" S.pr., noted by β.

No. 11. β 714. Piazzzi 23 h. 17. ^{MAG.} 7.1
 23^h 8^m 58^s — 3° 10'.7

Comes = 10.1

1877.8	154.9	0.7±	Cinc.	1 n
1878.6	145.5	0.57	β	1
1879.8	156.6	0.6±	Cinc.	1
1886.7	146.4	0.48	L. McC.	2

No. 12. β 715. Lal. 45,490. ^{MAG.} 6.3
 23^h 9^m 27^s — 11° 13'.9

Comes = 11.0

1877.7	253.4	3.38	β	2 n
1878.7	257.6	3.32	"	3-2
1890.7	256.9	3.50	"	3

Other measures.

"Large star, single":— β

" " :—L. McC.

It had been measured at Cinc. in 1877 as a close pair.

No. 13. Innes 143. Lac. 9405. ^{MAG.} 7.2
 23^h 9^m 36^s — 60° 14'.3

Comes = 10.5

1896.7	5.±	2.5±	Innes	1 n
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No. 14. λ 480. C. Z. 23 h. 230. ^{MAG.} 9.0
 23^h 9^m 53^s — 36° 15'.4

9.7 and 9.9

1896.7	291.9	0.56	See	2 n
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No. 15. β 716. Anon. ^{MAG.} 9.0
 23^h 10^m 17^s — 9° 37'.0

9.4 and 10.2

1877.6	208.7	1.70	β	2-1 n
1891.9	204.1	1.79	"	3

In the field with the triple system of ψ₁ Aquarii; see next star.

No. 16. β 1220. Lal. 45,523. ^{MAG.} 9.4
 23^h 10^m 36^s — 9° 37'.4

10.1 and 10.2

1889.69	267.1	0.14	β	1 n
1890.63	271.1*	0.22	"	3-4
1891.57	274.3	0.22	"	4
1894.66	279.1*	0.28	Barnard	5

This most difficult pair is 49 $\frac{1}{2}$ " N.pr. ψ₁ Aquarii, mag. 4.5, with which it is proceeding through space at the rate of 0".350 towards 89°.8. Another of the many examples in which the connection is demonstrated by the p.m. alone, as the angle and distance between these stars has not varied appreciably for 100 years:—

1782.5	314.7	.....	⊠	1 n
1836.7	312.2	49.6	Σ	4
1851.9	312.8	49.4	W. Struve	1
1878.8	311.8	49.7	Doubiago	4

No. 17. λ 481. Ö.A. 22,716. ^{MAG.} 8.8
 23^h 11^m 1^s — 26° 54'.7

9.5 and 9.6

1897.7	140.4	3.12	See	1 n
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SOUTHERN DOUBLE STARS.

23hrs.

235A

No. 18. β 182. W.B. 23 h. 175. 8.2
 23^h 11^m 54^s — 14° 21'.9.

8.9 and 9.0

	α	δ		
1876.3	42.3	0.83	Dembowski	4-3 n
1877.8	48.5	0.8±	Cinc.	1
1879.7	43.7	0.78	"	1
1886.8	43.1	0.85	L. McC.	3
1888.8	45.4*	0.74	Haverford	2
1891.6	48.8	0.63	β	3

No certain change, yet a common p.m. of 1".331 towards 202°.5.

No. 19. β 79. Lal. 45,585. 8.1
 23^h 12^m 26^s — 2° 3'.8.

8.6 and 9.2

	α	δ		
1872.8	120.±	1.±	β	1 n
1875.9	116.8	1.02	Dembowski	3
1877.8	114.3	0.9±	Cinc.	1
1877.8	111.1	1.06	Dembowski	1
1879.6	109.2	0.75	Cinc.	2
1886.6	102.4	1.02	L. McC.	2
1891.5	94.6	0.88	β	3
1893.5	87.7	0.86	Goodsell	1
1894.7	90.7	1.01	Barnard	4
1897.7	86.4	0.98	Aitken	3

A binary pair, the period being in all probability under 200 years.

Common p.m. of 0".212 towards 119°.7.

Prof. Barnard also measures a 16.5 mag. star, 157", 16".

Σ 2995, two 8th mag. stars, 5" apart, is S.pr.

No. 20. h. 5392. Bris. 7270. 8.5
 23^h 12^m 44^s — 58° 50'.9.

C. Z. 23 h. 305. = 9.5

	α	δ		
1834.8	19.4	8.±	h (mirror)	1 n
1835.9	19.7	6.96	" (refractor)	1
1836.8	16.5	12.±	" (mirror)	1
1873.8	343.7	14.92	C. Z.	1
1879.4	335.7	16.87	C. G. A.	4
1880.9	337.1	15.58	Russell	1

The change can be roughly accounted for by a p.m. of 0".26 towards 132° in the chief star. It is not, however, borne out by the somewhat scanty meridian observations of the brighter component, and the moving star may be the fainter one.

Both stars are in the C. P. D., mags. 7.8 and 8.5.

In the field with γ Toucani, mag. 4.0.
 Mr Russell's measure is recorded in his list of new pairs, this being = Russell 343.

No. 21. Hough 199. ψ_3 Aquarii. 5.1
 23^h 13^m 46^s — 10° 9'.4.

Comes = 11.7

	α	δ		
1884.9	223.5	1.15	Hough	1 n
1888.7	222.8	1.22	β	3
1889.9	222.7	.....	Hough	1
1890.6	218.6	1.15	β	2-3

The p.m. is small.

No. 22. μ . III. 34. 94 Aquarii. 5.2
 23^h 13^m 51^s — 14° 0'.2.

Piazz 23 h. 41 = 7.8.

	α	δ		
1802.7	342.8	.....	μ	1 n
1830.9	345.2	13.4	Σ	3
1853.0	345.6	13.6	Jacob	4
1858.1	344.8	13.7	Dembowski	2
1867.5	346.3	13.6	"	4
1876.8	347.7	13.5	Cinc.	5
1887.9	346.6	13.5	Hall	2
1892.8	346.1	12.7	Glazenapp	2

Relatively fixed, but common p.m. of 0".284 towards 109°.3.

Other measures.

Equal to Σ 2998 and South and h 354.

No. 23. Cordoba [65]. C. Z. 23 h. 349. 8.7
 23^h 14^m 12^s — 37° 13'.0.

9.2 and 9.7

	α	δ		
1896.7	57.5	1.71	See	2 n

Discovered in 1872 = Class I.

No. 24. h. 5394. 96 Aquarii. 5.7
 23^h 14^m 13^s — 5° 40'.2.

Comes = 11.0

	α	δ		
1836.7	26.3	10.±	h	1 n
1869.8	23.5	9.9	Dembowski	3
1878.6	23.1	10.1	β	1
1896.8	21.3	10.6	Leavenworth	3
1896.9	21.7	10.6	Hussey	2
1896.9	19.9	10.2	Aitken	2

The p.m. of the chief star is 0".166 towards 89°.3 in which the comes would seem to share.

Other measures.

236A

23hrs.

REFERENCE CATALOGUE OF

No. 25. Dunlop 248. Lac. 9446. ^{MAG.} 6.0
 23^h 15^m 13^s — 50° 51'.1

6.3 and 7.5

1836.9	211.5	16.9	h	3 n
1871.9	210.0	16.1	Russell	1
1879.9	209.8	16.4	Hargrave	1

The p.m. is very small.

Called h 5394 by Mr Russell in error; see preceding pair.

No. 26. h. 5395. C. Z. 23 h. 383. ^{MAG.} 7.9
 23^h 15^m 32^s — 38° 14'.1

8.0 and 10.5

1834.7	221.3	3.±	h	1 n
1835.8	222.1	3.±	"	2
1856.9	226.1	3.13	Jacob	2-1
1880.9	231.2	2.57	Hargrave	1
1896.9	225.4	3.60	Sellers	3-2

Change doubtful.

No. 27. h. 3184. Lal. 45,704. ^{MAG.} 7.3
 23^h 15^m 40^s — 19° 5'.4

7.5 and 9.3

1831.±	281.7	6.±	h	1 n
1877.8	282.1	5.56	Cinc.	3
1877.8	279.3	4.85	Schiaparelli	2
1892.7	282.3	5.18	Glazenapp	2

Fixed.

No. 28. Dunlop 249. Lac. 9455. ^{MAG.} 5.9
 23^h 18^m 15^s — 54° 21'.4

6.2 and 7.5

1835.2	213.5	27.1	h	2 n
1877.9	211.9	26.3	Melbourne	1
1880.9	211.2	25.8	Russell	1

In the Sydney list of new double stars = Russell

344.

Both stars have been observed on the meridian by Brisbane and others, and they are recorded separately in the C. P. D., mags. 6.4 and 6.8.

No. 29. H. N. 112. Mayer 993. ^{MAG.} 7.2
 23^h 18^m 34^s — 9° 0'.5

7.6 and 8.6

1795.8	pr.	Class III.	H	1 n
1824.8	274°.1	7".98	South	-
1830.9	273.3	7.54	Σ	3
1859.9	263.9	5.58	Morton	2
1866.2	262.2	5.34	Dembowski	5
1877.7	255.9	4.90	Cinc.	3
1884.9	252.3	4.64	Hall	2
1892.8	246.0	3.72	Glazenapp	2

H's Dec. was in error 10°.

Also recorded as South 829 and Σ 3008, and separately observed on the meridian by Bessel and others.

Probably a case of rectilinear motion in the chief star.

Other measures.

See also note by Auwers on page 197 of his *Tobias Mayer's Sternverzeichniss*. The p.m. there given will not quite account for the change shewn.

No. 30. Howe. Lal. 45,803. ^{MAG.} 7.6
 23^h 18^m 42^s — 27° 49'.8

Comes = 10.7

1877.7	267.0	6".27	Cinc.	2-1 n
1897.3	267.6	6.62	Lowell	5

Identified by Prof. See as Lal. 45816, which is about 10' S.f. the above position.

No. 31. Innes 144. Lac. 9467. ^{MAG.} 8.2
 23^h 20^m 13^s — 43° 26'.9

8.6 and 9.6

1896.8	5.±	0.9±	Innes	1 n
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No. 32. λ 483. C.P.D.—36°, ^{MAG.} 9.3
 9,742
 23^h 20^m 43^s — 36° 22'.0

9.8 and 10.3

1896.8	294.7	1.17	See	2 n
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This is the nearest star in the Cor. D. M. or the C. P. D. to Prof. See's position.

No. 33. λ 484. O.A. 22,832. ^{MAG.} 8.8
 23^h 20^m 44^s — 23° 4'.1.

8.9 and 11.6

1897.7 52.6 1.25 See 1 n
 Prof. See also measures a 12.8 mag. star 23" S.f.
 λ 486 is 4^m f., 10' S. It is a similar triple and the
 measures agree with those of the above pair within
 their probable errors.

No. 34. Harvard 176. B.D.—22°, ^{MAG.} 8.8
 6127.
 23^h 20^m 59^s — 21° 58'.9.

9.3 and 9.8

1868.8 48.9 4.45 Harvard 1 n
 1879.9 51.7 7.± Cinc. 1
 1896.8 52.4 4.61 See 2
 Prof. See's R.A. and Dec. are a little different
 from those adopted above.

No. 35. λ 485. Piazz 23 h. 82. 6.5
 23^h 21^m 19^s — 22° 17'.4.

Comes = 12.3

1897.7 130.9 5.60 See 1 n

No. 36. Ormond Stone. Lal. 45,914. 8.1
 23^h 22^m 27^s — 27° 13'.7.

8.7 and 9.1

1876.8 218.2 1.64 Cinc. 1 n
 1877.8 218.0 1.55 " 2
 1884.9 218.5 1.47 " 1
 1885.7 220.7 1.43 " 1
 1897.6 218.2 1.76 See 1

There is a wide pair 27' S.pr.

No. 37. Innes 23. Lac. 9481. 7.0
 23^h 22^m 34^s — 56° 59'.1.

7.2 and 9.2

1895.8 325.± 0.9± Innes 3 n

No. 38. Innes 145. C. Z. 23 h. 644. ^{MAG.} 8.7
 23^h 25^m 20^s — 58° 39'.8.

9.0 and 10.3

1896.9 80.± 1.3± Innes 1 n
 C. Z. 23 h. 655, mag. 8.5, is 21 secs. f. 6' S.

No. 39. Cordoba [66]. Cape 1880,
 12,192. ^{MAG.} 8.0
 23^h 27^m 52^s — 57° 34'.9.

8.5 and 9.1

1874.9 215.9 2.59 C. G. A. 1 n
 1895.9 207.5 1.95 Sellors 3
 Lac. 9512, mag. 7.2, is about 90" S.f.

No. 40. Innes 25. C. Z. 23 h. 766. 7.5
 23^h 29^m 47^s — 58° 2'.8.

8.1 and 8.5

1895.9 57.1* 1.18 Sellors 3 n
 After careful scrutiny in 1896, 180° has been
 added to the position angle.
 The pr. star of an elongated cross in the finder.

No. 41. β 81. Lal. 46,187. 8.0
 23^h 30^m 3^s — 12° 7'.9.

8.1 and 10.8

1876.1 10.5 1.53 Dembowski 3 n
 1877.8 16.4 1.93 Cinc. 2
 1886.4 13.4 1.96 L. McC. 2-3

No. 42. λ 492. Lac. 9527. 6.5
 23^h 30^m 24^s — 28° 2'.3.

6.7 and 8.6

1897.8 265.1 0.38 See 1 n

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23^{hrs.}

REFERENCE CATALOGUE OF

No. 43. β 721. Lal. 46,243. ^{MAG.} 7.8
 23^h 31^m 8^s — 7° 40'.2.

8.5 and 8.6

1878.2	138.2	0.51	β	2-1 n
1879.2	145.5	0.44 ±	Cinc.	2
1886.8	134.6	0.38	L. McC.	2

No. 44. Howe. Lac. 9534. ^{MAG.} 6.5
 23^h 31^m 48^s — 32° 25'.5.

6.6 and 9.5

1877.8	250.2	5.50	Cinc.	1 n
1881.4	251.0	5.35	β	4-3
1885.8	253.1	5.16	Cinc.	2
1886.9	248.0	5.60	Pollock	2
1896.8	251.3	5.38	See	2

Also found independently as β 775, and β 1012.

No. 45. h. 3206. Ö.A. 22,939. ^{MAG.} 8.1
 23^h 31^m 49^s — 22° 13'.6.

8.6 and 9.3

1831. ±	352.9	2. ±	h	1 n
1877.8	349.3	3.14	Cinc.	2
1886.9	348.3	3.44	L. McC.	4-3

No. 46. λ 493. Ö.A. 22,947. ^{MAG.} 8.6
 23^h 32^m 55^s — 25° 46'.4.

A=8.6 B=11.0 C=11.0
 A and B+C

1897.8	206.4	36.46	See	1 n
		B and C		

1897.8	262.8	1.75	See	1 n
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No. 47. Russell 348. C. Z. 23 h. 884. ^{MAG.} 8.2
 23^h 33^m 53^s — 69° 44'.8.

8.6 greenish and 9.6 yellow

1870.9	350.3	4.16	Russell	1 n
1890.8	349.2	4.82	Sydney	4

No. 48. Dunlop 251. θ Phoenicis. ^{MAG.} 6.2
 23^h 34^m 6^s — 47° 11'.6.

6.6 and 7.6

1835.4	268.8	4.47	h	3 n
1851.8	269.5	4.08	Jacob	3
1852.8	270.0	4.00	"	4
1856.9	270.6	4.18	"	3
1873.8	271.2	4.75	Russell	1
1877.9	271.4	4.36	Melbourne	1
1879.7	271.2	3.39	β	2
1887.7	270.0	4.30	Pollock	2
1895.8	273.1	.....	Doberck	4

Virtually fixed.

Mr Russell calls this double h 5411, but erroneously so.

No. 49. β 723. Lal. 46,375. ^{MAG.} 7.5
 23^h 35^m 33^s — 0° 8'.3.

Comes = 11.7

1877.8	169.5	3.96	β	2 n
1878.7	167.4	3.60	"	2
1891.8	167.8	3.66	"	3

No. 50. Σ 3030. Göttingen 6492. ^{MAG.} 8.2
 23^h 35^m 35^s — 0° 56'.2.

8.9 and 9.1

1829.6	220.8	2.49	Σ	4 n
1866.1	224.0	2.57	Dembowski	3
1877.8	222.5	2.47	Cinc.	4
1886.8	222.5	2.53	L. McC.	3

No. 51. λ 494. C. Z. 23 h. 957. ^{MAG.} 8.9
 23^h 36^m 14^s — 34° 44'.8.

9.2 and 10.4

1896.7	211.6	0.74	See	2-1 n
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SOUTHERN DOUBLE STARS.

23^{hrs.}

239A

No. 52. β 279. ω_2 Aquarii. MAG. 4.7
 23^h 37^m 32^s — 15° 5'.9.

Comes = 10.7

	\circ	"			
1875.5	87.8	5.68	Dembowski	4 n	
1877.8	84.5	5.59	Cinc.	3	
1888.7	83.3	5.86	β	3	
1888.9	85.4	5.11	Haverford	2-1	

The p.m. of the chief star is 0".094 towards 125°.6, in which the companion seems to participate.

Considered a test for a 4 or 4½-inch refractor.

No. 53. h. 5414. C. Z. 23 h. 981. MAG. 8.8
 23^h 37^m 36^s — 78° 21'.8.

Comes = 10.3

	\circ	"	h		
1835.7	262.1	8.±	h	1 n	
1870.8	261.9	8.32	Russell	1	
1880.9	261.3	6.64	Hargrave	1	

No. 54. β 725. Piazzii 23 h. 161. MAG. 7.4
 23^h 37^m 38^s — 11° 52'.9.

Comes = 10.7

	\circ	"	β		
1877.8	237.3	4.32	β	2 n	
1877.8	245.3	4.46	Cinc.	1	
1891.9	241.1	4.12	β	3	

No. 55. h. 5417. Piazzii 23 h. 167. MAG. 6.3
 23^h 39^m 17^s — 26° 48'.1.

Comes = 9.5

	\circ	"	h		
1836.7	326.9	8.±	h	1 n	
1876.8	321.4	8.45	Cinc.	1	
1877.8	319.4	9.07	"	2	
1897.1	319.7	8.91	See	3	

No. 56. Cordoba [67]. C. Z. 23 h. 1041. MAG. 9.0
 23^h 39^m 29^s — 45° 48'.1.

Comes = 9.7

	\circ	"			
1897.8	306.1	4.32	See	1 n	

Prof. See also measures a 12th mag. star 24" N.

S.f. Lac. 9574, mag. 6.4, and near Lac. 9587, mag. 7.5.

No. 57. H. II. 24. i_2 Aquarii. MAG. 5.4
 23^h 40^m 49^s — 19° 14'.1.

5.6 and 7.2

	\circ	"	Σ		
1821.9	143.4	.....	Σ	1 n	
1845.8	140.5	5.78	Jacob	1	
1855.9	140.7	5.68	Secchi	3	
1876.3	140.0	6.34	Cinc.	4-2	
1892.9	139.9	5.48	Glasenapp	2	
1895.8	139.7	5.73	Doberck	4	
1897.8	137.2	6.17	See	1	
1898.9	134.6	5.86	Solá	1	

Common p.m. of 0".087 towards 54°.2.

Also recorded as South and h 356.

Other measures.

No. 58. Σ 3036. Piazzii 23 h. 179. MAG. 8.2
 23^h 40^m 53^s — 0° 17'.5.

8.3 and 10.9

	\circ	"	Σ		
1832.5	228.2	2.42	Σ	3 n	
1847.7	227.5	2.70	Mitchel	1	
1869.0	230.2	2.76	Dembowski	4	
1877.9	227.9	2.38	β	1	
1886.8	227.4	2.58	L. McC.	3-2	
1892.8	233.2	2.50	Glasenapp	2	

Fixed.

Other measures.

No. 59. β 726. B. D.—13°, 6461. MAG. 8.5
 23^h 41^m 25^s — 13° 18'.7.

8.7 and 10.7

	\circ	"	β		
1877.9	324.2	0.91	β	1 n	
1879.8	326.6	0.77 ±	Cinc.	3	
1886.9	324.5	0.68	L. McC.	3-2	

No. 60. Cordoba [68]. C. Z. 23 h. 1109. MAG. 8.1
 23^h 42^m 10^s — 61° 4'.5.

8.5 and 9.5

	\circ	"	C. G. A.		
1880.8	119.2	4.30	C. G. A.	3 n	

240A

23hrs.

REFERENCE CATALOGUE OF

<p>No. 61. Innes 305. Lac. 9598. ^{MAG.} 6.9 $23^{\text{h}} 42^{\text{m}} 50^{\text{s}}$ — $51^{\circ} 26'7''$</p> <p style="text-align: center;"><i>Comes</i> = 11.0</p> <p>1897.9 $140^{\circ} \pm$ $3'' \pm$ Innes 1 n A 10th mag. star is some way N.pr.</p>	<p>No. 66. Innes 146. Lac. 9641. ^{MAG.} 7.3 $23^{\text{h}} 49^{\text{m}} 54^{\text{s}}$ — $37^{\circ} 55'2''$</p> <p style="text-align: center;">7.8 and 8.3</p> <p>1897.3 $222^{\circ} \pm$ $0.73 \pm$ Innes 2 n Two faint stars pr.</p>
<p>No. 62. β 1013. δ Sculptoris. 4.6 $23^{\text{h}} 43^{\text{m}} 43^{\text{s}}$ — $28^{\circ} 41'0''$</p> <p style="text-align: center;"><i>Comes</i> = 11.0</p> <p>1881.9 $228^{\circ}2'$ $3''36$ β 2 n 1891.6 228.9 3.34 " 2 (Seen, 1896.8). Common p.m. of $0''.123$ towards $154^{\circ}6'$. An 8.9 mag. star, $74''$ away, constitutes with the chief star, the old pair δ 3216.</p>	<p>No. 67. Σ 3046. Lal. 46,916. 8.3 $23^{\text{h}} 51^{\text{m}} 15^{\text{s}}$ — $10^{\circ} 3'3''$</p> <p style="text-align: center;">8.8 and 9.3</p> <p>1830.1 $232^{\circ}2'$ 2.52 Σ 4 n 1863.9 241.0 2.90 Dembowski 2 1875.3 244.8 2.83 " 2 1877.9 243.0 3.03 Cinc. 3 1877.9 244.8 3.05 β 1 1892.9 246.0 2.92 Glasenapp 2 Other measures. Common p.m. of $0''.352$ towards $248^{\circ}5'$. The p.m. in the <i>Handbook of Double Stars</i> is erroneous.</p>
<p>No. 63. Sellors 14. Lac. 9612. 7.2 $23^{\text{h}} 45^{\text{m}} 17^{\text{s}}$ — $52^{\circ} 15'5''$</p> <p style="text-align: center;">7.8 and 8.1</p> <p>1891.9 $70^{\circ}4'$ 0.90 Sellors 1 n 1895.9 64.1 1.28 " 2</p>	<p>No. 68. β 730. 27 Piscium. 5.0 $23^{\text{h}} 53^{\text{m}} 33^{\text{s}}$ — $4^{\circ} 6'6''$</p> <p style="text-align: center;"><i>Comes</i> = 11.0</p> <p>1877.9 264.9 1.44 β 1 n 1879.0 265.2 1.49 " 5 1879.1 264.0 1.40 Cinc. 2 1886.9 269.1 1.78 L. McC. 3-2 1889.6 267.4 1.50 β 3 Common p.m. of $0''.094$ towards $232^{\circ}7'$.</p>
<p>No. 64. λ 495. C. Z. 23 h. 1205. 8.5 $23^{\text{h}} 45^{\text{m}} 44^{\text{s}}$ — $34^{\circ} 7'1''$</p> <p style="text-align: center;">8.7 and 10.6</p> <p>1896.7 $16^{\circ}5'$ 2.34 See 2 n</p>	<p>No. 69. β 731. Lal. 47,033. 8.0 $23^{\text{h}} 54^{\text{m}} 29^{\text{s}}$ — $8^{\circ} 21'6''$</p> <p style="text-align: center;">8.3 and 9.4</p> <p>1878.3 $257^{\circ}8'$ 1.57 β 2 n 1886.8 262.0 1.67 L. McC. 4 1888.8 262.1 1.36 Haverford 2</p>
<p>No. 65. Lalande 192. Lac. 9639. 6.4 $23^{\text{h}} 49^{\text{m}} 11^{\text{s}}$ — $27^{\circ} 36'0''$</p> <p style="text-align: center;">6.9 and 7.4</p> <p>1851.9 269.1 6.66 Jacob 2 n 1876.8 267.7 7.10 Cinc. 2 1892.8 266.7 6.13 Glasenapp 2 In the C. G. A. (where both stars' co-ordinates are given) the order of brightness is reversed. Also called Dunlop 253. Other measures. Lac. 9639 was formerly called ϕ Sculptoris.</p>	<p>No. 70. λ 499. Lac. 9685. 8.1 $23^{\text{h}} 55^{\text{m}} 4^{\text{s}}$ — $40^{\circ} 44'9''$</p> <p style="text-align: center;">8.6 and 9.1.</p> <p>1897.7 $270^{\circ}3'$ 0.72 See 2-1 n</p>

No. 68. The means of 1879.0 include the previous measure of 1877.9.

SOUTHERN DOUBLE STARS.

23hrs.

241A

No. 71. Gilliss 289. C. Z. 23 h. 1475. ^{MAG.} 8.0
 23^h 55^m 25^s — 67° 14'.3.

8.3 and 9.4

1889.8	*262.7	"	3.65	Pollock	2 n
1891.9	261.9	3.80	Sellers	1	

Separately observed on the meridian at Cordoba.

No. 73. h. 5440. Lal. 47,124. ^{MAG.} 7.8
 23^h 57^m 8^s — 27° 41'.4.

8.4 and 8.8

1834.8	285.1	3.63	h	1 n
1851.9	287.0	3.58	Jacob	2
1885.8	287.0	3.52	Cinc.	2

Other measures.

No. 72. h. 5437. Lac. 9686. ^{MAG.} 6.7
 23^h 55^m 25^s — 53° 39'.2.

Comes = 10.2

1836.0	295.6	"	2.5 ±	h	2 n
1852.9	292.5	2.89	Jacob	3-2	
1857.9	292.1	2.63	"	2-1	
1870.7	Not seen		Russell	1	
1880.6	295.7	2.10	Cruls	1	
1891.8	293.0	2.04	Sellers	1	

No. 74. Cordoba [69]. C. Z. 23 h. 1574. ^{MAG.} 8.5
 23^h 58^m 51^s — 48° 40'.9.

Comes = 9.9

1887.8	68.0	2.64	Pollock	3-2 n
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C.P.D. mag. = 7.4.

No. 75. λ 500. Yarnall, 10,936. ^{MAG.} 8.5
 23^h 59^m 45^s — 33° 2'.8.

8.6 and 11.7

1896.7	203.0	0.92	See	2 n
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Lac. 9714, mag. 7.0, is 20 secs. f.

LIST OF REJECTED STARS.

This list consists of stars rejected for the reasons given in the last column.

Authority or Discoverer.	Star.	Mag.	1900.		Original Record.	Remarks.
			R. A.	Dec.		
Wilson, H. C. C. G. A. Cordoba Z. C. Cape 1880; Catalogue. <i>Harvard Circular</i> , 18. Cincinnati.	C. Z. α h 1280. Lac. 408. Lac. 590. Lac. 896.	7.2 6.3 5.6 6.8	h m 0 48 0 50 1 23 1 53	- 18 12 - 45 46 - 27 38 - 61 21	1885, 115°, 0".3. 1880, Duplex, I. M.O. 1873, Duplex, I.S. M.O. 1875, Double. M.O.	Identification too uncertain. No confirmation. No confirmation. No confirmation.
<i>h</i> 3839. <i>h</i> 383.			6 9 6 10	- 18 17 - 2 40	1835, Double? 1827, faint pair 2".	Too wide. 1898.0, a 10.7 star 20" f. being the nearest <i>comes</i> . Co-ordinates in error, no such pair here. See Σ 734. 1897, no pair here. Might be = B. D. - 2°, 1526, mag. 9.6. Too faint.
Hargrave. C. G. A. C. G. A. Harvard 114. <i>h</i> 4058. Harvard 118. Cordoba Z. C.	Lal. 14,706. Lac. 2920. γ Puppis. Lac. 3624.	6.2 7.2 5.3 8.0	6 25 7 27 7 36 8 6 8 10 8 11 8 54	- 75 23 - 8 40 - 48 49 - 23 55 - 35 36 - 24 30 - 50 39	1883, 55°, 2".9, 8 ^m and 9 ^m . Double. 1876.2 S. pr. 1870, 333°, 2", 8.5 ^m and 10 ^m . 1838, 190°, 4", 5.7 ^m and 6.6 ^m . 1869, 1".5, both 9.5 ^m . 1875.4. Dpl.	Identification too uncertain. The p.m. is 0".17 towards 206°. No confirmation. No suitable star here. Single. No suitable star near. 1896 certainly single. 1897 single.
<i>h</i> 4211. Russell 127. Cape 1880, Catalogue. Russell 142.	ζ Octantis. Lac. 3967.	5.5 7.5 Red.	9 11 9 33 9 36	- 85 16 - 48 34 - 30 28	<i>h</i> :—"Doubtful." 1880. Triple 2" and 13". 1878. Close double.	Russell:—"Not divided. No star here, 1894 and 1896. 1897, single.
<i>h</i> 4336. C. G. A.	Cor. D. M. - 29°, 8466. η Argus cluster Nos. 166-7.	9.2 8.7	10 32 10 43	- 29 59 - 59 34	1880, 354°, 3".4. 1834, 1".5, 9.6 and 10.6. Requires verifying. Both 9.5, 2".3.	No star here, C. Z. 10 ^h 1352 26' S. is double. See Cata- logue. No confirmation. Probably the same star. Prof. See in measuring an 11.5 <i>comes</i> at 16".8 makes no mention of a closer com- panion (<i>M. N. R. A. S.</i> , vol. lvii. p. 346).
Alvan Clark 6. <i>h</i> 4527. Cape 1880, Catalogue. Cordoba Z. C. <i>h</i> 4628. <i>h</i> 4694.	Lac. 5471. π Centauri. ζ Centauri. 4 Libræ.	6.0 7.7 5.2 2.8 5.8	12 4 12 28 13 12 13 41 13 49 14 38	- 19 49 - 23 17 - 43 33 - 35 45 - 46 48 - 24 34	1852. 1834, 94°, 2" both 9.7 ^m . 1877. Close Double. 1874. Dpl. Suspected <i>comes</i> at 6". 1836.3, 45°, close, very unequal, strongly sus- pected.	No such bright star here. No pair here. 1897. Under 0".5 if double, which is doubtful. No confirmation. No confirmation. No confirmation.
Cincinnati.			15 31	- 20 1	1884, 100°, 1".5, both 10 ^m .	Identification too uncertain.

LIST OF REJECTED STARS.

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REJECTED STARS—*continued.*

Authority. or Discoverer.	Star.	Mag.	1900.		Original Record.	Remarks.
			R. A.	Dec.		
Howe.		8.0	^h 15 ^m 39	- 20 40	1883, 200°, 2".7, 8.2 ^m and 9.7 ^m .	No star = 8 ^m in this position.
Harvard 141. <i>Harvard Circular</i> , 18. <i>h</i> 4864.	Lac. 6793.	6.5	16 3 16 15	- 30 45 - 43 40	1868, 353°, 4."2.	Identification too uncertain. 1897. 25". Too wide.
<i>h</i> 4865.	B.D. - 6°, 4457.	9.6	16 28	- 6 22	1835. Class I., 9.7 ^m and 12 ^m .	No confirmation.
Innes 103. <i>h</i> 4975.	Gilliss P. Z. 11,951. C. Z. 17 h 480 Lac. 7413.	8.0 6.4	16 41 17 9 17 40	- 83 56 - 33 43 - 35 22	1835, 314°, 2", 10 ^m and 11 ^m . <i>h</i> —: "dubious."	No close companion:—Russell. Not verified. Single on 7 nights, Sydney and Melbourne.
Cordoba Z. C. O. Stone.	C. Z. 18 h 2002.	9.0	18 37 19 22	- 54 0 - 16 8	1874. Class I. 1880.6, 195°, 5", 6.8 ^m and 7.3 ^m , 2 nights.	See 18 hrs., No. 74 in catalogue. No such bright star hereabouts.
O. Stone.			19 42	- 22 4	1879.5, 316°, 3", 7.8 and 11. Measured as Cinc. O. S. 1734.	Perhaps equal to Cinc. O. S. 1735?
Cape 1880, Catalogue. Gilliss 266.	Lac. 8469. <i>a</i> Octantis.	7.2 5.3	20 33 20 53	- 72 17 - 77 24	1874. Double. 1851, 302°, 1".9 comes 10 ^m .	1896.9. Not double. 1897. Single. The p.m. is 0".37 towards 184°.
Dembowski.	14 Aquarii.		21 11	- 9 38	1876, 147°, 0".5, 7.2 ^m and 7.3, 4 n.	Single: β . Dembowski retained a doubt as to the duplicity.
Cincinnati. β 768. Cincinnati.	Piazzi 21 h 324.	5.7	21 46 21 50 22 39	- 23 25 - 37 44 - 22 8	1883, 340°, 0".5, both 7.5. 1883, 20°, 1" 8 ^m and 9.5 ^m .	No bright star here. Practically rejected by β . No star of that magnitude here. Position too rough for identification.

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INDEXES TO STARS CONTAINED IN THE CATALOGUE.

THE following indexes have been added to facilitate the identification of stars when the names only are known, and not the places for 1900^o.

The first index contains the constellation-named stars; this is followed by indexes of the stars occurring in the lists of the Herschels, the Struves, Burnham, and of other discoverers of double stars.

In many cases the notes appended to the measures contain references to stars not necessarily double; these stars, if constellation-named, are also indexed; but they are distinguished in the index by having, in place of the right ascension, a reference to the double star in the notes to which they are mentioned.

In a similar way, when a double star is known by various synonyms these are usually all indexed, but reference is then made to the chief name of the double star, and the right ascension will be found under this name in the proper index.

In all the indexes the completed minute of the right ascension is given, this being more useful than the nearest minute for the purposes of an index.

INDEX TO CONSTELLATION-NAMED STARS.

(The R.A. is given to the nearest *completed* minute.)

Constellation.	R.A.	Constellation.	R.A.	Constellation.	R.A.
Antlia		Argo— <i>contd.</i>		Centaurus— <i>cont.</i>	
δ	10 ^h 24 ^m	δ	8 ^h 41 ^m	κ	See Innes 237
ζ ₁	9 26	ζ	See Innes 164	μ	13 ^h 43 ^m
Apus		η	See Rej. Stars	ξ ₂	13 1
β	16 ^h 28 ^m	κ	and <i>h</i> 4356	ο ₁	11 27
ι	See Innes 104	λ	See β 1061	ο ₂	See ο ₁
κ ₂	15 ^h 29 ^m	μ	9 ^h 4 ^m	ψ	14 ^h 14 ^m
Aquarius		ξ	10 42	φ	13 25
β	See β 72	π	7 45	χ	13 0
ζ	22 ^h 23 ^m	σ	See Jacob [4]	ψ	13 47
	see also β 76	υ	7 ^h 26 ^m	κ	13 46
	and β 1264	φ	9 44	ι	12 20
ο	See Hough 469		9 26	γ	13 47
ψ ₁	See Hough 469	Caelum		z	See Rej. Stars
ψ ₃	β 1220 and β 716	α	4 ^h 37 ^m	D	12 ^h 8 ^m
ω ₂	23 ^h 13 ^m	γ	5 0	F	12 13
e	23 37	Canis major		G	12 21
	See Leavenworth	α	6 ^h 40 ^m	J	13 16
	(22 ^h 5 ^m)	ε	see also β 20	M	13 40
f	22 21	λ	6 ^h 54 ^m	N	13 45
i ₃	23 40	μ	See β 753	Q	13 35
4	20 46	τ	6 ^h 51 ^m	R	14 9
7	20 51	ι ₂	7 14	Cetus	
12	20 58		O. Stone (6 ^h 42 ^m)	ζ	See β 1168
14	See Rej. Stars	Capricornus		χ	
18	See β 272	α ₂	20 ^h 12 ^m	ι ₂	0 ^h 24 ^m
19	See Hough 158	β	Barnard (20 ^h 15 ^m)	ι ₃	0 30
24	21 ^h 34 ^m	ζ	21 ^h 20 ^m	37	1 9
29	21 56	π	20 21	42	1 14
35	See β 170	ρ	20 23	58	1 52
41	22 ^h 8 ^m	41	21 36	66	2 7
51	22 18	Carina		84	2 36
60	See β 77	ι	See Innes 203	94	3 7
94	23 ^h 13 ^m	ρ	See Innes 32	95	3 13
96	23 14	ι ₂	10 ^h 34 ^m	Chamaeleon	
Aquila		γ	11 8	δ ₁	10 ^h 44 ^m
e	See Hough 106	C	8 13	δ ₂	See δ ₁
5	18 ^h 41 ^m	H	See Innes 201	ε	11 ^h 54 ^m
Ara		Centaurus		Circinus	
γ	17 ^h 16 ^m	α	14 ^h 32 ^m	α	14 ^h 34 ^m
ε ₂	16 55	γ	12 36	γ	15 15
ι	17 15	δ	12 3	δ	15 8
κ	17 18		see also Innes	κ	See <i>h</i> 4813
λ	See Innes 106	η	216	Columba	
ν ₁	See <i>h</i> 4978	ζ	14 ^h 29 ^m	α	5 ^h 36 ^m
Argo		θ	See Rej. Stars,		
α	6 ^h 21 ^m		also Dunlop 141		
γ	8 6		14 ^h 0 ^m		

CONSTELLATION-NAMED STARS—*continued.*

Constellation.	R.A.	Constellation.	R.A.	Constellation.	R.A.
Corona Australis		Grus		Lupus— <i>contd.</i>	
γ	18 ^h 59 ^m	β	See Cordoba [63]	φ ₁	15 ^h 15 ^m
κ	18 26	η	22 ^h 39 ^m	ψ ₂	See λ 245
λ	18 36	θ	23 1	ω	15 ^h 31 ^m
Corvus		π ₁	22 16	a	14 30
δ	12 ^h 24 ^m	τ ₂	See Innes 22	b	14 40
ζ	12 15	Hydra		d	15 29
Crater		β	11 ^h 47 ^m	f	See h 4788
γ	11 ^h 19 ^m	π	See β 938	h	See Innes 87
ε	See β 26	φ ₂	See β 1075	U.A. 103	15 ^h 22 ^m
Crux		φ ₃	14 ^h 22 ^m	Microscopium	
a	12 ^h 21 ^m	ι	14 40	a	20 ^h 43 ^m
η	12 1	N	11 27	θ ₂	21 18
ι	12 39	15	8 46	v	See Innes 127
κ	See Harvard (12 ^h 47 ^m)	17	8 50	R	See λ 423
μ	12 ^h 48 ^m	29	9 22	Monoceros	
Eridanus		59	14 52	β	6 ^h 23 ^m
ε	3 ^h 28 ^m	U.A. 214	10 16	3	5 57
θ	and Dunlop 156	„ 383	See H. III. 97	4	6 3
ι	2 ^h 54 ^m	Indus		Musca	
ο ₂	See Innes 53	a	20 ^h 30 ^m	β	12 ^h 40 ^m
ρ ₂	4 ^h 10 ^m	η	See Innes 128	ζ	12 16
τ ₄	2 57	θ	21 ^h 12 ^m	θ	13 1
v ₄	3 15	Lepus		Norma	
χ	4 14	a	5 ^h 28 ^m	γ ₂	16 ^h 12 ^m
ω	1 52	β	5 23	ε	16 19
f	See β 316	γ	5 40	θ	See also Innes 93
p	3 ^h 44 ^m	ι	5 7	ι ₁	16 ^h 8 ^m
w	1 35	κ	5 8	κ	15 55
Δ	3 49	Libra		λ	16 5
X	4 9	η	See β 35	Octans	
12	4 14	ι ₂	See β 618	a	See Rej. Stars
15	See h 3555	μ	14 ^h 43 ^m	ζ	12 ^h 44 ^m
30	3 ^h 13 ^m	ξ (51)	See ξ Scorpii	ι	21 35
32	3 47	4	See Rej. Stars	λ	20 29
46	See H. II. 36	5	14 ^h 40 ^m	μ ₂	
53	See β 185	48	See β 120	Ophiuchus	
54	See Howe 6	50	„	η	17 ^h 4 ^m
55	4 ^h 38 ^m	Lupus		ο	17 11
Fornax		a	14 ^h 35 ^m	ρ	16 19
a	3 ^h 7 ^m	β	See h 4786	see also β 624	
γ ₁	2 45	γ	15 ^h 28 ^m	and β 1115	
γ ₂	2 45	ε	15 15	τ	17 ^h 57 ^m
η ₂	2 46	ζ	Washburn 121	ψ	See β 120
η ₃	See h 3536	η	15 ^h 53 ^m	A	17 ^h 9 ^m
v	See h 3532	κ	15 4	see also β 956	
χ ₃	3 ^h 24 ^m	λ	15 2	24	16 ^h 50 ^m
ω	2 29	μ	15 11	38	17 11
		ξ	15 50	U.A. 105	17 9
		π	14 38		

CONSTELLATION-NAMED STARS—*continued.*

Constellation.	R.A.	Constellation.	R.A.	Constellation.	R.A.
Orion		Puppis— <i>cont.</i>		Sextans	
β	5 ^h 9 ^m	2	7 ^h 40 ^m	γ	9 ^h 47 ^m
ϵ	See β 89	5	7 43	40	10 44
ζ	5 ^h 35 ^m	9	7 47	Telescopium	
η	5 19	19	8 6	ϵ	18 ^h 3 ^m
θ	5 30	21	See β 906	Toucan	
θ_1	See β 1050	Reticulum		β	0 ^h 26 ^m
ι	5 ^h 30 ^m	a	See h 3641	γ	See h 5392
σ	5 33	ζ_2	See Innes 150	δ	22 ^h 20 ^m
c	5 30	θ	4 ^h 16 ^m	κ	1 12
31	5 24	Sagittarius		λ_1	0 ^h 48 ^m
Pavo		β_1	19 ^h 15 ^m	U.A. 64	0 40
a	See Innes 126	δ	18 14	Triang. Austr.	
ξ	18 ^h 14 ^m	ϵ	18 17	δ	16 ^h 6 ^m
Phoenix		ζ	18 56	ι	16 18
a	0 ^h 21 ^m	η	18 10	T	15 0
β	1 1	κ_1	20 15	Vela	
	and Sellors 2.	κ_2	20 17	f	8 ^h 47 ^m
ζ	1 ^h 4 ^m	μ	18 7	k	9 11
η	0 38	ν_1	See ν_2 Sagittarii	p	10 33
θ	23 34	ν_2	18 ^h 49 ^m	s	10 27
κ	0 21	f	See β 146	z	9 10
ξ	0 37	h_2	19 ^h 30 ^m	A	8 25
Pictor		16	18 9	B	8 19
ι	4 ^h 48 ^m	21	18 19	H	8 53
μ	6 30	53	19 33	I	9 23
Pisces		Scorpio		J	10 17
27	23 ^h 53 ^m	a	16 ^h 23 ^m	N	See Innes 31
Piscis Australis		β	15 59	T	See Rumker 13
a	22 ^h 52 ^m	ζ_1	16 46	Y	See h 4329
β	22 25	θ	17 30	Virgo	
γ	22 46	ι_1	See Innes 108	γ	12 ^h 36 ^m
δ	22 50	ι_2	17 ^h 43 ^m	θ	and β 607
η	21 55	ν	16 6	ϕ	13 ^h 4 ^m
θ	21 41	ξ	15 58	14	23
Puppis		σ	16 15	Y	See β 932
b	7 ^h 49 ^m	c_1	16 6	46	12 ^h 55 ^m
d_2	7 36	c_2	See h 4839	48	12 58
k	7 34	k	16 ^h 58 ^m	53	See β 221
n	7 30	A	15 47	54	13 ^h 8 ^m
r	See Rej. Stars	11	16 2	81	13 32
v	See Jacob [4]	Sculptor		86	13 40
G	6 ^h 23 ^m	δ	23 ^h 43 ^m	Volans	
J	See Innes 286	ϵ	1 40	a	See h 4167
K	See Dunlop 63	κ_1	0 4	γ	7 ^h 9 ^m
N	7 ^h 54 ^m	τ	1 31	ϵ	8 7
U	See β 332	Serpens		ζ	7 43
Z	See Sellors 7	e	See Σ 2347		

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THE HERSCHELS' STARS.

♃. I.		♃. IV.	h	h	h		
10	6 ^h 23 ^m	105	12 ^h 24 ^m	1249	14 ^h 11 ^m	3527	2 ^h 39 ^m
13	19 33	112	See β 601	1381	See h 596	3532	2 44
33	15 58	121	16 ^h 15 ^m	1537	20 ^h 30 ^m	3534	2 44
35	17 11			1713	See Dunlop 141	3535	2 45
44	20 46	♃. V.		1957	0 ^h 16 ^m	3536	2 46
47	21 6	6	16 ^h 6 ^m	1964	0 20	3541	2 49
50	22 37	7	See h 2822	1968	0 22	3545	Piazzi (2 ^h 54 ^m)
54	5 9	24	1 ^h 9 ^m	2004	0 52	3549	2 ^h 59 ^m
77	10 57	50	See γ Leporis	2036	1 15	3555	3 7
80	13 32	78	See ζ Sagittarii	2043	1 17	3556	3 8
88	17 57	95	22 ^h 18 ^m	2067	See h 2072	3565	3 14
93	19 56	119	See β 1049	2072	1 ^h 36 ^m	3576	3 21
		120	See β 587	2298	See β 1242	3589	3 40
		124	See Howe 25	2435	See β 904	3592	3 42
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7	C. Mayer (22 ^h 23 ^m)	♃. VI.		2822	18 7	3611	3 ^h 53 ^m
17	6 ^h 23 ^m	44	See β 618	2843	See h 2847	3641	4 13
19	16 19			2844	See h 2845	3642	4 15
20	15 58	♃. N.		2845	18 ^h 50 ^m	3644	See Rumker 3 and
24	23 40	9	See ♃. III. 33	2904	19 48		β 744
26	5 30	19	7 ^h 30 ^m	2948	Barnard (20 ^h 15 ^m)	3646	4 ^h 18 ^m
33	5 9	24	4 9	2992	20 ^h 38 ^m	3650	4 23
36	3 49	26	See β 600	3003	20 47	3672	4 34
42	12 51	28	14 ^h 51 ^m	3014	21 8	3683	4 38
45	13 8	33	See Σ 3094	3074	21 53	3694	See Innes 273
51	20 23	38	Lalande (12 ^h 36 ^m)	3092	See β 170	3696	4 ^h 45 ^m
57	22 42	39	16 ^h 18 ^m	3184	23 ^h 15 ^m	3697	4 47
63	7 32	40	17 56	3206	23 31	3699	4 47
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77	8 ^h 50 ^m	49	See A. Clark 5	3362	0 ^h 18 ^m and h 1964	3707	4 ^h 51 ^m
80	4 10	50	10 ^h 24 ^m	3370	0 ^h 23 ^m	3715	4 56
85	15 50	51	13 47	3373	See β Toucani	3721	4 53
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7	15 ^h 59 ^m	112	23 ^h 18 ^m	3387	0 37	3735	5 9
12	5 30	117	22 34	3391	0 38	3739	5 10
18	See γ Virginis	119	19 23	3396	0 41	3743	5 11
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26	See β 1064			3485	2 7	3834	6 1
76	Secchi (0 ^h 29 ^m)			3488	2 9	3835	See Dunlop 23
87	See β 190			3494	2 15	3839	See Rejected Stars
91	7 ^h 40 ^m			3497	2 ^h 29 ^m	3857	6 ^h 20 ^m
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3875	See β 755	4200	9 16	4555	See Dunlop 126	4756	15 13
3883	See Dunlop 31	4206	9 17	4556	12 ^h 48 ^m	4757	15 15
3891	6 ^h 41 ^m	4211	See Rejected Stars	4562	See Cape 13	4771	15 22
3896	See Innes 182	4213	9 ^h 22 ^m	4563	12 ^h 55 ^m	4773	15 25
3900	6 ^h 50 ^m	4218	9 29	4566	13 0	4774	See β 1114
3905	See Innes 66	4220	9 30	4567	13 0	4776	15 ^h 23 ^m
3928	7 ^h 1 ^m	4224	9 31	4568	See Dunlop 129	4777	15 24
3932	6 58	4249	9 44	4569	13 ^h 1 ^m	4780	15 30
3941	7 8	4252	9 44	4576	13 9	4786	15 28
3945	See Dunlop 42	4269	See Rumker 12	4579	13 14	4787	See <i>h</i> .4780
3948	7 ^h 14 ^m	4283	10 ^h 0 ^m	4580	13 17	4788	15 ^h 29 ^m
3949	7 14	4284	10 1	4586	13 21	4795	15 36
3950	See Lalande 53	4295	See Innes 13	4587	13 20	4799	See Rumker 20
3956	7 ^h 18 ^m	4303	See β 219	4596	13 30	4807	See Dunlop 193
3957	7 18	4306	10 ^h 15 ^m	4598	13 33	4809	See Sellors 11
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4018	7 ^h 50 ^m	4373	10 44	4634	See Dunlop 151	4845	16 16
4023	7 51	4383	10 50	4636	13 ^h 51 ^m	4847	See Dunlop 201
4025	7 55	4393	10 53	4640	13 55	4848	16 ^h 17 ^m
4041	8 0	4409	11 2	4649	14 2	4850	See <i>H. N.</i> 39
4045	8 0	4414	11 8	4655	14 4	4853	16 ^h 19 ^m
4046	8 1	4421	11 11	4661	14 6	4854	16 21
4058	See Rejected Stars	4423	11 11	4667	14 13	4857	16 23
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4084	8 ^h 15 ^m	4445	11 ^h 27 ^m	4685	14 28	4864	See Rejected Stars
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4087	8 18	4460	11 34	4690	14 30	4866	16 34
4093	8 22	4462	11 34	4693	See Dunlop 168	4874	16 33
4104	8 25	4463	See <i>h</i> .4455	4694	See Rejected Stars	4876	16 40
4106	8 26	4465	11 ^h 36 ^m	4696	14 ^h 39 ^m	4885	16 44
4107	8 27	4475	11 43	4698	14 40	4889	16 47
4125	8 35	4478	11 47	4706	14 44	4892	16 47
4128	8 37	4480	11 49	4707	14 45	4896	16 48
4130	8 41	4481	11 52	4712	14 48	4899	16 50
4136	8 41	4484	11 53	4715	14 49	4901	16 52
4140	See Rumker 9	4486	11 54	4716	14 50	4904	16 56
4142	See <i>h</i> .4130	4490	11 57	4718	14 51	4906	See Hargrave [288]
4143	8 ^h 46 ^m	4495	12 0	4722	14 53	4908	$\lambda...$ (16 ^h 54 ^m)
4144	8 46	4498	12 1	4723	14 54	4909	16 ^h 56 ^m
4145	See <i>h</i> .4148	4501	See η Crucis	4728	14 58	4913	16 57
4148	8 ^h 47 ^m	4505	12 ^h 6 ^m	4731	15 5	4914	17 1
4165	8 58	4506	12 6	4734	15 3	4919	See Dunlop 213
4167	8 58	4507	12 7	4735	15 4	4920	17 ^h 4 ^m
4178	9 2	4518	12 19	4740	15 4	4923	17 3
4188	9 8	4521	See α Crucis	4742	15 8	4926	17 7
4190	9 8	4527	See Rejected Stars	4750	15 9	4931	17 11

Note.—*h* 4668 to *h* 4670 on page 227 of his "Astronomical Results," should be *h* 4968 to *h* 4970.

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α		α		α		α	
4935	17 ^h 12 ^m	5031	18 ^h 7 ^m	5152	19 ^h 47 ^m	5278	21 ^h 35 ^m
4942	17 16	5032	18 6	5163	19 56	5292	21 47
4945	17 17	5034	18 8	5167	20 2	5296	21 41
4949	17 19	5035	See α 2822	5173	20 4	5316	22 0
4953	See Dunlop 217	5041	18 ^h 17 ^m	5177	20 6	5319	22 6
4957	17 ^h 24 ^m	5045	18 23	5178	20 7	5324	Howe (21 ^h 56 ^m)
4962	17 28	5053	See Russell 309	5188	20 14	5334	22 ^h 20 ^m
4963	17 29	5057	18 ^h 37 ^m	5189	20 15	5344	22 29
4970	17 34	5066	18 43	5190	20 15	5348	22 32
4975	17 40	5067	18 45	5194	20 20	5356	See μ . N. 17
4978	17 42	5069	18 47	5204	20 25	5362	22 ^h 40 ^m
4979	17 43	5073	See β 1033	5209	20 30	5365	22 46
4981	17 43	5075	18 ^h 54 ^m	5218	20 39	5367	22 46
4992	17 48	5078	18 55	5220	See β 153	5379	See α 5381
4996	17 51	5080	18 56	5222	See Runkner 26	5381	23 ^h 0 ^m
5000	17 52	5082	18 57	5224	20 ^h 43 ^m	5382	22 59
5003	17 52	5084	18 59	5231	20 48	5387	23 7
5009	17 58	5085	19 1	5233	20 57	5392	23 12
5010	17 58	5101	See Cordoba [55]	5235	21 0	5394	23 14
5013	See α 5014	5103	19 ^h 15 ^m	5245	See α 5235	5395	23 15
5014	17 ^h 59 ^m	5107	See Dunlop 226	5246	21 ^h 3 ^m	5411	See Dunlop 251
5015	18 1	5113	19 ^h 18 ^m	5252	See μ . I. 47	5414	23 ^h 37 ^m
5021	18 3	5114	19 19	5258	21 ^h 12 ^m	5417	23 39
5023	18 3	5117	19 21	5261	21 28	5437	23 55
5027	18 5	5120	19 23	5267	21 20	5440	23 57
5028	18 5	5140	19 40	5271	21 21	5517	See β 272
5029	18 6	5141	19 40				

THE STRUVES' STARS.

Σ		Σ		Σ		Σ	
15	0 ^h 10 ^m	547	4 ^h 20 ^m	836	5 ^h 57 ^m	1146	7 ^h 43 ^m
23	0 12	564	4 28	850	6 2	1152	See Σ 1154
39	Secchi (0 ^h 29 ^m)	590	See μ . III. 99	919	See μ . II. 17	1154	7 ^h 47 ^m
49	0 ^h 35 ^m	614	4 ^h 49 ^m	955	6 ^h 36 ^m	1157	7 49
91	1 2	631	4 56	971	6 43	1216	8 16
113	1 14	636	4 58	987	6 49	1260	See Lalande 66
120	1 19	655	See μ . III. 67	990	See Σ 997	1270	See Lalande 67
147	See Lalande 8	661	5 ^h 8 ^m	997	6 ^h 51 ^m	1295	See μ . II. 77
171	1 ^h 43 ^m	667	See μ . I. 54	998	6 51	1357	9 ^h 23 ^m
218	See Lalande 12	668	See μ . II. 33	1011	6 56	1416	10 7
231	See μ . IV. 25	692	See β 190	1019	Dembowski 12	1441	10 25
280	2 ^h 29 ^m	701	See μ . II. 102	1026	See β 328	1445	10 27
295	2 36	725	5 ^h 24 ^m	1029	7 ^h 3 ^m	1470	10 41
315	2 44	734	5 ^h 28 ^m and β 1049	1031	7 4	1474	See β 595
356	See β 527	743	5 ^h 29 ^m	1034	7 4	1476	10 ^h 44 ^m
357	3 ^h 3 ^m	748	See θ Orionis	1043	7 7	1500	10 54
358	See β 528	750	See μ . II. 26	1049	7 8	1560	11 33
407	3 ^h 25 ^m	752	See μ . III. 12	1056	7 10	1593	11 58
408	3 25	754	5 ^h 31 ^m	1057	See β 575	1604	12 4
470	See μ . II. 36	757	5 32	1085	7 ^h 19 ^m	1619	See Lalande 96
489	3 ^h 57 ^m	758	See Σ 757	1097	See β 332	1669	Lalande
516	See μ . N. 24	774	See ζ Orionis	1104	7 ^h 24 ^m		(12 ^h 36 ^m)
518	See μ . II. 80	790	5 ^h 41 ^m	1121	See μ . II. 63	1670	See γ Virginis
536	4 ^h 17 ^m	809	See β 1188	1133	7 ^h 37 ^m	1690	See μ . II. 42
544	4 20	826	5 ^h 53 ^m	1138	See μ . IV. 91	1724	See μ . III. 50

INDEXES TO STARS.

THE STRUVES' STARS— <i>continued.</i>							
Σ		Σ		Σ		Σ	
1738	13 ^h 17 ^m	2171	17 ^h 23 ^m	2597	19 ^h 49 ^m	3030	23 ^h 35 ^m
1763	See \mathbb{H} . I. 80	2173	17 25	2643	20 7	3036	23 40
1780 rej.	See β 935	2234	See Σ 3128	2729	20 46	3046	23 51
1788	13 ^h 49 ^m	2262	17 ^h 57 ^m	2745	20 58	3063	0 2
1799	13 59	2296	18 10	2752	21 1	3081	13 31
1802	14 2	2303	18 14	2781	21 11	3090	15 3
1833	14 17	2306	18 16	2826	21 42	3091	15 10
1837	14 19	2313	18 19	2847	21 52	3094	15 33
1846	14 23	2347	18 32	2909	22 23	3095	15 39
1876	14 41	2373	18 40	2928	22 34	3099	15 49
1925	15 11	2379	18 41	2935	See \mathbb{H} . I. 50	3101	15 53
1974	15 43	2434	18 57	2944	See \mathbb{H} . II. 57	3105	16 26
1985	See \mathbb{H} . II. 85	2490	19 12	2970	See β 481	3106	16 50
1998	15 ^h 58 ^m	2503	19 17	2980	23 ^h 4 ^m	3116	6 16
2005 rej.	See β 948	2535	Dembowski 21	2981	See Σ 2980	3126	See Σ 1974
2048	16 ^h 23 ^m	2541	19 ^h 31 ^m	2988	See Lalande 185	3128	17 ^h 47 ^m
2119	17 0	2545	See \mathbb{H} . I. 13	2995	See β 79		
2132	17 7	2547	"	2998	See \mathbb{H} . III. 34	O Σ	
2156	17 18	2582	19 ^h 44 ^m	3008	See \mathbb{H} . N. 112	256	12 ^h 51 ^m

BURNHAM'S STARS.

β		β		β		β	
6	1 ^h 39 ^m	81	23 ^h 30 ^m	142	See Schjellerup ₂ 30	215	9 ^h 49 ^m
7	1 52	83	2 41	146	19 ^h 41 ^m	216	9 52
10	2 45	84	3 11	148	19 46	217	10 2
11	2 57	89	5 32	153	20 41	218	10 2
12	3 19	94	See Jacob	154	20 47	219	10 16
13	5 29	97	6 ^h 19 ^m	157	21 1	220	11 7
15	5 42	98	6 27	168	21 48	221	13 7
16	5 57	101	4 47	169	21 51	222	13 12
17	6 3	102	8 11	170	22 3	225	14 19
18	6 12	103	8 50	172	22 18	226	14 33
19	6 37	106	14 43	177	22 47	227	15 13
20	6 44	110	See λ 2036	178	22 50	228	See λ 4756
24	8 49	111	10 ^h 46 ^m	181	23 8	233	0 ^h 50 ^m
25	See Schjellerup ₂ 16	114	13 29	182	23 11	234	0 55
26	11 ^h 18 ^m	116	Cape (14 ^h 14 ^m)	183	1 48	239	14 52
28	12 24	117	14 ^h 25 ^m	184	4 23	241	16 49
33	15 25	118	14 48	185	4 32	242	17 18
34	See β 33	119	15 0	186	4 41	243	18 2
35	15 ^h 37 ^m	120	16 6	189	5 15	244	18 2
36	15 47	121	15 33	190	5 15	245	18 3
37	15 56	122	15 34	195	6 38	246	18 11
38	15 56	123	16 48	197	7 7	251	21 6
39	16 2	124	17 5	199	7 25	252	21 14
40	16 5	125	17 ^h 5 ^m and β 956	201	See Argelander [2]	256	0 14
47	17 55	126	17 ^h 14 ^m	202	7 ^h 57 ^m	259	1 47
48	18 15	127	See Harvard 144	205	8 28	261	2 39
56	19 59	128	17 ^h 20 ^m	206	8 31	267	20 36
60	See Mitchel	129	17 22	207	8 34	271	21 13
61	See \mathbb{H} . II. 51	131	18 7	208	8 34	272	21 18
72	21 ^h 24 ^m	132	18 5	210	8 52	276	21 55
76	22 24	133	18 21	212	9 11	279	23 37
77	22 28	135	18 32	213	9 23	282	17 9
79	23 12	138	19 7	214	9 36	283	17 55

BURNHAM'S STARS—*continued.*

β		β		β		β	
285 ^a	18 ^h 10 ^m	462	14 ^h 24 ^m	618	15 ^h 6 ^m	798	12 ^h 59 ^m
285 ^b	18 10	463	18 11	620	15 40	803	14 5
286	18 9	467	19 40	623	15 55	804	14 32
300	See β 639	473	21 2	624	16 16	805 ^a	See β 805 ^b
301	0 ^h 44 ^m	475	22 7	631	17 34	805 ^b	14 ^h 34 ^m
308	3 33	478	22 24	639	18 12	806 ^a	14 34
311	4 22	481	22 57	654	19 30	806 ^b	14 34
312	4 43	486	0 9	662	20 15	807	14 37
314	4 54	488	0 18	668	20 26	808	14 52
316	4 47	490	0 30	674	20 39	809	15 4
318	5 11	494	0 41	678	20 55	819	16 31
319	5 22	501	1 1	683	21 21	820	16 34
320	5 23	511	1 43	684	21 ^h 24 ^m and β 72	824	17 43
321 ^a	5 34	514	1 54	693	21 ^h 50 ^m	827	19 39
321 ^b	5 34	516	2 0	709	22 36	830	19 50
322	5 35	519	2 24	714	23 8	832	20 1
323	6 9	520	2 31	715	23 9	833	20 6
324	6 45	527	3 1	716	23 10	840	21 47
325	6 47	528	3 3	721	23 31	871	1 42
327	6 53	529	3 9	723	23 35	877	2 45
328	7 ^h 1 ^m and β 754	531	3 18	725	23 37	881	4 29
330	7 ^h 14 ^m	532	3 28	726	23 41	882	4 33
331	7 15	534	3 33	730	23 53	884	4 58
332	7 23	539	3 44	731	23 54	885	5 5
333	7 58	541	3 49	734	0 47	897	6 45
334	8 2	542	3 51	735	O. Stone (0 ^h 59 ^m)	898 ^a	6 45
336	9 7	543	3 52	737	O. Stone (2 ^h 13 ^m)	898 ^b	6 45
339	9 26	548	4 11	738	2 ^h 18 ^m	902	7 53
341	12 58	555	5 9	739	2 20	903	7 59
342	13 9	556	5 19	741	2 52	904	8 8
343	13 46	564	5 56	744	4 17	905	8 11
344	13 53	565	6 4	746	4 ^h 27 ^m and Innes	906	8 12
345	14 35	566	6 9		154	907	8 15
346	14 42	567	6 10	747	4 ^h 29 ^m	908	9 9
347	14 48	568	6 19	748	4 48	910	9 28
350	15 9	569	6 20	750	See Jacob [2]	911	10 ^h 3 ^m and β 218
354	15 37	570	6 23	751	See Jacob [12]	912	10 ^h 17 ^m
368	21 2	572	6 56	753	6 ^h 24 ^m	914	10 40
384	22 57	573	6 57	754	6 31	916	11 9
391	0 4	574	7 2	755	6 31	920	12 10
393	0 13	575	7 10	757	7 8	921	12 12
395	0 32	578	7 22	759	18 5	922	12 21
399	1 22	583	8 4	760	18 10	926	12 53
401	3 ^h 45 ^m and β 539	586	8 42	761	19 33	927	See β 928
403	4 ^h 20 ^m	587	8 46	762	O. Stone (20 ^h 10 ^m)	928	12 ^h 58 ^m
407	8 46	590	9 22	763	20 ^h 17 ^m	929	12 58
409	8 55	591	9 24	764	20 53	932	13 29
410	9 5	592	9 50	765	20 54	935 ^a	13 40
411	10 31	595	10 43	766	21 18	935 ^b	13 40
412	12 3	600	11 11	767	See Melbourne [6]	938	14 0
414	14 35	601	11 24	768	See Rejected Stars	939	14 8
416	See Melbourne [4]	605	12 15	769	22 ^h 5 ^m	940	14 22
419	18 ^h 26 ^m	606	12 21	770	22 28	942	14 48
423	19 21	607	12 36	771	22 ^h 31 ^m and Innes	947	15 59
454	8 11	609	13 5		138	948	16 0
456	11 31	610	13 8	772	Howe (22 ^h 50 ^m)	949	16 2
457	11 56	611	13 32	775	Howe (23 31)	950	16 19
460	13 19	617	14 43	790	10 ^h 5 ^m	956	17 ^h 5 ^m and β 125

INDEXES TO STARS.

BURNHAM'S STARS—continued.							
β		β		β		β	
957	17 ^h 10 ^m	1032	5 ^h 33 ^m	1108	See Howe 25	1188	5 ^h 45 ^m
958	17 10	1033	18 49	1110	14 ^h 13 ^m	1195	7 46
960	17 33	1034	20 51	1112	14 27	1197	13 57
965	18 21	1035	21 18	1114	15 22	1205	20 6
966	18 26	1036	21 42	1115	16 19	1209	20 35
967	18 35	1042	3 53		and β . II. 19	1211	20 58
969	See β 970	1048	See Harvard 73	1116	16 ^h 38 ^m	1212	21 34
970	18 ^h 45 ^m	1049	5 ^h 28 ^m	1117	16 50	1215	22 7
972	18 51	1050	5 31	1118	17 4	1219	22 44
974	18 59	1051	5 33	1119	17 10	1220	23 10
1000	1 30	1052	5 36	1120	See β 129	1229	1 14
1001	1 44	1063	7 45	1122	Howe (17 ^h 45 ^m)	1230	1 25
1002	2 42	1064	8 6	1123	17 ^h 46 ^m	1236	4 35
1003	3 41	1069	8 44	1126	17 58	1242	6 4
1004	3 58	1073	10 27	1128	18 24	1245	12 15
1006	5 7	1075	10 31	1158	0 26	1246	14 13
1010	22 50	1078	11 34	1160	0 44	1247	17 8
1011	22 57	1079	11 55	1163	1 19	1252	18 17
1012	Howe (23 ^h 31 ^m)	1084	13 17	1168	1 44	1254	18 39
1013	23 ^h 43 ^m	1085	14 53	1174	2 58	1262	See β . N. 139
1017	6 7	1089	17 24	1177	3 13	1264	22 ^h 25 ^m
1019	6 12	1107	13 21	1180	3 23		

CAPE OBSERVATORY.*

Cape		Cape		Cape		Cape	
1	1 ^h 5 ^m	7	6 ^h 54 ^m	12	12 ^h 22 ^m	17	17 ^h 37 ^m
2	1 52	8	See β 454	13	12 54	18	17 48
3	3 4	9	8 ^h 49 ^m	14	13 32	19	6 48
4	4 46	10	10 27	15	14 56	20	7 44
5	5 53	11	11 35	16	15 21	21	11 19
6	6 32					—	14 14

CORDOBA OBSERVATORY.*

Cordoba		Cordoba		Cordoba		Cordoba	
[1]	0 ^h 19 ^m	[20]	8 ^h 53 ^m	[38]	15 ^h 3 ^m	[56]	19 ^h 34 ^m
[2]	0 40	[21]	9 6	[39]	15 6	[57]	20 13
[3]	1 7	[22]	9 46	[40]	15 10	[58]	21 34
[4]	1 53	[23]	10 19	[41]	15 14	[59]	21 43
[5]	2 12	[24]	10 31	[42]	15 54	[60]	21 44
[6]	2 47	[25]	10 38	[43]	15 55	[61]	21 53
[7]	2 52	[26]	12 21	[44]	16 5	[62]	22 6
[8]	3 28	[27]	12 39	[45]	16 17	[63]	22 36
[9]	4 39	[28]	12 52	[46]	16 33	[64]	22 58
[10]	4 46	[29]	12 59	[47]	16 42	[65]	23 14
[11]	4 46	[30]	13 19	[48]	16 55	[66]	23 27
[12]	5 0	[31]	13 40	[49]	16 55	[67]	23 39
[13]	5 14	[32]	13 58	[50]	17 49	[68]	23 42
[14]	6 8	[33]	14 7	[51]	18 16	[69]	23 58
[15]	6 38	[34]	14 14	[52]	18 54	[70]	7 31
[16]	6 48	[35]	14 20	[53]	18 55	[71]	7 31
[17]	7 47	[36]	14 30	[54]	18 59	[72]	13 5
[18]	8 36	[37]	14 37	[55]	19 8	[73]	17 0
[19]	8 36					—	14 36

* See also List of Rejected Stars.

INDEXES TO STARS.

HARVARD OBSERVATORIES.

Harvard		Harvard		Harvard		Harvard	
59	2 ^h 49 ^m	—	5 ^h 36 ^m	—	15 ^h 29 ^m	—	See Sellors 1
73	5 27	—	7 54	—	15 31	—	See Innes 27
88	O. Stone (6 ^h 42 ^m)	—	8 35	—	15 32	—	See Innes 55
104	See β 199	—	8 47	—	15 40	—	See Gale
109	See Harvard 110	—	8 49	—	15 49	—	See β 312
110	7 ^h 46 ^m	—	11 46	—	15 58	—	See β 755
114	See Rej. Stars	—	12 1	—	16 0	—	See Innes 7
118	"	—	12 13	—	16 3	—	See Howe 8
123	9 ^h 19 ^m	—	12 16	—	16 5	—	See Gilliss 91
125	10 1	—	12 23	—	16 8	—	See Innes 10
126	See β 217	—	12 41	—	16 8	—	See Innes 78
128	10 ^h 35 ^m	—	12 47	—	16 36	—	See Jacob [8]
129	See Jacob [7]	—	12 50	—	16 36	—	See Howe 19
131	See β 605	—	13 4	—	16 37	—	See h 4632
132	See β 1245	—	13 6	—	16 51	—	See Dunlop 156
134	See β 607	—	13 16	—	16 55	—	See Innes 87
135	O. Stone (12 ^h 48 ^m)	—	13 30	—	16 55	—	See Rumker 20
136	See β 222	—	13 40	—	16 58	—	See h 4813
137	See β 610	—	13 43	—	16 59	—	See Innes 91
138	See β 225	—	13 53	—	17 9	—	See Rej. Stars
139	See β 117	—	14 7	—	17 14	—	(16 ^h 15 ^m)
140	See β 122	—	14 8	—	17 15	—	See Brisbane
141	See Rej. Stars	—	14 9	—	17 18	—	(17 ^h 11 ^m)
144	17 ^h 14 ^m	—	14 20	—	17 20	—	See h 4942
146	See β 128	—	14 22	—	17 20	—	See h 5003
149	See β 245	—	14 23	—	17 27	—	Howe (18 ^h 24 ^m)
150	18 ^h 56 ^m	—	14 26	—	17 36	—	See β 771
151	See H. N. 129	—	14 29	—	17 42	—	See Dunlop 126
152	19 ^h 8 ^m	—	14 29	—	17 43	—	See Howe 25
153	See H. N. 119	—	14 35	—	17 44	—	See β 1112
168	See β 168	—	14 37	—	17 57	—	See Innes 236
173	See β 177	—	14 37	—	17 58	—	See λ 249
176	23 ^h 20 ^m	—	14 40	—	17 59	—	See Dunlop 193
—	0 1	—	14 40	—	18 1	—	See λ 25 8
—	0 26	—	14 49	—	18 3	—	See Innes 161
—	0 28	—	14 49	—	18 21	—	Washburn 131
—	0 41	—	14 58	—	18 36	—	See β 760
—	2 16	—	15 0	—	18 56	—	See Russell 314
—	3 50	—	15 8	—	20 58	—	See β 763
—	3 51	—	15 10	—	22 11	—	See β 766
—	4 37	—	15 16	—	See Cordoba [2]	—	Melbourne [6]
—	5 29	—	15 20	—	See Innes 47	—	Melbourne [8]

LOWELL OBSERVATORY.

λ		λ		λ		λ	
1	0 ^h 0 ^m	18	See h 3494	36	4 ^h 16 ^m	62	6 ^h 7 ^m
2	0 2	19	2 ^h 36 ^m	39	See β 312	66	6 21
3	0 4	21	2 47	40	4 ^h 46 ^m	70	6 37
5	0 20	22	3 8	42	4 49	73	6 55
6	0 21	23	3 13	44	4 57	76	7 16
10	0 57	24	3 21	45	5 1	77	7 18
11	1 13	26	3 28	47	5 5	78	7 18
12	1 14	27	3 28	48	5 8	79	7 22
13	1 16	30	3 42	53	5 23	80	7 26
15	1 36	32	3 44	55	5 42	84	7 35
16	2 1	35	4 15	58	5 58	87	7 45

LOWELL OBSERVATORY— <i>continued.</i>							
λ		λ		λ		λ	
88	7 ^h 46 ^m	186	13 ^h 32 ^m	318	16 ^h 59 ^m	416	20 ^h 16 ^m
89	7 49	187	13 36	320	17 5	417	20 17
91	7 52	192	See Innes 224	321	17 7	420	20 26
92	7 54	193	13 ^h 51 ^m	322	17 9	422	20 23
93	7 55	194	See Innes 234	323	17 9	423	20 34
94	See Innes 30	196	See θ Centauri	324	17 11	427	20 38
95	8 ^h 2 ^m	197	14 ^h 2 ^m	325	17 15	428	20 38
96	8 9	202	14 10	326	17 16	429	20 45
97	8 10	204	14 14	329	17 22	431	20 47
98	8 11	206	14 26	330	17 23	432	20 48
102	8 35	207	14 29	331	17 24	435	20 57
108	8 56	209	14 33	335	17 30	436	20 57
109	9 4	210	14 35	338	See Innes 108	441	21 9
110	9 8	212	14 41	342	17 ^h 46 ^m	443	21 12
111	9 11	213	14 42	343	See Russell 306	445	21 19
113	9 25	215	14 50	344	17 ^h 52 ^m	446	21 20
115	9 33	218	14 57	347	18 5	447	See Innes 133
116	9 41	219	15 2	348	18 8	448	21 ^h 24 ^m
119	10 33	221	15 9	350	18 14	449	21 25
125	10 47	228	15 15	351	18 17	454	21 36
126	10 55	229	15 15	352	18 19	455	21 38
128	11 10	236	15 22	353	18 24	456	21 39
129	11 17	238	15 27	356	See λ 357	458	21 40
130	11 18	241	15 30	357	18 ^h 38 ^m	459	21 42
133	See λ 4465	242	See Innes 243	358	18 38	460	21 45
135	11 ^h 42 ^m	243	See Innes 244	359	18 39	461	21 50
137	11 47	244	See Addenda	361	18 43	465	21 58
138	11 47	245	15 ^h 36 ^m	364	18 49	466	21 58
139	11 49	248	15 38	366	See Pollock [7]	469	22 3
140	11 51	249	15 40	367	18 ^h 57 ^m	470	22 4
141	See λ 4484	250	15 44	370	19 2	474	22 23
142	See Innes 215	251	15 51	372	19 12	475	22 27
143	11 ^h 58 ^m	254	15 54	373	19 19	476	22 39
145	12 5	258	15 55	376	19 21	477	See λ 5362
146	12 5	259	15 55	377	Ormond Stone	478	22 ^h 52 ^m
147	12 8	262	15 58		(19 ^h 18 ^m)	480	23 9
149	12 15	264	15 59	380	19 25	481	23 11
151	12 20	266	16 3	381	19 26	483	23 20
152	12 20	267	16 5	382	19 28	484	23 20
154	12 21	268	16 8	384	19 29	485	23 21
156	12 30	269	16 9	385	19 31	486	See λ 484
157	12 31	271	16 12	387	19 32	492	23 ^h 30 ^m
158	12 33	272	16 12	388	19 32	493	23 32
159	12 36	273	16 13	389	19 33	494	23 36
160	12 40	277	See Innes 94	393	19 38	495	23 45
164	12 46	278	16 ^h 19 ^m	394	19 40	499	23 55
168	12 58	282	16 32	395	19 42	500	23 59
170	Harvard (13 ^h 6 ^m)	284	See Russell [283]	399	19 50	—	0 21
171	13 ^h 9 ^m	289	16 ^h 44 ^m	400	19 54	—	7 21
173	See Innes 233	291	16 46	403	19 57	—	12 3
174	13 ^h 11 ^m	292	16 46	404	19 59	—	16 13
177	See Innes 220	293	16 47	405	20 0	—	16 54
179	13 ^h 25 ^m	294	16 47	406	20 1	—	16 55
180	13 25	311	16 49	407	20 2	—	18 13
181	13 27	313	16 50	410	20 7	—	20 17
182	13 28	315	16 52	411	20 8	—	20 26
183	13 31	316	16 52	414	20 14	—	21 37
184	13 32						

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SYDNEY OBSERVATORY.

Russell		Russell		Russell		Hargrave	
3	0 ^h 23 ^m	193	12 ^h 12 ^m	307	18 ^h 9 ^m	[288]	16 ^h 54 ^m
4	0 30	198	12 17	308	See Melb'rne [5]	[317]	18 55
11	1 38	200	12 22	309	18 ^h 34 ^m	—	5 29
12	See ζ 3475	201	See Cape 12	310	See Russell 309	—	7 55
38	4 ^h 0 ^m	207	12 ^h 40 ^m	314	18 ^h 37 ^m		
47	See Russell 38	208	12 41	319	19 36		
51	See Russell 38	209	12 42	321	20 20	Pollock	
56	See Jacob [2]	210	See ζ 4563	322	See Dunlop 232	[1]	1 ^h 34 ^m
65	See Dunlop 30	213	13 ^h 1 ^m	323	20 ^h 32 ^m	[2]	4 1
82	See Gilliss 91	216	See ζ 4576	333	See ζ 5261	[3]	14 4
83	See ζ 4084	217	13 ^h 21 ^m	334	21 ^h 30 ^m	[4]	17 33
87	8 ^h 53 ^m	218	13 22	343	See ζ 5392	[5]	17 34
121	See Russell 122	220	13 23	344	See Dunlop 249	[6]	18 18
122	9 ^h 29 ^m	222	See ζ 4596	348	23 ^h 33 ^m	[7]	18 55
123	9 30	227	13 ^h 49 ^m	349	See Hargrave 19		
125	9 32	231	13 54				
127	See Rej. Stars	232	13 54				
129	9 ^h 39 ^m	234	See Russell 232	Hargrave		Sellors	
139	10 12	243	See ζ 4671	2	5 ^h 3 ^m	1	1 ^h 1 ^m
140	10 15	244	14 ^h 16 ^m	9	7 7	2	1 4
141	10 17	248	14 29	19	8 46	3	1 39
142	See Cordoba [23]	249	14 29	20	8 49	4	3 10
149	10 ^h 25 ^m	255	See Gilliss 213	28	9 42	5	3 38
150	See Cape 10	262	See ζ 4780	47	10 0	6	4 23
151	10 ^h 28 ^m	265	See ζ 4780	53	10 48	7	6 27
152	10 35	267	See Rumker 20	54	10 52	8	8 29
153	See Dunlop 94	269	15 ^h 51 ^m	65	11 23	9	8 45
154	10 ^h 39 ^m	274	16 6	69	See Gilliss 165	10	12 9
155	10 42	275	16 ^h 9 ^m and	70	See Russell 177	11	15 46
161	10 45		Innes 15	71	See Gilliss 169	12	16 32
163	11 13	278	See Dunlop 201	74	12 ^h 4 ^m	13	See Addenda
164	10 55	281	16 ^h 26 ^m	77	12 42	14	23 ^h 45 ^m
165	11 8	282	See ζ 4874	78	See Hargrave 77	15	5 52
168	11 17	283	16 ^h 35 ^m	79	"	16	9 1
171	11 20	287	See ζ 4901	81	See Cordoba [24]	17	10 10
173	11 32	289	See ζ 4909	83	See Melb'rne [3]	18	13 16
174	See ζ 4462	296	17 ^h 7 ^m	86	13 ^h 25 ^m	19	14 1
177	11 ^h 40 ^m	297	Bris. (17 ^h 11 ^m)	102	See Russell 249	20	15 15
180	11 41	298	See Melb'rne [4]	113	15 ^h 9 ^m	21	16 33
181	See ζ 4475	303	17 ^h 36 ^m	121	See Howe 37	22	7 11
191	12 ^h 5 ^m	304	See Cape 18	124	17 ^h 34 ^m	23	7 17
192	12 ^h 6 ^m and Innes 216	306	17 ^h 51 ^m	128	18 5	24	11 53
						—	22 58

WASHBURN OBSERVATORY.

Washburn		Washburn		Washburn		Washburn	
12	12 ^h 16 ^m	22	14 ^h 56 ^m	36	19 ^h 49 ^m	71	3 ^h 53 ^m
13	12 21	25	15 34	38	20 23	72	4 0
16	14 3	28	17 18	42	20 47	73	5 18
17	See β 803	29	17 25	53	22 43	76	5 29
18	14 ^h 13 ^m	30	17 31	62	0 57	77	5 40
19	14 37	31	17 33	66	3 47	78	5 44
20	14 40	33	18 56	67	3 49	82	6 46
21	14 50	35	19 18	70	3 53	91	7 36

INDEXES TO STARS.

WASHBURN OBSERVATORY— <i>continued.</i>							
Washburn		Washburn		Washburn		Washburn	
93	7 ^h 54 ^m	110	10 ^h 40 ^m	133	17 ^h 17 ^m	151	See Washbn. 35
94	7 55	112	See Gilliss 165	134	17 18	154	20 ^h 0 ^m
99	9 43	114	11 ^h 49 ^m	136	17 24	155	20 0
100	10 10	115	11 58	139	17 49	159	20 24
101	10 12	116	12 32	140	17 55	160	See Hough 133
102	10 15	118	13 1	141	18 8	162	20 ^h 38 ^m
103	10 15	119	Melbourne [3]	142	18 9	165	20 54
105	10 18	121	15 ^h 5 ^m	144	See Jacob [10]	167	21 37
106	10 29	124	15 37	145	18 ^h 37 ^m	169	22 25
107	10 30	127	15 59	147	18 43	170	23 7
108	10 34	131	16 52	149	19 16	174	13 2
109	10 38	132	17 12				
THE OLD SANTIAGO OBSERVATORY.							
Gilliss		Gilliss		Gilliss		Gilliss	
4	0 ^h 48 ^m	91	8 ^h 13 ^m	169	11 ^h 46 ^m	259	20 ^h 25 ^m
9	1 7		See Dunlop 94	213	14 52	263	20 51
14	1 39	165	11 ^h 31 ^m	248	18 48	289	23 55
LALANDE.							
Lalande		Lalande		Lalande		Lalande	
4	0 ^h 53 ^m	67	8 ^h 40 ^m	145	18 ^h 40 ^m	192	23 ^h 49 ^m
8	1 36	94	12 6	170	21 11	—	7 12
12	2 3	96	12 10	180	22 34	—	12 36
53	7 15	123	15 27	185	23 6	—	See Σ 3094
66	8 35	141	18 19				
RUMKER.							
Rumker		Rumker		Rumker		Rumker	
2	1 ^h 4 ^m	7	See Dunlop 66	14	12 ^h 8 ^m	21	15 ^h 53 ^m
3	4 16	9	8 ^h 42 ^m	18	13 45	26	20 43
4	4 22	12	9 53	19	See Dunlop 159	27	See Dunlop 251
6	7 17	13	10 17	20	15 ^h 38 ^m		

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DUNLOP.

Dunlop		Dunlop		Dunlop		Dunlop	
1	See β Toucani	52	See μ . N. 19	133	See J Centauri	201	16 ^h 18 ^m
2	0 ^h 48 ^m	53	See δ Puppis	138	See μ . N. 69	213	17 2
5	1 35	57	7 ^h 43 ^m	141	13 ^h 35 ^m	214	17 3
8	See β 741	63	8 6	143	13 42	216	See δ 4949
9	Piazzi (2 ^h 54 ^m)	65	See γ Argus	148	See μ . III. 101	217	17 ^h 21 ^m
12	3 ^h 13 ^m	66	8 ^h 7 ^m	151	13 ^h 50 ^m	222	18 26
15	3 36	70	8 26	156	14 0	226	19 15
16	3 44	78	9 26	159	14 15	227	19 44
18	4 48	81	9 50	166	14 34	230	20 11
22	5 28	88	See δ Velorum	168	14 35	232	20 29
23	6 2	93	See Innes 74	177	15 4	240	Piazzi (22 ^h 25 ^m)
[26]	6 11	94	10 ^h 34 ^m	180	See δ 4753	242	See μ . N. 117
30	See Sellors 7	109	11 23	182	See Copeland [2]	246	23 ^h 1 ^m
31	6 ^h 35 ^m	111	See μ . III. 96	189	See Innes 88	248	23 15
32	6 38	126	12 ^h 48 ^m	190	15 ^h 34 ^m	249	23 18
39	7 1	128	13 1	193	15 43	251	23 34
42	7 9	129	13 1	195	15 47	253	See Lalande 192
51	7 26						

JACOB.

Jacob		Jacob		Jacob		Jacob	
[1]	3 ^h 15 ^m	[5]	8 ^h 42 ^m	[8]	12 ^h 4 ^m	[11]	20 ^h 27 ^m
[2]	5 0	[6]	9 26	[9]	16 6	[12]	23 1
[3]	5 45	[7]	11 24	[10]	18 19	—	See Innes 55
[4]	7 14						

ORMOND STONE.

Ormond Stone		Ormond Stone		Ormond Stone		Ormond Stone	
—	0 ^h 47 ^m	—	7 ^h 21 ^m	—	14 ^h 19 ^m	—	20 ^h 10 ^m
—	0 59	—	8 5	—	17 15	—	20 32
—	2 13	—	12 41	—	17 55	—	21 11
—	3 5	—	12 48	—	18 27	—	21 42
—	5 18	—	12 48	—	18 38	—	22 37
—	6 34	—	12 52	—	19 18	—	22 53
—	6 42	—	13 20	—	19 41	—	23 22
—	6 51						

See also the List of Rejected Stars on p. 242A.

INDEXES TO STARS.

SOUTH.							
South 390 423 497 504 537	See Lalande 4 See β 741 See Σ 790 5 ^h 54 ^m See β 324	South 538 552 580 634	See β 324 See \mathbb{H} . N. 19 See Lalande 67 See Lalande 94	South 651 673 710 715	See \mathbb{H} . N. 69 See Lalande 123 19 ^h 1 ^m See h 596	South 802 824 829 —	21 ^h 56 ^m See Lalande 185 See \mathbb{H} . N. 112 18 ^h 14 ^m
SOUTH AND HERSCHEL.							
South and h 145 190 224 228	See \mathbb{H} . IV. 105 See \mathbb{H} . N. 28 See \mathbb{H} . IV. 21 See \mathbb{H} . II. 19	South and h 240 243 245	16 ^h 51 ^m 17 9 See \mathbb{H} . III. 25	South and h 264 339 345	See β 639 See \mathbb{H} . N. 56 Bradley (22 ^h 21 ^m)	South and h 346 354 356	Mayer (22 ^h 23 ^m) See \mathbb{H} . III. 34 See \mathbb{H} . II. 24
HOUGH.							
Hough 35 37 44 96 103 106 133 135 142 149 158 199 215 277	7 ^h 32 ^m 7 44 10 6 See Hough 441 See Σ 2490 19 ^h 22 ^m 20 27 20 35 20 43 21 2 21 19 23 13 See Muller Schjellerup ₂ 33	Hough 313 314 315 329 330 338 344 352 355 356 358 359 363	2 ^h 18 ^m 2 19 2 31 See Hough 330 4 ^h 18 ^m 6 13 See β 568 7 ^h 10 ^m 8 4 8 37 8 47 8 53 8 54 9 10	Hough 371 373 386 391 395 401 403 404 408 413 422 428 429 435	10 ^h 1 ^m See Washbn. 108 14 ^h 22 ^m 14 58 See Howe 38 See h 4836 16 ^h 19 ^m See Howe 42 16 ^h 49 ^m 17 10 17 47 18 3 18 6 18 26	Hough 436 438 439 441 461 462 468 469 521 — — — —	18 ^h 32 ^m See β 1254 18 ^h 43 ^m 19 1 20 54 20 59 21 58 21 57 7 18 7 18 18 17 18 30 See Howe 46
HOWE.							
Howe 1 3 5 6 7 8 9 10 11 12 13 14 15 16 17	0 ^h 50 ^m 2 26 4 8 4 35 7 29 7 48 8 13 9 2 9 35 See Howe 13 10 ^h 10 ^m 10 53 10 58 11 34 11 49	Howe 18 19 21 22 23 24 25 26 27 28 29 30 32 34 37	See Jacob [8] 12 ^h 8 ^m 12 17 13 7 13 37 13 43 13 47 13 49 See Howe 28 14 ^h 12 ^m 14 30 See h 4722 15 ^h 15 ^m 15 25 15 37	Howe 38 39 40 41 42 46 47 48 50 — — — — —	15 ^h 33 ^m 15 41 15 54 15 57 16 19 17 7 17 23 17 24 17 58 1 28 2 39 4 3 5 11 7 10 7 57	Howe — — — — — — — — — — — — — —	8 ^h 12 ^m 17 45 18 24 19 17 20 20 21 21 21 38 21 42 21 56 22 2 22 50 23 0 23 7 23 18 23 31

INDEXES TO STARS.

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INNES.

Innes		Innes		Innes		Innes	
1	U.A. 64 Toucani	62	5 ^h 27 ^m	120	19 ^h 40 ^m	178	6 ^h 31 ^m
2	See Pollock 2	63	5 45	121	19 42	179	6 41
3	6 ^h 11 ^m	64	5 49	122	19 43	180	6 42
4	6 27	65	6 53	123	20 3	181	6 46
5	6 36	66	6 54	124	20 9	182	6 47
6	6 41	67	8 19	125	20 9	183	6 56
7	7 14	68	8 32	126	20 15	184	7 7
8	7 59	69	See Cordoba [18]	127	20 27	185	7 36
9	8 15	70	8 ^h 43 ^m	128	20 36	186	7 45
10	8 41	71	8 53	129	20 48	187	7 57
11	9 11	72	9 23	130	20 57	188	7 58
12	See $\frac{1}{2}$ 4206	73	10 24	131	21 14	189	8 1
13	10 ^h 7 ^m	74	10 31	132	21 16	190	8 2
14	See Russell 192	75	Cordoba (10 ^h 34 ^m)	133	21 23	191	8 5
15	16 ^h 10 ^m	76	11 ^h 22 ^m	134	22 16	192	8 8
16	5 49	77	See $\frac{1}{2}$ 4445	135	22 16	193	8 9
17	20 37	78	11 ^h 28 ^m	136	22 19	195	8 30
18	20 47	79	11 49	137	22 20	196	9 2
19	21 40	80	11 50	138	22 32	197	9 4
20	22 10	81	12 9	139	Cruls (22 ^h 39 ^m)	198	9 16
21	See Cordoba [63]	82	12 25	140	22 ^h 41 ^m	199	9 23
22	22 ^h 49 ^m	83	12 50	141	22 43	200	9 29
23	23 22	84	14 48	142	Howe (23 ^h 7 ^m)	201	9 30
24	See Cordoba [66]	85	14 58	143	23 ^h 9 ^m	202	9 34
25	23 ^h 29 ^m	86	15 14	144	23 20	203	9 35
26	7 54	87	15 18	145	23 25	204	9 43
27	1 11	88	15 31	146	23 49	205	9 44
28	2 42	89	15 34	147	2 17	206	10 14
29	7 55	90	15 41	148	2 52	207	10 14
30	7 55	91	16 13	149	2 52	208	10 19
31	9 27	92	See $\frac{1}{2}$ 4843	150	3 15	209	10 20
32	10 28	93	16 ^h 19 ^m	151	3 18	210	10 23
33	10 27	94	16 19	152	4 1	211	10 54
34	11 34	95	16 26	153	4 4	212	10 58
35	12 19	96	16 33	154	4 27	213	11 5
36	12 23	97	16 33	155	5 55	214	See Howe 17
39	16 35	98	See Russell 283	156	6 23	215	11 ^h 56 ^m
40	17 24	99	16 ^h 42 ^m	157	6 44	216	12 4
41	20 29	100	16 47	158	6 44	217	See Howe 19
43	0 5	101	16 47	159	6 47	218	12 ^h 23 ^m
44	0 23	102	See Cordoba [73]	160	7 36	219	12 26
45	0 28	103	See Rejected Stars	161	7 43	220	13 19
46	0 35	104	17 ^h 9 ^m	162	7 52	221	13 31
47	0 47	105	17 25	163	7 57	222	See Howe 23
48	0 54	106	17 29	164	8 2	223	13 ^h 40 ^m
49	0 56	107	17 33	165	8 6	224	13 50
50	1 12	108	17 40	166	8 11	225	13 54
51	1 30	109	17 49	167	8 11	226	14 48
52	1 43	110	17 51	168	8 27	227	14 50
53	2 35	111	18 7	169	9 7	228	15 7
54	3 5	112	18 46	170	9 17	229	17 8
55	3 8	113	18 51	171	See Jacob [6]	230	17 53
56	3 15	114	19 10	172	9 ^h 43 ^m	231	11 8
57	3 24	115	19 16	173	10 2	232	11 34
58	3 24	116	19 16	174	10 27	233	13 11
59	4 21	117	19 23	175	10 32	234	13 51
60	4 38	118	19 25	176	11 1	235	14 39
61	5 15	119	19 34	177	0 23	236	14 43

INDEXES TO STARS.

INNES—continued.							
Innes		Innes		Innes		Innes	
237	14 ^h 52 ^m	256	19 ^h 54 ^m	275	5 ^h 19 ^m	293	10 ^h 0 ^m
238	15 5	257	20 56	276	5 27	294	10 44
239	15 22	258	21 4	277	5 36	295	11 4
240	15 27	259	22 58	278	5 42	296	12 32
241	15 28	260	0 26	279	5 42	297	12 48
242	15 31	261	0 43	280	6 6	298	13 25
243	15 31	262	1 4	281	6 17	299	20 7
244	15 33	263	1 18	282	6 21	300	20 40
245	15 40	264	1 27	283	6 39	301	21 0
246	17 3	265	1 56	284	6 41	302	21 32
247	17 31	266	2 10	285	7 35	303	22 12
248	17 38	267	2 41	286	7 49	304	22 40
249	18 10	268	2 44	287	8 55	305	23 42
250	18 34	269	3 58	288	9 6	306	10 51
251	18 43	270	4 14	289	9 29	307	11 34
252	18 54	271	4 18	290	9 58	308	11 36
253	19 12	272	4 18	291	9 59	309	12 25
254	19 23	273	4 48	292	9 59	310	13 5
255	19 25	274	5 0				

MISCELLANEOUS.

Argelander [1]	6 ^h 1 ^m	Clark, Al. G.	12 20 ^h 12 ^m	Melbourne [4]	17 ^h 12 ^m
" [2]	7 34	Copeland [1]	9 26	" [5]	18 24
Barnard	17 8	" [2]	15 15	" [6]	21 20
"	20 15	Cruls	22 39	" [7]	22 26
Berlin	13 48	Dawes 3	5 31	" [8]	16 33
Brisbane	11 20	" 4	5 30	Mitchel	18 16
"	16 3	" 5	5 19	"	20 21
"	17 11	" 6	5 23	Muller	0 40
"	18 54	Dembowski	7 1	Peters	5 18
"	21 41	"	19 26	Piazzi	2 54
Burg	16 23	Gale	1 3	"	10 27
Cincinnati	See H. N. 56	"	4 14	"	15 50
"	9 ^h 35 ^m	"	18 14	"	16 51
"	14 24	"	19 7	"	22 25
"	15 42	Hall, Asaph	21 33	Schjellerup ₂	13 8 47
"	17 9	Hastings	2 11	" 16	10 16
"	17 57	Knott [1]	6 3	" 24	18 14
Clark, Alvan	2 3 13	Kunowsky	5 35	" 30	19 22
" 3	6 6	Leavenworth	2 43	" 33	20 15
" 4	6 44	"	3 39	" 35	21 22
" 5	9 47	"	12 28	Secchi 1	0 29
" 10	See Jacob [10]	"	20 48	" 2	1 18
" 11	18 ^h 19 ^m	"	21 38	Washington 1	0 48
" 12	19 53	"	22 5	"	17 47
" 22	See β 76	Melbourne [1]	0 37	Wilson, H. C.	9 15
Clark, Al. G.	1 6 ^h 40 ^m	" [2]	8 3	"	10 1
" 5	12 55	" [3]	13 8	"	13 33

LIST OF WORKS AND PAPERS ON DOUBLE STARS.

(Chiefly limited to treatises of general interest, or such as contain observations of Southern Double Stars.)

Works not consulted in the formation of the preceding Catalogue are marked: *Not seen*.

- [1685.] **Fontenay**, Jean de. Discovery of the Duplicity of α Crucis with a 12-foot Telescope at the Cape in June 1685. The star is described as resembling Castor as to the interval between the components. The distant companion, Lac. 5147, is also noticed.
Histoire de l'Acad. depuis 1686-1699, T. II., Paris, 1733, p. 19 (p. 31 in another edition); *Lettres édifiantes*, Recueil VII., 1707, p. 79. (There are other editions of both these publications.) See also Humboldt's *Cosmos*, vol. iii. div. A., a, chap. vii. note 44. *Not seen*.
- [1689.] **Richaud**, Jean. *Mém. de l'Acad. depuis 1686-1699*, T. VII. 2. Paris, 1729, p. 206.
Discovery of α Centauri as a Double Star at Pondicherry, in December 1689. *Not seen*.
1714. **Feuillée**, Louis. *Journal des Observations physiques*. . . . 4to, T. I. Paris.
Observation of α Centauri at Lima, on July 4, 1709. *Not seen*.
1718. **Bradley and Pound**.
Discovery of γ Virginis as double in 1718.
See Rigaud's *Miscellaneous Works and Correspondence of the Rev. James Bradley*. 4to.
Oxford, 1832, p. 342. *Not seen*.
1757. **La Caille**, N. L. de. *Astronomiæ Fundamenta Novissimis Solis et Stellarum Observationibus stabilita*. . . . 4to. Parisiis.
Contains, on pp. 103 and 197, meridian observations of the components of α Centauri, made at the Cape in 1751 and 1752.
1763. **La Caille**, N. L. de. *Cælum Australe Stelliferum*. 4to. Paris.
Zones containing observations of 9766 stars with a $\frac{1}{2}$ -inch telescope in 1751-2.
Contains a few wide pairs such as β Toucani.
The zones have been reduced by T. Henderson, formerly director here, and published by the British Association for the Advancement of Science in 1 vol. 8vo. London, 1847.
The original work, and also La Caille's *Astronomiæ Fundamenta*, are exceedingly scarce.
1779. **Mayer**, Christian. *De Novis in Coelo Sidereo Phaenomenis*. . . . 128 pp. 4to. Mannhemii.
The first catalogue of 72 Double Stars with R.A. and Dec. for 1777. Gives differences of right ascension and declination. *Not seen*.
For H. C. F. C. Schjellerup's summary arranged according to constellations, see *Copernicus*, vol. iii. pp. 57-65.
1781. **Bode**, J. E. *Verzeichniss aller bisher entdeckten Doppeltsterne*. 8vo. Berlin.
(*Berliner Jahrbuch*, 1784.)
A Catalogue of 81 Double Stars chiefly from Christian Mayer's observations. *Not seen*.
1781. **Pigott**, N. [Three] Double Stars discovered in 1779. 4to. London.
(*Philosophical Transactions*, vol. lxxi.)
The stars are γ Delphini and two wide *Durchmusterung* pairs. *Not seen*.

1782. **Herschel, William.** Catalogue of Double Stars. 4to. London.
(*Philosophical Transactions*, vol. lxxii.)
269 double stars. Includes the discovery of ξ Scorpii. *Not seen.*
1785. **Herschel, William.** Catalogue of Double Stars. 4to. London.
(*Philosophical Transactions*, vol. lxxv.)
434 double stars. Including τ Ophiuchi and 4 Aquarii.
1801. **Lalande, J. de.** Histoire Céleste Française. 4to. Paris.
The wide pairs occurring in this work have been collected by Labaume. See under 1831.
1803. **Herschel, William.** Account of the Changes that have happened, during the last Twenty-five Years, in the relative Situation of Double-Stars; etc. 4to. London.
(*Philosophical Transactions*, 1803, pp. 339-382.
Continued in the vol. for 1804.)
1814. **Piazzi, Giuseppe.** Praecipuarum Stellarum inerrantium Positiones Mediae, etc. Fol. Panormi.
Piazzi's Palermo Catalogue of 7646 stars, from which a few wide pairs have been taken.
1820. **Struve, F. G. W.** Observationes angulorum positionis stellarum duplicium et multiplicium, opera tubi achromatici quinque pedum micrometrico apparatus instructi anno 1819 institutae. 4to. Dorpati.
(*Dorpat Observations*, vol. ii. pp. 163-8.)
Few distances. Only a few southern doubles. One new northern pair.
On pp. 175-198 of the same volume there is an "Additamentum" on Double Stars, including 66 Ceti, γ Virginis, Mira Ceti, etc.
1822. **South, James.** Catalogue of Double Stars. 4to. London.
(*Mems. R. A. S.*, vol. i. pp. 115-128.)
A compilation of known double stars, of small value now.
1822. **Herschel, Sir William.** On the places of 145 new Double Stars. 4to. London.
(*Mems. R. A. S.*, vol. i. pp. 166-181.)
Particulars from observing books of 145 pairs. Like all Herschel's catalogues, interesting, but superseded for working purposes by Sir John Herschel's list in *Mems. R. A. S.*, vol. xxxv. Some of the stars in this list have never been identified or re-observed; the positions are indifferent, and no magnitudes or position angles are given, the stars being merely referred to as Class I. or II., etc. These pairs have been omitted in the Reference Catalogue.
1822. **Struve, F. G. W.** Observationes astronomica[e] (1820 et 1821) [made at Dorpat]. Vol. iii. 4to. Dorpati.
Catalogus stellarum duplicium a 20° decl. Austr. ad 90° decl. Bor. pro anno, 1820, pp. xv-xxiv.
Struve's first catalogue (compiled), giving merely discoverer's name, name of star, magnitude, and R.A. and Dec. The discoverers include Struve himself, Herschel, Piazzi, Lalande (*Histoire Céleste*), Mayer, Gauss, Bessel, etc.
Also printed separately under the title "Catalogus 795 stellarum duplicium," etc.
A continuation of his measures of 1819 are contained on pp. 132-136 (last page printed, 361), and another series will be found on pp. 137-144.

- Further observations will be found in vol. iv. of the same series, 1825. But all Struve's earlier work is collected in the *Mensuræ Micrometricæ* (1837), which see.
1822. **Struve, Prof.** A Comparison of Observations made on Double-Stars. 4to. London.
(*Mems. R. A. S.*, vol. ii. pp. 443-455.)
Notes on the chief Double Stars communicated in a letter to J. F. W. Herschel.
1823. **Amici, J. B.** 8vo. Gênes.
(*Zach's Correspondance Astronomique*, etc., vol. viii. pp. 67, 216.)
Measures only. A description of his double image micrometer.
1825. **South, J., and Herschel, J. F. W.** Observations of the apparent distances and positions of 380 double and triple stars, made in the years 1821, 1822, and 1823.
(*Philosophical Transactions*, 1824. Part III. pp. 1-412, with an Index.) 4to. London.
Made with two equatorial refractors of $3\frac{3}{4}$ and 5 ins. aperture. Mostly wide northern pairs.
1826. **Herschel, J. F. W.** Approximate Places of 321 new Double and Triple Stars [with Descriptions]. 4to. London.
(*Mems. R. A. S.*, vol. ii. pp. 475-485.)
Sir John Herschel's first list containing the stars *h* 1 to *h* 321, discovered with the 20-foot reflector.
1826. **South, Sir James.** Observations of the apparent distances and positions of 458 double and triple stars, . . . with a re-examination of 36 stars, etc., 1823-4-5. 4to. London.
(*Philosophical Transactions*, 1826. Part I. pp. 1-391, with a Synoptical View.) *Not seen.*
1827. **Struve, F. G. W.** *Catalogus novus Stellarum Duplicium et Multiplicium maxima ex parte . . . in specula Dorpatense . . . detectarum.* fol. Dorpati.
Places and descriptions of 3112 double and multiple stars, nearly all discovered with the 9.6-inch Fraunhofer refractor. Some measures are given in notes at the end.
The Dorpat Catalogue. Not seen.
1829. **Dunlop, James.** Approximate Places of Double Stars in the Southern Hemisphere, observed at Paramatta in New South Wales. In a Letter addressed to Sir T. Macdougall Brisbane. 4to. London.
(*Mems. R. A. S.*, vol. iii. pp. 257-275.)
This is Dunlop's well-known list of Double Stars in the Southern Hemisphere, made with a 9-foot Reflecting Telescope between 1825 and 1827. Containing Dunlop 1 to Dunlop 253. The stars are not of much interest, as a rule being very wide, and in several cases the observations seem erroneous, or, at least, they have not been confirmed with more powerful instruments.
1829. **Herschel, J. F. W.** Approximate Places and Descriptions of 295 new Double and Triple Stars, discovered . . . with a 20-foot Reflecting Telescope: together with some Observations of Double Stars previously known. 4to. London.
(*Mems. R. A. S.*, vol. iii. pp. 47-63.)
Sir John Herschel's 2nd list containing stars *h* 322 to *h* 616, with a few measures of other double stars.

1829. **Herschel, J. F. W.** Observations with a 20-feet Reflecting Telescope.—Third Series; containing a Catalogue of 384 new Double and Multiple Stars; completing a first Thousand of those Objects detected in a Course of Sweeps with that Instrument: together with some Observations of some previously known. 4to. London.

(*Mems. R. A. S.*, vol. iii. pp. 177–213.)

Preceded by an interesting introduction and a “Comparative Catalogue of 284 Double Stars, as observed with the Dorpat Refractor and the 20-feet Reflector.”

Sir John Herschel's 3rd list containing the stars *h* 617 to *h* 1000.

1831. **Herschel, J. F. W.** Fourth Series of Observations with a 20-feet Reflector; containing the mean places and other particulars of 1236 Double Stars, as determined at Slough, in the years 1828 and 1829, with that Instrument, (the greater part of them not previously described). 4to. London.

(*Mems. R. A. S.*, vol. iv. pp. 331–378.)

Contains the double stars *h* 1001 to *h* 1937. Prefaced by a few interesting remarks as to the relative power of his reflectors compared with the refractor used by Σ .

1831. **Labauve, Berenger.** A catalogue of 195 double Stars, taken from the *Histoire Céleste* of M. F. Lalande, reduced to January 1, 1800. 4to. London.

(*Mems. R. A. S.*, vol. iv. pp. 165–170.)

Communicated by Baron Zach. Many of these stars are to be found as new pairs in the catalogues of later observers, albeit all are, as might be expected, very easy to see.

Referred to in the Catalogue as “Lalande” with Labauve's number.

The date of publication of these pairs is, of course, the date of the *Histoire Céleste*, 1801.

1832. **Rumker, C.** Preliminary Catalogue of Fixed Stars intended for a Prospectus of a Catalogue of the Stars in the Southern Hemisphere, etc. 4to. Hamburg.

In this work there is a section on *Double Stars*, pp. 15–16, with a list of 28 pairs. One of these, α Argûs, is credited with a *comes* about 12" S.f., the real existence of which is very doubtful. Rumker's remarks on α Crucis and α Centauri are curious reading; he inclines to the opinion that α Crucis is in motion, but α Centauri, he says, “cannot be classed among the double stars, the contiguous stars not being close enough. . . . There has therefore, in seventy-seven years, no important change taken place in the relative situation of these two stars.”

1833. **Dawes, Rev. W. R.** Observations of Double Stars. 4to. London.

(*Mems. R. A. S.*, vol. v. pp. 139–146.)

Excepting γ Virginis, all northern stars.

1833. **Herschel, J. F. W.** Micrometrical Measures of 364 Double Stars with a 7-feet Equatorial Achromatic Telescope; taken at Slough, in the years 1828, 1829, and 1830. 4to. London.

(*Mems. R. A. S.*, vol. v. pp. 13–91.)

Preceded by an interesting preface on the effect of strain on an object glass, and a list of measures of the chief double stars by different observers, including the southern stars γ Virginis and ζ Aquarii.

General hints on observation are given on pp. 47–48.

1833. **Herschel, Sir J. F. W.** On the Investigation of the Orbits of revolving Double Stars; being a Supplement to a Paper entitled "Micrometrical Measures of 364 Double Stars," etc., etc. 4to. London.

(*Mems. R. A. S.*, vol. v. pp. 171-222.)

Containing Sir John Herschel's well-known method of finding Double Star Orbits.

1833. **Herschel, Sir J. F. W.** Fifth Catalogue of Double Stars observed at Slough in the years 1830 and 1831 with the 20-foot Reflector; containing the Places, Descriptions, and measured Angles of Position of 2007 of those objects, of which 1304 have not been found described in any previous collection; the whole reduced to the epoch 1830.0. 4to. London.

(*Mems. R. A. S.*, vol. vi. pp. 1-73.)

Contains the double stars *h* 1938 to *h* 3241.

The above paper is followed by one entitled "Remarks on a Fifth Catalogue of Double Stars, etc.,"; on a comparison of *h*'s measures with those of Σ , and on the colours of stars as affected by refractors and reflectors. A list of Errata is also added.

1835. **Bessel, F. W.** Beobachtungen der gegenseitigen Stellungen von 38 Doppelsternen.

(*Berlin Acad., Abhand.*, 1833, p. 57.)

Reprinted in 1841.

1835. **Brisbane, Sir Thomas Macdougall.** A catalogue of 7385 Stars . . . from Observations made in the years 1822-1826, at the Observatory at Paramatta, founded by Sir T. M. Brisbane. Reduced by W. Richardson. 4to. London.

A few double stars have been taken from this catalogue.

1835. **Dawes, W. R.** Micrometrical Measurements of the Positions and Distances of 121 Double Stars, taken at Ormskirk, during the years 1830, 1831, 1832, and 1833. 4to. London.

(*Mems. R. A. S.*, vol. viii. pp. 61-94.)

Made with a 3.8-inch refractor. Dawes says in the preface that he has frequently used powers of 475 and 600.

The effects of a central stop on the object-glass are described.

1835. **Herschel, Sir J. F. W.** List of Test Objects, principally Double Stars, arranged in Classes, for the trial of telescopes in various respects, as to light, distinctness, etc. 4to. London.

(*Mems. R. A. S.*, vol. viii. pp. 25-32.)

1835. **Herschel, Sir J. F. W.** A Second Series of Micrometrical Measures of Double Stars, chiefly performed with the 7-foot Equatorial, at Slough, in the years 1831, 2, and 3. 4to. London.

(*Mems. R. A. S.*, vol. viii. pp. 37-59.)

Some measures by Smyth and by Dawes are appended.

- 1835-1837. **Mädler, J. H.** {Doppelstern-Messungen.

Astr. Nachr., Band 12, No. 280.

" " " 13, Nos. 299, 303.

" " " 14, No. 324.

1836. **Herschel**, Sir J. F. W. Sixth Catalogue of Double Stars, observed at Slough, in the years 1831 and 1832, with the 20-foot Reflector, containing the Places, etc. of 286 of those Objects, of which 105 have not been previously described. 4to. London.
(*Mems. R. A. S.*, vol. ix, pp. 193–204.)
Contains the stars h 3242 to h 3346 and measures of Σ 's and other double stars. All the stars, except two, are north of the Equator.
1837. **Struve**, F. G. W. *Stellarum Duplicium et Multiplicium Mensurae Micrometricae*. fol. Petropoli.
The publication of this great work gave an enormous impulse to Double Star Astronomy. It contains no stars south of -15° Declination. This work is too large for convenient use, but it has been most usefully indexed by the late Robert Copeland (1876).
Struve also published popular descriptions of this work in French and German in 1837.
1839. **Mädler**, J. H. *Die Doppelsterne*. *Not seen*.
(*Schumacher's Jahrbuch*, 1839, pp. 57–132.)
- 1840–1848. **Encke**, J. F., and **Galle**, J. G. (*Astronomische Beobachtungen auf der Königlichen Sternwarte zu Berlin*, vol. i. pp. 142–145, 1840, vol. iii. pp. 234–5, 1848.) fol. Berlin.
Not seen.
1840. **Kaiser**, F. Ueber die Sternwarte in Leiden, und die ersten daselbst angestellten Micro-meter-Messungen. (*Astr. Nachr.*, Band 18, No. 409.) *Not seen*.
1841. **Bessel**, F. W. *Astronomische Untersuchungen*. (vol. i. pp. 280–313.) 4to. Königsberg in Pr.
A reprint of his paper of 1835, and a paper on p Ophiuchi.
1841. **Struve**, F. G. W. *Additamentum in mensuras micrometricas*. 4to. St. Pétersbourg.
(*St. Pétersbourg Acad. Mems. Math. et Phys.*, vol. iv. pp. 337–358.)
45 Double Stars. See also the St. Pétersbourg Bulletin, vol. vi. No. 11, 1840.
Also published separately in 4to. Petropoli, 1840.
1842. **Doppler**, Christian A. Ueber das farbige Licht der Doppelsterne, etc. 4to. Prag. *Not seen*.
(*Abhandlungen der K. böhm. Gesells. der Wissenschaften*, vol. ii. p. 465.)
1842. **Mädler**, J. H. *Measures of Double Stars, etc.*
(*Beobachtungen der K. U. Sternwarte*. 4to. Dorpat, Bd. 9.)
Measures 1840–1841, pp. 37–60.
Orbits „ pp. 80–207.
Continued in each part of volumes x.–xv., 1843–1863.
1843. **Dien**, C. *Tables donnant les Mesures Micrométriques de plus de 500 Étoiles Doubles et Multiples*. 4to. Paris. *Not seen*.
1843. **Mädler**, J. H. *Double Star Measures*.
(*Beobachtungen der K. U. Sternwarte*, Dorpat, Bd. 10.)
Results of Measurés made in 1842, pp. 31–60.
Formulæ for Motion of Double Stars, pp. 83–97.

1843. **Santarelli**, Michele. 4to. Roma.
(*Mem. intorno a . . . osservazioni fatte nella specola dell' Università Gregoriana in Collegio Romano.*)
Contains a table of the angles and distances of 104 Double Stars, chiefly derived from Dorpat observations. *Not seen.*
1843. **Struve** (F. G. W.). Catalogue d'Étoiles Doubles et Multiples découvertes sur l'hémisphère céleste boréal par la grande lunette de Poulkova. fol. St. Pétersbourg.
514 new close pairs indicated by the symbol "OΣ," and 256 wide pairs.
Nearly all northern stars.
Revised in 1853.
1844. **Smyth**, (Admiral W. H.). A Cycle of Celestial Objects. 2 vols. 8vo. London.
The second volume of this very well-known work contains the Bedford Catalogue of 680 multiple stars with measurements and approximate places for 1840.
See also his "Ædes Hartwellianæ." 4to. London, 1851, p. 284.
1845. **Mädler**, J. H. Double Star Results, 1843-4.
(*Beobachtungen der K. U. Sternwarte*, Dorpat, Bd. 11.) 4to.
Observations of stars of the Dorpat Catalogue, pp. 3-48, and pp. 95-139.
Observations of the close stars of the Pulkowa Catalogue of 1843, pp. 49-66.
- 1846-48. **Mitchel**, O. M. New Double Stars.
These appeared in the "Sidereal Messenger," vol. i., 1846-1847; vol. ii., 1847-1848; and vol. iii. No. 1, 1848. *Not seen.*
The above were all the numbers that appeared. They are now very scarce, and no copies are to be found in South Africa.
The particulars of the stars found and measured by Mitchel have been republished by Prof. Ormond Stone in 1876.
1847. **Herschel**, Sir J. F. W. Results of Astronomical Observations made during the years 1834, 5, 6, 7, 8, at the Cape of Good Hope. 4to. London.
The sections on Double Stars in this work are to the Southern Heavens what Struve's *Mensuræ Micrometricæ* are to the Northern Heavens.
The chapter on Double Stars is divided into two parts:—
"Reduced Observations of Double Stars made with the 20-foot Reflector at Feldhausen, C. G. H., in the years 1834-1838."
This includes the new Double Stars *h* 3347 to *h* 5449, with observations of known pairs giving magnitudes, R.A. and N.P.D. for 1830, angles and (generally) estimates of distances.
"Micrometrical Measures of Double Stars with the Seven-foot Equatorial, taken at Feldhausen, C. G. H."
This section gives measures of those pairs in the preceding part which are bright enough for observation with the refractor, which had an aperture of five inches.
The co-ordinates (R.A. and N.P.D.) in this great work are very reliable, and, considering the lack of extensive southern catalogues of stars, are a monument to the younger Herschel's perseverance and thoroughness.
The angles of the pairs are all through of high excellence. Herschel compares his refractor and reflector angles, and gives a table to reduce one to the other. Herschel preferred his refractor-measures; Prof. See, however, considers the reflector-measures more reliable. This point still seems well worthy of thorough examination.

1847. **Hind, J. R.**, and others. Observations and Orbits of γ Virginis and other stars. 4to. London.
(*Mems. R. A. S.*, vol. xvi. pp. 19-22, 291-294, 461-463.)
Three short memoirs.
1847. **Jacob, W. S.** Double Stars observed at Poonah in 1845-6. 4to. London.
(*Mems. R. A. S.*, vol. xvi. pp. 311-322.)
108 measures, many of southern stars made with a (4-inch) refractor, with a postscript on the orbits of four double stars.
See also his memoir published in 1849.
- 1847-48. **Mädler, J. H.** Untersuchungen über die Fixstern-Systeme. 2 vols. fol. Mitau und Leipzig. *Not seen.*
1849. **Jacob, W. S.** Catalogue of Double Stars, deduced from Observations made at Poona from November 1845 to February 1848. 4to. London.
(*Mems. R. A. S.*, vol. xvii. pp. 79-91.)
Contains reduced measures of 244 stars including those published by him in 1847; elements of α Centauri; and a supplement containing the separate observations of those pairs suspected to be in motion, and on the colours of double stars.
1850. **Herschel, Sir J. F. W.** On the Determination of the most probable Orbit of a Binary Star. 4to. London.
(*Mems. R. A. S.*, vol. xviii. pp. 47-68.)
Gives a method of determining the orbit of a double star, chiefly from position angles, by arithmetical processes only; the paper in *Mems. R. A. S.*, vol. v., describes a purely graphical process.
1850. **Mädler, J. H.** Uebersichts-Tafel der Doppelsterne von erkannter Bewegung. 4to. Dorpat.
(*Beobachtungen der K. Univ. Sternwarte*, Dorpat, vol. xii., at end.)
663 stars from Struve's *Mens. Micrometricae*.
1850. **Mädler, J. H.** Berechnungen der Doppelstern-Bewegungen.
(*Beobachtungen der K. U. Sternwarte*, Dorpat, vol. xii. pp. 61-110.)
Second addition to his *Untersuchungen über die Fixstern-systeme*.
1851. **Dawes, W. R.** Micrometrical Measurements of Double Stars, made at Ormskirk between 1834.0 and 1839.4. 4to. London.
(*Mems. R. A. S.*, vol. xix. pp. 191-212.)
Including measures of a few pairs south of the Equator. 98 Pairs.
Made partly with the 3.8-inch refractor, and partly with a 6 $\frac{1}{4}$ -inch reflector.
1851. **Maclear, Thomas.** Micrometrical Measures of Double Stars. 8vo. London.
(*M. N. R. A. S.*, vol. xi. p. 39.)
Measures of 10 Southern pairs, one of which, ϵ Canis Majoris, is new.
1852. **Doppler, Christian A.** Weitere Mittheilungen meine Theorie des farbigen Lichtes der Doppelsterne betreffend.
(*Vienna K.K. Acad., Sitzungsberichte*, vol. viii. p. 91.) *Not seen.*
Appended is a list of 13 treatises on coloured stars, or on the perception of colour.

1852. **Hind, J. R.** *Astronomical Observations taken at Mr George Bishop's Observatory.* 4to. London.
Observations of 252 Double Stars during 1839-1851.
Catalogue made chiefly by W. R. Dawes.
1852. **Struve, F. G. W.** *Stellarum fixarum imprimis Duplicium et Multiplicium positiones mediae.* fol. Petropoli.
Mean places of 2874 Stars, mostly double, for the epoch 1830. Cited as "Pos. Med."
1853. **Struve, Otto W.** *Catalogue revu et corrigé des Étoiles Doubles et Multiples découvertes à l'Observatoire centrale de Poulkova.* 4to. St. Pétersbourg.
(*St. Pétersbourg Acad. Mems.*, vol. vii.)
1854. **Fletcher, Isaac.** *Results of Micrometrical Measurements of Double Stars, made at Tarn Bank, Cumberland, from 1850·2 to 1853·4.* 4to. London.
(*Mems. R. A. S.*, vol. xxii. pp. 167-188.)
It also includes measures of double stars made in 1851-53 by J. F. Miller.
Very few southern pairs are included.
1854. **Jacob, W. S.** *Observations of 144 Double or Multiple Stars, made at the Madras Observatory, with the Lerebours' Equatorial in 1850-52.* 4to. Madras.
(*Astronomical Observations made at Madras, 1848-1852*, pp. 57-77.)
Nearly all south of the equator.
1854. **Jacob, W. S.** 105 Double Stars observed with the Lerebours Equatorial. 4to. Madras.
(*Astronomical Observations made at Madras, 1848-1852*, appendix, pp. (3) to (18).)
A continuation of Jacob's valuable work, mostly on stars in the Southern Hemisphere.
1855. **Struve, Otto.** *Résultats d'observations faites sur des étoiles doubles artificielles.* 4to. St. Pétersbourg.
(*Bulletin de la classe physico-mathématique de l'Académie des Sciences de St. Pétersbourg*, vol. xiii. col. 33.)
See also vol. xvii. col. 225, 1859.
These and other papers on the same subject are collected in the "Mélanges mathématiques . . . tirés du Bulletin." 8vo. St. Pétersbourg, vol. ii., 1859, and vol. iv., 1872.
1856. **Mädler, J. H.** *Double Star Measures, 1846-1853, etc.* 4to. Dorpat.
(*Beobachtungen der K. U. Sternwarte, Dorpat*; vol. xiii. pp. 3-180.)
Observations with many notes.
1856. **Secchi, Angelo.** *Osservazioni di Stelle Doppie.* 4to. Roma.
(*Memorie dell' Osservatorio del Collegio Romano, 1852-55*, pp. 25-70.)
Measures of a variety of stars made with a 9·6-inch Merz Equatorial. See also under 1859.
- 1856-1878. **Dembowski, Ercole.** *Measures of Double Stars.*
(*Astr. Nachr.*, Band 42, No. 999, to Band 92, No. 2195.)
These valuable series of measures have been collected and published in two volumes. See under 1883-1884.

1857. **Clark, Alvan.** New Double Stars discovered by ; with appended remarks by W. R. Dawes. 8vo. London.
(*Monthly Notices R. A. S.*, vol. xvii. pp. 257-259.)
12 close pairs, 8 south of the Equator. See continuation under 1860.
1857. **Powell, E. B.** Observations of Double Stars taken at Madras in 1853, 4, 5, and the beginning of 1856. 4to. London.
(*Mems. R. A. S.*, vol. xxv. pp. 55-97.)
Measures of 130 double or multiple stars.
This memoir includes many southern stars.
The measures are mostly of angle, few distances being given.
An important paper.
1858. **Smyth, C. Piazz.** Report on the Teneriffe Astronomical Experiment of 1856, addressed to the Lords Commissioners of the Admiralty. 4to. London and Edinburgh.
Chaps. I. to V. (paged 465-533), with plates 30 to 39, are identical with the corresponding portions of the *Phil Trans.* for 1858; the two remaining chapters, with title-page, preface, contents, index, photo-stereograph vignette, and one photograph, complete the work as issued separately.
1858. **Smyth, C. Piazz.** Teneriffe, an Astronomer's Experiment. . . . 8vo. London.
An altogether charming popular account of the important Teneriffe expedition.
The details of the Experiments and Observations, including notes on the colours of double stars, will be found in vol. xii. of *Astronomical Observations made at Edinburgh*. 4to. 1863, pp. 401-514, with 5 photographs.
1859. **Pogson, N. R.** On the Ocular Crystal Micrometer, with observations of twelve double stars. . . . 8vo. London.
(*British Association Report for 1858.*) *Not seen.*
Of the twelve stars only ζ Aquarii is south of the equator.
1859. **Mädler, J. H.** Beobachtungen der K. U. Sternwarte, Dorpat. Band 15, Abth. 1. 4to. Dorpat.
Doppelstern-Messungen, 1853-1858, pp. 1-35.
Nachtrag, pp. 59-100.
1859. **Secchi, A.** Misure di Stelle Doppie, pp. 33-144. Appendix to same, pp. 169-176. 4to. Roma.
(*Memorie dell' Osservatorio del Collegio Romano Nuova Serie*, 1857 al 1859.)
A continuation of his measures with a resumé—A fair number of southern pairs.
1859. **Webb, T. W.** Celestial Objects for Common Telescopes. Small 8vo. London.
2nd ed., 1868, 3rd ed., 1873, 4th ed., 1881, each in one volume, 5th ed. in two volumes, by **Espin**. 1894.
One of the best works for the amateur astronomer ; in the last edition, the 2nd volume is entirely devoted to double stars, those north of — 23° being arranged in constellations.
1860. **Clark, Alvan.** New Double Stars discovered by. Communicated by W. R. Dawes. (*Second Series*.) 8vo. London.
(*M. N. R. A. S.*, vol. xx. p. 55.)
Nos. 13 to 20. All north of the equator.

1860. **Gubbins, C.** Catalogue of Multiple Stars observed in Upper India in 1855-6. 8vo. London.
(*M. N. R. A. S.*, vol. xx. pp. 20-22.)
The observations were made with a $3\frac{1}{2}$ -inch refractor.
The details were never published, the author's paper being "deposited in the archives of the Society." The stars, 122 in number, seem all to have been south of the equator. *Not seen.*
1860. **Jacob, W. S.** Micrometrical Measures of 120 Double or Multiple Stars taken at the Honourable East India Company's Observatory at Madras, in the years 1856-58. 4to. London.
(*Mems. R. A. S.*, vol. xxviii, pp. 13-47.)
A continuation of his previous observations. Three new pairs are included, one of which was detected through an occultation by the moon.
A very valuable list containing measures of 120 pairs, the greater part being south of the equator.
A preliminary notice of the above list will be found in *M. N. R. A. S.*, vol. xix., No. 2, December 1858.
1860. **Secchi, A.** Catalogo di 1321 Stelle Doppie misurate col grande Equatoriale di Merz all'Osservatorio del Collegio Roma. 4to. Roma.
(*Atti dell' Accademia Pontificia de' Nuovi Lincei*, vol. xiii.)
Stars from Struve in five orders of distances.
See also vol. xiv., p. 1, 1861.
1860. **Smyth, Admiral W. H.** The Cycle of Celestial Objects continued at the Hartwell Observatory to 1859. 4to. London.
Known also as "Speculum Hartwellianum."
Chapters on Colours of Double Stars, Orbit of γ Virginis, etc.
1861. **Wrottesley, Lord.** A Catalogue of the Positions and Distances of 398 Double Stars. 4to. London.
(*Mems. R. A. S.*, vol. xxix. pp. 85-168.)
A series of measures made with a $7\frac{3}{4}$ -inch refractor, between the years 1843-1859, by Messrs Simms, Philpott and Morton.
Although mostly Struve stars, a fair proportion are south of the equator. Some of these measures have been used, and are referred to by the name of the actual observer.
1862. **Auwers, G. F. J. Arthur.** Untersuchungen über veränderliche Eigenbewegung. Erster Theil. Inaugural-Dissertation. 4to. Königsberg.
Contains investigations of the proper motions of some double and other stars. *Not seen.*
- 1862-1877. **Main, Robert.** Measures of Double Stars. 8vo. Oxford.
(In *Radcliffe Observations*, vols. xx-xxxvi.)
1863. **Mädler, J. H.** Beobachtungen der K. U. Sternwarte, Dorpat. Band 15; Theil. 2. 4to. Dorpat.
Measures in 1859-1862, with means, pp. 1-28.
Comparison between his measures and those of Auwers with the Königsberg Heliometer, pp. 28-32.
Remarks on a few double stars, pp. 51-66.

1864. **Mitchell, Maria.** Observations on some of the Double Stars.
(American Journal of Science and Arts, 2nd ser. vol. xxxvi.) Not seen.
 Measures and notes of colours of 36 stars with a 5-inch Clark Refractor, 1859-63.
- [1864.] **Powell, E. B.** Second Series of Observations of Double Stars taken at Madras in 1859-62.
 4to. London.
(Mems. R. A. S., vol. xxxii. pp. 75-95.)
 56 double stars, about half being south of the equator. Followed by notes.
 The observations were made with a 4-inch equatorial.
1864. **Schjellerup, H. C. F. C.** Stjernefortegnelse indeholdende 10,000 Positioner af teleskopiske
 Fixstjerner imellem -15 og + 15 Graders Deklination. 4to. Kjöbenhavn.
 In the introduction, pp. xxiv-xxv, will be found a list of 36 new double stars: those with
 South Declination are included here under the designation Schjellerup.
 A preliminary list containing the greater number of these stars will be found in the *Astr.*
Nachr., Band 62, No. 1485; 1864.
1864. **Smyth, Admiral W. H.** Sidereal Chromatics. 8vo. London.
 On the colours of double stars, written in Admiral Smyth's delightful style. An amplification
 of a chapter in his *Speculum Hartwellianum*.
1865. **Engelmann, R.** Messungen von 90 Doppelsternen am sechsfüssigen Refractor. 8vo.
 Leipzig.
(See also Astr. Nachr., Band 64, p. 81.)
1865. **Kaiser, F.** 4to. Doppelstern-Messungen, 1840-1844. 4to. Altona.
(Astr. Nachr., Band 64, p. 97.)
 See also *Annalen der Sternwarte in Leiden*, Band 3, p. 179, 1872.
- 1865, '70, '73. [Romberg, H., and Talmage, C. G.] Astronomical Observations taken during the
 years 1862-72, at the Private Observatory of Joseph Gurney Barclay, Esq., F.R.A.S., at
 Leyton, Essex. Vols. i.-iii. 4to. London.
 Measures of 92, 217, and 91 double stars, respectively.
 Before 1864 the observations were made by H. Romberg, and afterwards by C. G. Talmage.
1867. **Brothers, A.** Catalogue of Binary Stars, with Introductory Remarks. 8vo. Manchester.
(Mems. of the Literary and Philosophical Society of Manchester, 3rd ser. vol. iii. pp. 204-230.)
 Also presented with *Astronomical Register*, vol. v.; which see p. 96.
 197 binary or doubtful binary stars, with selections of measures *Not seen.*
 The author's measures of 8 stars are given in the Remarks.
1867. **Dawes, W. R.** Catalogue of Micrometrical Measurements of Double Stars. 4to. London.
(Mems. R. A. S., vol. xxxv. pp. 137-502.)
 A most valuable paper containing all his measures from 1839-1865.
 With copious notes and hints on observing, and on various micrometers and screens, together
 with remarks on many of the pairs measured.

1867. **Herschel**, Sir J. F. W. A Synopsis of all Sir William Herschel's Micrometrical Measurements and Estimated Positions and Distances of the Double Stars described by him, together with a Catalogue of those Stars in order of Right Ascension, for the epoch 1880.0, so far as they are capable of identification. 4to. London.
(*Mems. R. A. S.*, vol. xxxv. pp. 21-136.)
After giving the stars of \mathbb{H} 's six classes, and his last *new* list published in 1822, *h* arranges all in order of R.A., numbering them from 1 to 812. These numbers, prefixed by the initials *Hh*, are sometimes used for \mathbb{H} stars in place of the original classes and numbers, which are retained in this catalogue.
1868. **Secchi**, A. Serie seconda delle misure micrometriche . . . dal 1863 al 1866 inclusive. Stelle doppie e nebulose. 4to. Roma.
(*Atti dell' Accademia Pontificia de' Nuovi Lincei*, vol. xxi. p. 159.) *Not seen.*
Measures of 159 double stars, and of 3 planetary nebulae.
1869. **Copeland**, Ralph. Ueber die Bahnbewegung von α Centauri. Inaugural-Dissertation. 8vo. Göttingen.
Contains a discussion of the earlier observations of the great binary.
Reviewed by A. Winnecke in *Vierteljahrsschrift der Astr. Ges.*, v. Jg. p. 312.
1869. **Lamont**, J. von. Messungen an Sternen, welche sehr kleine Begleiter haben, und an einigen bekannten Doppelsternen. 8vo. München.
(*Annalen der K. Sternwarte bei München*, Band xvii.)
1869. **Winnecke**, A. Doppelsternmessungen. 4to. Altona.
(*Astr. Nachr.*, Band 73, No. 1738.)
Chiefly made with the 9.6-inch refractor at Berlin in 1855-6.
- 1869-1873. **Ellery**, R. L. J. Results of Astronomical Observations made at the Melbourne Observatory, 1866-1868 and 1869-70. 2 vols. 8vo. Melbourne.
Several new pairs were taken from the meridian observations in these volumes.
1870. **Gore**, J. E. Southern Stellar Objects between the Equator and 55° South Declination. 8vo. Calcutta.
Reprinted 1877. *Not seen.*
1871. **Gilliss**, J. M. A Catalogue of . . . 290 Double Stars observed by U.S. Naval Astronomical Expedition . . . during 1850-'51-'52. 4to. New York.
Originally published as part of an appendix to the Washington Observations for 1868.
A few new southern pairs will be found in this list. They were noted with the meridian instrument erected at Santiago in Chile, not being specially looked for.
1871. **Herschel**, Sir J. F. W. Seventh Catalogue of Double Stars observed at Slough. 4to. London.
(*Mems. R. A. S.*, vol. xxxviii. pp. 1-16.)
368 stars, observed in the years 1823-1828 inclusive, of which 84 are new.
Contains *h* 5450 to *h* 5533.

1872. Talbot, H. Fox. On a Method of Estimating the Distances of some of the Fixed Stars. 8vo. London.
(*Report of the British Association*, 1871, pp. 34-36.)
The method proposed is founded on Spectral Analysis, and has been the subject of many papers since this date.
1873. Burnham, S. W. Catalogue of 81 Double Stars, discovered with a 6-inch Alvan Clark Refractor. 8vo. London.
(*M. N. R. A. S.*, vol. xxxiii. pp. 351-357.)
The first of Burnham's celebrated series of catalogues of new double stars. These catalogues are rich in southern pairs of the most interesting character.
Contains β 1 to β 81, all but one (β 64), found with a 6-inch refractor made by Alvan Clark, now at the Washburn Observatory.
1873. Burnham, S. W. A Second Catalogue of New Double Stars, discovered with a 6-inch Alvan Clark Refractor. 8vo. London.
(*M. N. R. A. S.*, vol. xxxiii. pp. 437-439.)
Contains β 82 to β 106.
1873. Burnham, S. W. A Third Catalogue of 76 New Double Stars, discovered with a 6-inch Alvan Clark Refractor. 8vo. London.
(*M. N. R. A. S.*, vol. xxxiv. pp. 59-71.)
Contains β 107 to β 182.
- 1873-4. Burnham, S. W. "Errors and Omissions" and "Additional Notes" concerning Sir William Herschel's Double Stars. 8vo. London.
(*M. N. R. A. S.*, vols. xxxiii. pp. 567-570 and xxxiv. pp. 98-103.)
Notes on stars about which there is some uncertainty.
1874. Burnham, S. W. A Fourth Catalogue of 47 New Double Stars, discovered with a 6-inch Alvan Clark Refractor. 8vo. London.
(*M. N. R. A. S.*, vol. xxxiv. pp. 382-392.)
Containing β 183 to β 229.
1874. Herschel (Main and Pritchard). A Catalogue of 10,300 Multiple and Double Stars arranged in the order of Right Ascension.
(*Mems. R. A. S.*, vol. xl. pp. 1-144.)
Places for 1830. No angles, distances, or magnitudes of the components.
10,317 double and multiple stars, with many notes.
1874. Niven, C. On a Method of finding the Parallax of Double Stars, and on the Displacement of the Lines in the Spectrum of a Planet.
A list of double stars, showing the best times for their spectroscopic examination, is given.
1875. Burnham, S. W. A Fifth Catalogue of 71 New Double Stars. 8vo. London.
(*M. N. R. A. S.*, vol. xxxv. pp. 31-49.)
Containing β 230 to β 300 found with telescopes (refractors) of 6-inch, 9.4-inch, 18½-inch, and 26-inch aperture.

1875. **Burnham, S. W.** Sixth Catalogue of 90 new double stars discovered with a 6-inch refractor. 4to. Kiel.
(*Astr. Nachr.*, Band 86, No. 2062.)
Containing β 301 to β 390.
1875. **Doberck, W.** New Elements of μ_2 Bootis. 4to. Kiel.
(*Astr. Nachr.*, Band 85, No. 2026.)
The first of a long series of papers on double stars, which include measures, orbits, colours, theories, etc. Here it has been impossible to enumerate all the papers, but the more important from the point of view of this catalogue will be noticed.
1875. **Doberck, W.** On the Binary Stars σ Coronae, τ Ophiuchi, γ Leonis, ζ Aquarii, 36 Andromedae, and ι Leonis.
(*Transactions of the Royal Irish Academy*, vol. xxv.) *Not seen.*
1875. **Ferrari, G. S.** Serie terza delle misure micrometriche delle stelle doppie fatte all' equatoriale del Collegio Romano . . . 1872-4. 4to. Roma. *Not seen.*
(*Atti dell' Accademia Pontificia de' Nuovi Lincei*, vol. xxviii. pp. 207-228.)
1875. **Gledhill, J.** Measures of 484 Double Stars, made at Mr Edward Crossley's Observatory, Bermerside, Halifax. 4to. London.
(*Mems. R. A. S.*, vol. xlii. pp. 101-127.)
Measures of 484 stars made with a $9\frac{1}{2}$ -inch refractor by Cooke.
1875. **Nobile, A.** Misure di angoli di posizione di alcuni sistemi di stelle multiple. 4to. Napoli.
Not seen.
(*Rendiconto dell' Accademia delle scienze fisiche e matematiche*. Anno xiv. pp. 9-21, 1875.)
1875. **Wilson, J. M., and Seabroke, G. M.** Catalogue of Micrometrical Measurements of Double Stars, made at the Temple Observatory. 4to. London.
(*Mems. R. A. S.*, vol. xlii. pp. 59-100.)
Measures of 447 double stars with the well-known $8\frac{1}{4}$ -inch refractor, originally made by Alvan Clark for Dawes.
1876. **Bessel, F. W.** Abhandlungen, herausgegeben von R. Engelmann, vol. ii. pp. 282-299. 4to. Leipzig.
Reprints of various papers on Double Stars.
1876. **Burnham, S. W.** Seventh Catalogue of New Double Stars. 4to. Kiel.
(*Astr. Nachr.*, Band 88, No. 2103.)
Containing β 391 to β 436.
1876. **Burnham, S. W.** A Catalogue of Red Double Stars. 8vo. London.
(*M. N. R. A. S.*, vol. xxxvi. pp. 331-338.)
A list of 102 red double stars within 121° of the North Pole.
1876. **Copeland, Robert.** A Summary of the *Mensure Micrometrica* of Struve. 4to. Dun Echt, Aberdeen.
(*Lord Lindsay's Dun Echt Observatory Publications*, vol. i.)
A very convenient summary of Struve's measures. Struve's great volume is too large for practical use, and is now very scarce. Besides which, the arrangement of the stars in classes is inconvenient. In the above work the stars are arranged in order of R.A. for 1875.

LIST OF WORKS AND PAPERS ON DOUBLE STARS.

- 1876: **Dunér, N.** *Mesures Micrométriques d'Étoiles Doubles*: 4to. Lund.
 A valuable collection of observations made at Lund from 1867–1875 with a 9 $\frac{1}{4}$ -inch refractor. Nearly all the stars measured are north of the Equator, and thus do not come within the scope of this catalogue.
1876. **Howe, Herbert A.** *Catalogue of 50 New Double Stars, discovered with the 11-inch Refractor*. 8vo. Cincinnati.
 (*Publications of the Cincinnati Observatory, No. 1.*)
 Fifty new pairs (Howe 1 to Howe 50) all south of the Equator, with right ascensions and declinations for 1880.
 Later pairs found by the same observer have not been regularly numbered.
1876. **Knobel, E. B.** *Reference Catalogue of Astronomical Papers and Researches*. 8vo. London.
 (*M. N. R. A. S.*, vol. xxxvi. pp. 365–392.)
 Mr Knobel starts this paper as follows:—“A Catalogue of Scientific Papers, classified according to subjects, is a desideratum and a necessity to exhaustive scientific research. . . . I have made an attempt to supply this want, for a few branches of Stellar Astronomy; by a series of references to all books, papers, and notes relating to the following subjects:—
 “1. Double Stars, including the Mathematical Investigation of the Orbits of Binary Systems.
 “2. Variable Stars.
 “3. Red Stars.
 “4. Nebulae and Clusters.
 “5. Proper Motions of Stars.
 “6. Parallax and Distance of Stars.
 “7. Star Spectra.”
 Mr Knobel's paper has been of considerable use in this compilation.
1876. **Mitchel, O. M.** *Micrometrical Measures of 176 Double and Triple Stars, observed with the 11-inch Refractor of the Cincinnati Observatory*. 8vo. Cincinnati.
 (*Publications of the Cincinnati Observatory, No. 2.*)
 Measures, chiefly of southern pairs, made by several observers, but in greater part by Mitchel. Several new pairs will be found in this list.
 See also under 1846–48.
 The above measures have been reduced under the direction of Prof. Ormond Stone.
1877. **Burnham, S. W.** *Double-Star Discoveries with the 18 $\frac{1}{2}$ -inch Chicago Refractor*. 8vo.
 (*American Journal of Science*, vol. cxiv. pp. 31–35.)
 His eighth catalogue, containing β 437 to β 452: all north of the Equator.
1877. **Burnham, S. W.** *Ninth Catalogue of New Double Stars, discovered with the 6-inch Refractor*: 8vo. London.
 (*M. N. R. A. S.*, vol. xxxviii. pp. 78–80.)
 Containing β 453 to β 482, and including twelve southern pairs.
1877. **Gore, J. E.** *Southern Stellar Objects for Small Telescopes*. *Not seen.* (See under 1870.)

1877. **Knott, George.** *Micrometrical Measures of Double Stars.* 4to. London.
(*Mems. R. A. S.*, vol. xliii. pp. 75-104.)
309 double stars measured between 1860 and 1873 with the 7 $\frac{1}{2}$ -inch telescope formerly belonging to the Rev. W. R. Dawes.
A considerable number of southern pairs is included.
The measures seem to be very good, and great attention was given to magnitudes and colours.
1877. **Schiaparelli, G. V.** *Mesures micrométriques de quelques étoiles doubles plus importantes.* 4to. Kiel.
(*Astr. Nachr.*, Band 89, Nos. 2132-3.)
Made in 1875-1877.
1877. **Stone, E. J.** *Results of Astronomical Observations made at the Royal Observatory, Cape of Good Hope.* 1874. 8vo. Cape Town.
From this and subsequent volumes of the same series several new double stars have been taken. As in most meridian work, the direction of the companion and its magnitude is all that is recorded.
1877. **Stone, Ormond.** *Micrometrical Measurements of 166 Double and Triple Stars, observed with the 11-inch Refractor of the Cincinnati Observatory during the years 1875-76.* 8vo. Cincinnati.
(*Publications*, No. 3, pp. i-iii and 1-34.)
In the introduction to this series of measures Professor Stone remarks: "The labours of European astronomers have rendered our knowledge of the double stars between the pole and 15° of south declination very complete. For our knowledge of double stars situated farther south, we are almost wholly indebted to the observations of Dunlop at Paramatta, Sir John Herschel at the Cape of Good Hope and those of Jacob and Powell at Madras. No systematic survey of the southern heavens similar to that made by Struve of the northern heavens has ever been undertaken. A large portion of Sir John Herschel's southern doubles has never been measured micrometrically, and no strictly southern observatory, as far as I am aware, has published any double star observations of recent date. It has therefore seemed to me appropriate that the 11-inch refractor of this Observatory should be devoted to supplementing the labours of other astronomers, by observations of double stars between 15° and 35° of south declination."
This indicates the course of the work clearly enough, and the series of measures thus commenced has been of great utility in the formation of the present catalogue.
The observers were Messrs Stone, Howe, and Upton.
1877. **Wilson, J. M., and Seabroke, G. M.** *Second Catalogue of Micrometrical Measures of Double Stars, made at the Temple Observatory.* 4to. London.
(*Mems. R. A. S.*, vol. xliii. pp. 105-128.)
Measures, chiefly of Struve stars.
1878. **Burnham, S. W.** *New Double Stars.* 8vo. London.
(*M. N. R. A. S.*, vol. xxxviii. p. 478.)
Asking for measures of some new double stars.
1878. **Doberck, W.** *Binary Stars.* 8vo. London.
(*The Observatory*, vol. ii. Nos. 16, 17, 18, 19.)
Mainly on computation of orbits, with examples. A slight historical sketch is given.

1878. **Doberck, W.** On Double-Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Band 92, No. 2187.)
A graphic description of the Markree Observatory, the 13.2-inch Cauchoix Refractor, and the filar micrometer, with an explanation of his method of double star observation.
1878. **Doberck, W.** Markree Double-Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Band 92, Nos. 2196-7-8-9.)
Made in 1875-1878.
1878. **Doberck, W.** Values of M for different e with argument E.
Values of E for different e with argument M. 4to. Kiel.
(*Astr. Nachr.*, Band 92, No. 2202.)
1878. **Flammarion, Camille.** Catalogue des Étoiles Doubles et Multiples en mouvement relatif certain. 8vo. Paris.
A very useful work.
The lists of measures are fairly complete to the date of publication.
1878. **Gledhill, Joseph.** Double-star Measurement. 8vo. London.
(*The Observatory*, vol. ii. No. 17.)
1878. **Oxford University Observatory.** Observations of Double Stars in the years 1876 and 1877. 8vo. Oxford.
(*Astronomical Observations*, No. I. pp. 17-42.)
Observations mostly of northern stars made by Mr W. E. Plummer and Mr Jenkins with the 12 $\frac{1}{4}$ -inch refractor.
1878. **Stone, Ormond.** Micrometrical Measurements of 517 Double Stars. 8vo. Cincinnati.
(*Publications of the Cincinnati Observatory*, No. 4, pp. i-ix and 1-74.)
The observations of 1877 in continuation of those in publication No. 3. All are southern pairs.
1878. **Struve, Otto.** Observations de Poulkova. 4to. St. Pétersbourg. Vol. ix., Mesures Micrométriques des Étoiles Doubles.
In this most interesting work unfortunately very few southern stars come under consideration. The introduction contains a very full description of the methods for determining the screw-value of the micrometer, measures of artificial double stars, empirical formulæ for the correction of measures of angle and distance, comparisons between the measures of several astronomers, etc.
1878. **Talmage, C. G.** Double Star Observations. 4to. London.
(*Astronomical Observations taken to the end of 1877, at the Private Observatory of Joseph Gurney Barclay, Esq., F.R.A.S., Leyton, Essex*, vol. iv. pp. 1-98.)
Made with a 10-inch Cooke Refractor. Contains a summary of all the Leyton measures.
1878. **Waldo, Leonard.** Miscellaneous Observations of Double Stars made in 1876 at the Observatory of Harvard College. 4to. Kiel.
(*Astr. Nachr.*, Band 92, No. 2190.)
Made with the 15-inch Merz Refractor.
The only southern stars are γ Virginis and τ Ophiuchi.

1879. **Brünnow**, Francis. Observations of Double Stars. 4to. Dublin.
(*Dunsink Observations*, Third Part, No. 4, pp. 71-85.)
1879. **Burnham**, Sherburne Wesley. 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. 4to. London.
(*Mems. R. A. S.*, vol. xlv, pp. 141-305.)
See also an advance note on this paper in *M. N. R. A. S.*, vol. xxxix, p. 76 (1878).
Includes Burnham's tenth catalogue of new stars, β 483 to β 733.
A very valuable paper.
In the *M. N. R. A. S.*, vol. xl, pp. 99-102 (1879) a preliminary list of additional new pairs is added.
1879. **Doberck**, W. Markree Double Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Band 94, No. 2242.)
On the Brightness and Parallax of Double-Stars. 4to. Kiel.
(*Astr. Nachr.*, Band 95, No. 2269.)
On the Colour of Revolving Double-Stars, etc. 4to. Kiel.
(*Astr. Nachr.*, Band 95, No. 2278.)
1879. **Goldney**, Gabriel A. Double-Stars observed at the University Observatory, Durham, during the year 1878. 4to. Kiel.
(*Astr. Nachr.*, Band 95, No. 2257.)
Made with a 6.3-inch equatorial and a double image micrometer.
1879. **Gould**, B. A. Uranometria Argentina. 4to. Buenos Aires.
A few pairs have been taken from this work.
1879. **Russell**, H. C. Clark's Companion of Sirius. 8vo. Sydney.
(*Proc. Roy. Soc. N. S. Wales*, 1878, pp. 233-5.)
1879. **Schur**, W. Heliameter-Messungen von Doppelsternen, 1875-76. 4to. Kiel.
(*Astr. Nachr.*, Band 94, pp. 353 and 369.)
1879. **Seeliger**, H. Ueber Mädler's Doppelsternmessungen. 4to. Kiel.
(*Astr. Nachr.*, Band 96, No. 2288.)
1879. **Stone**, Ormond. Micrometrical Measurements of 1054 Double Stars, observed with the 11-inch Refractor from January 1, 1878, to September 1, 1879. 8vo. Cincinnati.
(*Publications of the Cincinnati Observatory*, No. 5, pp. i-xxix and 1-180.)
A continuation of the previous series. The observers were Stone, Howe, and Egbert. A list of 74 new double stars is given.
The introduction contains much interesting matter on personal equation and the accuracy of observations, also a formula for the rejection of wide pairs.
- 1879-1880. **Crossley**, **Gledhill**, and **Wilson**. A Handbook of Double Stars. 8vo. London.
Corrections, etc. to the same. 8vo. London.
A very useful treatise on Double Stars, appealing mainly to northern astronomers. Too well known to require description here.

1880. **Burnham, S. W.** Catalogue of 42 New Double Stars, and Micrometrical Measures of Double Stars. 4to. Chicago.
(*Report to the Trustees of the "James Lick Trust" of Observations made on Mt. Hamilton, pp. 21-32.*) Reprinted in vol. i. of the Lick Publications.
Contains β 734 to β 775 found with his 6-inch refractor.
- 1880-1881. **Jedrzejewicz, J.** Mesures micrométriques des Étoiles Doubles à Plonsk. 4to. Kiel.
(*Astr. Nachr.*, Band 97, No. 2324, Band 98, Nos. 2329-2351, Band 99, No. 2369, and Band 101, No. 2407.)
1881. **Burton, C. E.** Recent Measures of Double Stars. 4to. Dublin.
(*Copernicus*, vol. i. pp. 54-56.)
1881. **Hall, Asaph.** Observations of Double Stars made at the U.S. Naval Observatory. 4to. Washington.
(*Washington Observations*, 1877, Appendix VI.)
Measures of 423 stars made with the 26-inch refractor from 1875 to 1880, a considerable number being in south declination. Also some measures with the 9.6-inch equatorial.
1881. **Holden, E. S.** List of New Double Stars. List of New Zone Doubles. 4to. Madison.
Not seen.
(Contributions from the Washburn Observatory of the University of Wisconsin, No. 1.)
The first list contains 34 doubles discovered by Burnham; in the second are 28 pairs found by Holden and Burnham. Both these lists are incorporated in the fuller lists in the publications of the Washburn Observatory. See under 1882.
1881. **Seabroke, Geo. M.** Third Catalogue of Micrometrical Measures of Double Stars made at the Temple Observatory, Rugby. 4to. London.
(*Mems. R. A. S.*, vol. xlvi pp. 183-212.)
A continuation of similar lists by the Rev. J. M. Wilson and Mr Seabroke.
1881. **Stone, E. J.** The Cape "Catalogue of 12,441 Stars for the Epoch 1880." 4to. London.
Containing meridian observations of several wide pairs and notices of stars not previously recorded as double.
1882. **Burnham, S. W.** Hints on Double Star Observing. 8vo. Northfield, Minn.
(*The Sidercal Messenger*, vol. i. Nos. 2, 3, 4.)
No one is better qualified than Burnham to write such a paper as this, and it requires no recommendation here. So far as my limited experience goes, it entirely agrees with the principles set forth in this valuable paper. It treats of:—
- | | |
|----------------------------|-------------------------|
| The Telescope. | Eye-pieces. |
| Refractors and Reflectors. | Working List. |
| Driving Clock. | Record of Observations. |
| The Micrometer. | Amount of Work. |
| What to do. | Methods of Observing. |
| New Double Stars. | Works of Reference. |
| Magnitudes. | Star Catalogues. |
| Variability. | |
- Reprinted with slight alterations in *Astronomy for Amateurs*. 8vo. London, 1888.

1882. **Burnham, S. W.** A List of 88 New Double Stars discovered and micrometrically measured at the Washburn Observatory from April 23 to September 30, 1881. 8vo. Madison.
(*Publications of the Washburn Observatory*, vol. i, pp. 91-111.)
This is Burnham's 12th catalogue, including β 776 to β 863.
All found with the 15.6-inch Clark Refractor.
Followed by an important series of "Measures of double stars selected from his MS. General Catalogue of Double Stars." (Same volume, pp. 113-159.)
1882. **Doberck, W.** On the Poles of Double-Star-Orbits. 4to. Kiel.
(*Astr. Nachr.*, Band 102, No. 2433.)
With a table showing the poles of the orbits on both hypotheses of inclination, and also the hypothetical parallaxes.
1882. **Engelmann, Rudolf.** Messungen von Doppelsternen. 4to. Leipzig.
Measures of Σ and $O\Sigma$ stars in 1864-1867.
This paper also appeared in the *Publicationen der K. Universitäts-Sternwarte zu Leipzig*. Heft 1.
See also *Astr. Nachr.*, Bd. 70, Nos. 1673-76, 1868.
1882. **Harvard College Observatory.** Double Stars. 4to. Cambridge, Mass.
(*Annals of the Astronomical Observatory of Harvard College*, vol. xiii., part i, chap. ii, pp. 17-61.)
Table VI. New Double Stars.
,, VII. Micrometric Measurements of Double Stars.
Observations by Winlock, C. S. Peirce, Searle, and others.
The new double stars, 179 in number, were discovered with the 15-inch refractor between 1866 and 1881. The greater portion are southern stars, mostly wide and faint, and the positions are in some cases too rough to permit identification. The celebrated binary ζ Sagittarii is in this list. Several of the stars were independently found later on by Burnham, and were first published by him.
The measures of double stars were chiefly made from 1866 to 1871, and include a considerable number of southern pairs.
1882. **Houzeau, J. C.** Vade-Mecum de l'Astronome. 8vo. Bruxelles.
A most useful work, of which pp. 889-905 are devoted to Double Star Astronomy.
1882. **Jedrzejewicz, J.** Mesures micrométriques des étoiles doubles à Plonsk. (2^e Série). 4to. Kiel
(*Astr. Nachr.*, Band 103, Nos. 2449-50.)
Made in 1880-1882. Stars selected from the Struve catalogues.
1882. **Russell, H. C.** Results of Double Star Measures made at the Sydney Observatory, 1870 to 1881. 8vo. Sydney.
(The official reprint of a paper published by the Royal Society of N. S. Wales, 1881, pp. 1-68.)
This paper was also published in the *Memoirs R. A. S.*, vol. xlvii., 1883, but there are many small differences; here the official publication has been used in preference.
A valuable series of measures of known double stars (mostly from h) nearly all south of Dec. -34° made by Mr Russell and Mr L. Hargrave with refractors of $7\frac{1}{4}$ and $11\frac{1}{2}$ inches,

followed by a list of 350 new double stars. Unfortunately this work suffers much from misprints and other errors. In the observations of the new double stars, the name of the observer has not been recorded; here it has been assumed to be Mr Russell, except in one or two cases where there is other evidence that Mr Hargrave was the observer.

In the work itself the new stars, where referred to, have the initial R prefixed, but in the more recent Sydney Observations this is changed to Syd.

1882. **Shdanow, A.** Zur Berechnung der Doppelsternbahnen. 4to. Kiel.
(*Astr. Nachr.*, Band 103, No. 2469.)
1882. **Stone, Ormond.** Micrometrical Measurements of 455 Double Stars observed with the 11-inch Refractor during the year ending September 1, 1880. 8vo. Cincinnati.
(*Publications of the Cincinnati Observatory*, No. 6, pp. i-iv and 1-69.)
A continuation of the measures in previous years by the same observers (Stone, Howe, and Egbert). About half the stars are north of the equator.
1882. **Thiele, T. N.** On some Interpolation Formulæ for Double Stars. 4to. Dublin.
(*Copernicus*, vol. ii. pp. 25-41.)
A mathematical paper.
1882. **Washburn Observatory.** List of 60 New Double Stars discovered in the Zone Observations . . . from April 23 to September 30, 1881. 8vo. Madison.
(*Publications*, vol. i. pp. 77-89.)
Contains Washburn 1 to Washburn 60 found with the 15·6-inch refractor and a power of 145, mostly by Professor E. S. Holden. A considerable number of southern pairs.
1883. **Burnham, Sherburne Wesley.** Double Star Observations made in 1879 and 1880 with the 18½-inch Refractor of the Dearborn Observatory, Chicago, U.S. I. Catalogue of 151 New Double Stars with Measures. II. Micrometrical Measures of 770 Double Stars. 4to. London.
(*Mems. R. A. S.*, vol. xlvii. pp. 167-[325].)
Containing Burnham's thirteenth catalogue of new pairs, viz. : β 864 to β 1025.
Also, in an appendix, some valuable remarks on double stars. He shows that the average distance of 743 double stars, out of 1000 discovered by him, is only 1"·58.
1883. **Cruls, L.** Mesures Micrométriques d'Étoiles Doubles et Multiples de l'Hémisphère Austral. 4to. Rio.
(*Annales de l'Observatoire Impérial de Rio de Janeiro*, tome iv., partie 1, pp. [97-123].)
The volume was published in 1889, but this paper was first printed in 1883. The measures, which are chiefly of wide pairs, were made in 1879 and 1880 with a 9¾-inch refractor.
1883. **Powell, E. B.** Measures of Southern Double Stars. 8vo. London.
(*M. N. R. A. S.*, vol. xlv. pp. 17-22.)
Made between 1863-1871, completing Mr Powell's series of measures.

1883. **Seagrave, F. E.** Double Stars. 8vo. Northfield.
(*Sidereal Messenger*, vol. ii. pp. 22-23.)
Measures made with an 8 $\frac{1}{4}$ -inch equatorial in 1882. Thirty-seven Σ and $O\Sigma$ stars.
1883. **Thiele, T. N.** Neue Methode zur Berechnung von Doppelsternbahnen. 4to. Kiel.
(*Astr. Nachr.*, Band 104, No. 2488.)
- 1883-1884. **Dembowski, Ercole.** Misure Micrometriche di Stelle Doppie e Multiple fatte negli anni 1852-1878. 2 vols. 4to. Roma.
These two volumes contain the collected measures of Baron Dembowski, edited by Otto Struve and G. V. Schiaparelli.
Dembowski's measures extend to all known double stars from the North Pole to about -20° declination. Their value is too well known to require comment here.
- 1883-1886. **Perrotin, J.** Mesures Micrométriques d'Étoiles Doubles faites à l'Observatoire de Nice (Équatorial de Gautier de 0^m.38 d'ouverture).
1^o Série, *Astr. Nachr.*, Band 106, No. 2529.
2^o " " " 107 " 2559-60.
3^o et 4^o Séries, " " 112 " 2684-85.
5^o Série, " " 115 " 2748-49.
The third series also appeared in vol. i. of the *Bulletin Astronomique*.
All stars from Σ 's or $O\Sigma$'s catalogues.
1884. **Bigourdan, G.** Sur une Cause d'Erreurs Systématiques dans les mesures d'Étoiles Doubles. 8vo. Paris.
(*Bulletin Astronomique*, vol. i. pp. 439-445.)
1884. **Copeland, Ralph.** Experiments in the Andes. 4to. Dublin.
(*Copernicus*, vol. iii. pp. 193-231.)
On pp. 199-201 of this most interesting account of mountain observations will be found the double star results with a 6-inch refractor. The new pairs ψ Argûs (a rapid binary) and ϵ Lupi were discovered on this occasion.
1884. **Downing, A. M. W.** On an Instance of Change of Personality in Observing Position Angles of Double Stars; and on the Orbit of α Centauri.
(*M. N. R. A. S.*, vol. xlv. pp. 238-240.)
The Change of Personality occurs in the Sydney observations of α Centauri, and amounts to 5° or 6° .
1884. **Franz, J.** Heliometermessungen von Doppelsternen zu Königsberg. 4to. Kiel.
(*Astr. Nachr.*, Band 108, No. 2590.)
1884. **Gould, B. A.** Cordoba Zone Catalogue. 2 vols. 4to. Cordoba.
A large number of double stars are to be found in this great work, and many were new at the time of observation. It is hoped that all the closer pairs, not elsewhere previously recorded, have been given in the Reference Catalogue. To those who care to give their time to wide pairs these volumes will be very useful.

1884. **Holden, E. S.** List of 111 New Double Stars . . . encountered in the Sweeps from December 1881, to January 1884.
 Contains Washburn 61 to Washburn 171, found with the 15·6-inch refractor, excepting ten high southern pairs found with Burnham's 6-inch refractor during an expedition to Caroline Island, in the South Pacific Ocean.
1884. **Küstner, F.** Messungen von Doppelsternen am Hamburger Aequatoreal. 4to. Kiel.
 (*Astr. Nachr.*, Band 108, No. 2584.)
 Made with two different object-glasses: 9·05-inch (Schröder) and 9·46-inch (Merz).
1884. **Russell, H. C., and Hargrave, L.** New Double Stars. 8vo. Sydney.
 (*Proc. Roy. Soc. N.S.W.*, 1883, pp. 123-128.)
 A list of 130 new double stars found by Mr Russell and Mr Hargrave in 1882-1883. The observers' names are not given, hence it is impossible to indicate with certainty to whom the new pairs are due. Very few indeed of this list fall within the limits of distance adopted for the Reference Catalogue; for those included the discoverer has been assumed to be Mr Hargrave. Mr Sellors calls this list Syd₂ in his measures.
1884. **Seabroke, G. M.** Fourth Catalogue of Micrometrical Measures of Double Stars. 4to. London.
 (*Mems. R. A. S.*, vol. xlviii, pp. 195-224.)
 A few of the measures were made by Mr C. H. Hodges and Mr A. Percy Smith.
- 1885-1887. **Engelmann, Rudolf.** Doppelsternmessungen.
 1885. *Astr. Nachr.*, Band 111, Nos. 2662-63.
 1885. " " 112 " 2677-78.
 1886. " " 115 " 2742.
 1887. " " 117 " 2786.
 Of Σ and $O\Sigma$ stars, made with a 7½-inch Clark Refractor.
1885. **Sadler, Herbert.** Notes and Corrections to Sir John Herschel's Synopsis of all Sir William Herschel's Measures. 8vo. London.
 (*M. N. R. A. S.*, vol. xlv, pp. 316-325.)
 An important list of corrections.
1885. **Tebbutt, John.** Observations of Double Stars at Windsor, N.S.W. 8vo. London.
 (*M. N. R. A. S.*, vol. xlvi, pp. 50-55.)
 The first of a valuable series, this set being made with a 4½-inch refractor (not driven by clockwork) between 1880-1885.
1886. **Ball, L. de.** Doppelsternbeobachtungen. 4to. Kiel.
 (*Astr. Nachr.*, Band 115, No. 2753.)
 All Σ or $O\Sigma$ stars, measured with a 10-inch refractor. Two have south declination.
1886. **Bigourdan, G.** Sur l'Équation personnelle dans les Mesures d'Étoiles Doubles. Thèse de doctorat. (pp. 1-74.) 4to. Paris.
1886. **Gould, B. A., and Thome, J. M.** Catálogo General Argentino. 4to. Córdoba.
 Several pairs are due to this catalogue, which contains meridian observations of both components of many double stars.

LIST OF WORKS AND PAPERS ON DOUBLE STARS.

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1886. **Peek**, Cuthbert E. *Astronomical Observations, 1882-1885.* 4to. London.
On pp. 6-11 some remarks on the double stars near η Argus will be found. The observations were made in 1882.
1886. **Wilson**, H. C. On Personal Errors in Double-Star Observations. 8vo. Northfield, Minn.
(*Sidereal Messenger*, vol. v. Nos. 6 and 7.)
1887. **Hall**, A. The Nomenclature of Double Stars. 4to. Boston, Mass.
(*Astr. Journ.*, vol. vii. No. 159.)
Deprecating the increase of new symbols until the astronomer has found a pretty large number of new double stars. In the present catalogue this warning has been steadily borne in mind; many symbols having been discarded, and only one new one (viz. λ for Lowell) adopted.
1887. **Hough**, G. W. Catalogue of 209 New Double Stars. 8vo. Chicago.
(*Chicago Astronomical Society Report for 1885 and 1886*, pp. 27-36.)
Found with the 18 $\frac{1}{2}$ -inch Dearborn refractor with which Clark discovered the companion to Sirius.
Also printed in *Astr. Nachr.*, Nos. 2778-79.
1887. **Jedrzejewicz**, J. Mesures Micrométriques d'Étoiles Doubles. 4to. Kiel.
(*Astr. Nachr.*, Band 116, No. 2772.)
Third series made with a 6 $\frac{1}{2}$ -inch Steinheil refractor at Plonsk.
All Σ and $O\Sigma$ stars.
1887. **Leavenworth**, F. P., and **Muller**, F. New Double Stars discovered at the Leander McCormick Observatory. 4to. Boston, Mass.
(*Astr. Journ.*, vol. vii. No. 156.)
Thirteen pairs, all but one of which are south of the Equator.
1887. **Marth**, A. On the Formulæ for Correcting Approximate Elements of the Orbits of Binary Stars. 8vo. London.
(*M. N. R. A. S.*, vol. xlvii. pp. 480-494.)
1887. **Pritchett**, C. W., H. S., and C. W., jun. Measures of Double Stars. 4to. Lynn, Mass.
(*Publications of the Morrison Observatory*, No. 1, pp. 38-49.)
Many southern pairs measured with the 12 $\frac{1}{4}$ -inch Alvan-Clark Refractor during 1880-1884.
1887. **Russell**, H. C., and **Pollock**, J. A. Measures of Southern Double Stars, made at the Observatory, Sydney, N.S.W. 8vo. London.
(*M. N. R. A. S.*, vol. xlvii. pp. 473-477.)
Made in 1884, '6, and '7. Reprinted with other measures in 1891.

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LIST OF WORKS AND PAPERS ON DOUBLE STARS.

1887. **Tisserand, F.** Sur la Force qui produit les Mouvements des Étoiles Doubles. 8vo. Paris.
(*Bulletin Astronomique*, vol. iv. pp. 5-15.)
See also tome i. chap. i. of his *Traité de Mécanique Céleste*.
1887. **Washburn Observatory.** Double Star Observations. 8vo. Madison.
(*Publications*, vol. v. pp. 101-115.)
A few southern stars.
The observations were made by Dr Davies, Miss Lamb, and Mr Updegraff.
1888. **Burnham, S. W.** New Double Stars. 4to. Boston, Mass.
(*Astr. Journ.*, vol. viii. No. 186.)
A preliminary list only.
1888. **Clerke, Agnes M.** An Historical and Descriptive List of some Double Stars suspected to vary in Light. 4to. London.
(*Nature*, vol. xxxix. No. 994, pp. 55-58.)
A valuable paper on an obscure subject.
Among the cases analysed are γ Virginis, O Σ 256, β Scorpii, U Puppis, and Y Virginis.
See also *The Observatory*, vol. xi. pp. 188-192. 8vo. London.
1888. **Johnson, S. J.** Southern Double Stars. 8vo. London.
(*M. N. R. A. S.*, vol. xlviii. p. 257.)
Measures of 5 pairs made with a 3 $\frac{1}{4}$ -inch equatorial.
1888. **Monck, W. H. S.** The Distance of Double Stars. 8vo. Northfield, Min.
(*Sidereal Messenger*, vol. vii. pp. 290-292.)
1888. **Schiaparelli, G. V.** Osservazioni sulle Stelle Doppie, Serie Prima comprendente le Misure di 465 Sistemi eseguite col Refrattore di otto pollici di Merz negli anni 1875-1885. 4to. Milano.
(*Pubblicazioni del Reale Osservatorio di Brera in Milano*, No. xxxiii. pp. i-lxxxv and 1-147.)
A valuable series containing many stars from Burnham's catalogues.
1888. **Tarrant, K. J.** Micrometrical Measures of Double Stars. 1885-1886. 4to. Kiel.
(*Astr. Nachr.*, Band 120, No. 2866).
Made with a silver on glass reflector of 10 $\frac{1}{4}$ inches aperture by Calver. The first of a series of measurements of Σ , O Σ , β and other stars, including—for observations made in England only—a large number of southern pairs.
1889. **Bigourdan, G.** Mesures d'Étoiles Doubles faites à l'Équatorial de la Tour de l'Ouest de 1880 à 1884. 4to. Paris.
(*Annales de l'Observatoire de Paris. Observations.* 1883. Section H., pp. 1-81.)
343 stars, very few being south of the Equator.

1889. **Burnham, S. W.** Double-Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Band 120, No. 2875.)
Measures made in 1888 at the Lick Observatory, with the new pairs β 1026 to β 1038—these constituting his 14th catalogue—but the stars are here unnumbered; see introduction to his measures made in 1889.
1889. **Burnham, S. W.** Double Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Band 123, Nos. 2929–30.)
Nearly all made with the 36-inch Lick refractor in 1888 and 1889. Burnham's 15th catalogue containing the new doubles β 1039 to β 1092 is included, as well as a numbered summary of the new pairs in his 14th catalogue. Also a full account of θ Orionis as seen with the 36-inch.
1889. **Glazenapp, S. de.** On a Graphical Method for determining the Orbit of a Binary Star. 8vo. London.
(*M. N. R. A. S.*, vol. xlix. pp. 276–280.)
See also a paper by Prof. M. Kowalski in the *Proceedings of the Kasan Imperial University* for 1873.
1889. **Glazenapp, S. de.** Orbits des Étoiles Doubles du Catalogue de Poulkova. 51 pp. 8vo. St. Pétersbourg.
1889. **Haverford College Observatory.** Micrometrical Measurements of Double Stars. 8vo.
(*Haverford College Studies*, No. 1, pp. 21–71.)
Made under the direction of Mr F. P. Leavenworth by ten observers in 1887–1889, with a 10-inch refractor by Alvan Clark & Sons.
1889. **Leavenworth, F. P., and Muller, Frank.** Double Stars, 1885–'86. 8vo. Charlottesville.
(*Publications of the Leander McCormick Observatory*, vol. 1, pt. 4, pp. 47–97.)
Observations of southern pairs made with the 26-inch refractor of the observatory.
1889. **Palisa, J.** Ueber die Bestimmung der Parallaxe von Doppelsternen. 4to. Kiel.
(*Astr. Nachr.*, Band 123, No. 2941.)
1889. **Tarrant, K. J.** Micrometrical Measures of Double Stars, 1887. 4to. Kiel.
(*Astr. Nachr.*, Band 121, Nos. 2898–99.)
A continuation of the observations published in *Astr. Nachr.*, No. 2866.
1889. **Tebbutt, John.** Results of Double-Star Measures at Windsor, N.S.W., during the years 1886, 1887, and 1888. 8vo. London.
(*M. N. R. A. S.*, vol. 1. pp. 23–31.)
Made with refractors of $4\frac{1}{2}$ and 8-inches aperture.

1890. **Burnham, S. W.** Double Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Band 124, Nos. 2956-57.)
Nearly all made in May-July 1890, chiefly with the 36-inch Lick telescope.
Includes his 16th catalogue containing β 1093 to β 1154.
1890. **Comstock, G. C.** Observations of Double Stars. 4to. Madison, Wis.
(*Publications of the Washburn Observatory*, vol. vi. part 2, pp. 25-140.)
Mostly southern pairs measured with the 15½-inch refractor.
1890. **D'Engelhardt, B.** Observations Astronomiques faites . . . dans son Observatoire à Dresde.
Part II. 4to. Dresde.
Mesures micrométriques d'étoiles de Bradley, pp. 36-80.
Liste des étoiles de Bradley qui n'ont pas de compagnons, pp. 81-102.
Mesures d'étoiles doubles écartées de Struve, pp. 103-110.
1890. **Doberck, W.** Markree Observations of Double Stars. 4to. Dublin.
(*Transactions, Royal Irish Academy*, vol. xxix. pp. 379-426.)
Made with the 13.2-inch refractor, mostly northern stars.
1890. **Hough, G. W.** Catalogue of 94 New Double Stars discovered with the 18½-inch Refractor of the Dearborn Observatory, Evanston, Ill., U.S.A., and Measures of 107 Double Stars. 4to. Kiel.
(*Astr. Nachr.*, Band 125, Nos. 2977-78.)
A continuation of the series in *Astr. Nachr.*, Nos. 2778-79.
Contains the new pairs Hough 210 to Hough 303, a goodly proportion of which are south of the equator, followed by measures of miscellaneous close pairs.
1890. **Hough, G. W.** New Double Stars. 4to. Boston, Mass.
(*Astr. Journal*, vol. ix. No. 215.)
Discovered with the 18½-inch refractor of the Dearborn Observatory in 1889-1890. Several southern pairs. Contains additional stars to those in the above paper.
1890. **Pickering, Edward C.** A New Class of Binary Stars. 8vo. London.
(*M. N. R. A. S.*, vol. 1. pp. 296-298.)
Spectroscopic Binaries.
1890. **Pierson, Wm. M.** Does the Colour of a Star indicate its Age? 8vo. San Francisco.
(*Publications of the Astr. Soc. of the Pacific*, vol. ii. pp. 105-114.)
With a table of colours of binary stars. Followed on page 303 by a note by Prof. Holden.
1890. **Rambaut, Arthur A.** On the Parallax of Double Stars. 8vo. London.
(*M. N. R. A. S.*, vol. 1. pp. 302-310.)
To be found by spectroscopic observations.
1890. **Schwarzschild, K.** Methode zur Bahnbestimmung der Doppelsterne. 4to. Kiel.
(*Astr. Nachr.*, Band 124, No. 2965.)

1890. **Tarrant, K. J.** Micrometrical Measures of Double Stars, 1888. 4to. Kiel.
(*Astr. Nachr.*, Band 125, No. 2991.)
A continuation of the series in *Astr. Nachr.*, Nos. 2898-99.
1890. **Wellmann, V.** Zur Theorie des Doppelbild-Mikrometers. 4to. Kiel.
(*Astr. Nachr.*, Band 126, No. 3006.)
- 1890-1. **Doberck, W.** Markree Double-Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Band 125, No. 2989, and Band 126, No. 3023.)
A continuation of the series in *Astr. Nachr.*, No. 2242.
The period covered by this series extends from 1879 to 1885, the measures after 1884 being made with the Lee Equatorial at Hong Kong.
The R.A.'s and Dec.'s are not given.
1891. **Burnham, S. W.** Invisible Double Stars. 8vo. London.
(*M. N. R. A. S.*, vol. li. pp. 388-395.)
Inferred from the anomalous motions of known double stars.
1891. **Burnham, S. W.** Double Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Band 127, Nos. 3047-48.)
Made in 1890, mostly with the 36-inch Lick refractor.
Includes his 17th catalogue of new double stars β 1155- β 1224.
1891. **Comstock, George C.** Mr Burnham on Double Stars. 8vo. Northfield, Minn.
(*Sidereal Messenger*, vol. x. pp. 277-279.)
Quoting a letter from Mr Burnham describing his method of observing.
Besides the articles referred to, many minor notes on double stars will be found in this new series of the *Sidereal Messenger*.
1891. **Glasenapp, S.** Measures of Double Stars discovered at Cordoba. 4to. Boston, Mass.
(*Astr. Jour.*, vol. xi. No. 241.)
Followed in No. 243 by a paper by Prof. Burnham, entitled "Notes on the Double Stars of the *Uranometria Argentina*."
1891. **Gore, J. E.** A Catalogue of Binary Stars for which Orbits have been computed. With notes. 8vo. Dublin.
(*Proceedings, Royal Irish Academy*, 3rd series, vol. i. No. 4, pp. 571-99.)
1891. **Haverford College Observatory.** Double Star Observations. 8vo.
(*Studies*, No. 11, pp. 28-40.)
Made between 1889-1892 with the 10-inch refractor—the greater part by Mr W. H. Collins—the remainder were made by Mr Leavenworth and students of practical astronomy. A fair proportion of southern stars.
1891. **Hayn, F.** Doppelsternmessungen. 4to. Kiel.
(*Astr. Nachr.*, Band 128, No. 3051.)
Only two or three well-measured southern pairs are included.
1891. **Pickering, E. C.** The Discovery of Double Stars by means of their Spectra. 4to. Kiel.
(*Astr. Nachr.*, Band 127, No. 3034.)

1891. **Rambaut**, Arthur A. On a Geometrical Method of finding the most probable Apparent Orbit of a Double Star. 8vo. Dublin.
(*Scientific Proceedings, Royal Dublin Society*, pp. 95-98.)
1891. **Rambaut**, Arthur A. On the Determination of Double Star Orbits from Spectroscopic Observations of the Velocity in the Line of Sight. 8vo. London.
(*M. N. R. A. S.*, vol. li. pp. 316-330.)
1891. **Russell**, H. C., **Hargrave**, L., and **Pollock**, J. A. Results of Double Star Measures. 8vo. Sydney.
Measures of double stars made at the Sydney Observatory with the 7½- and 11½-inch refractors between 1882 and 1890 (with a few exceptions), preceded by a catalogue of double stars which seem to be in motion. A very valuable list.
Also printed in the *Mems. R. A. S.*, vol. l. pp. 57-74. 4to. London, 1892.
1891. **Tebbutt**, John. Double Star Measures at Windsor, N.S.W., 1889 and 1890. 8vo. London.
(*M. N. R. A. S.*, vol. li. pp. 331-333.)
Made with an 8-inch Grubb refractor.
Eight southern pairs.
1892. **Burnham**, S. W. Double Star Discoveries and Measures. 4to. Kiel.
(*Astr. Nachr.*, Band 130, Nos. 3113-14.)
Contains his 18th catalogue of the new double stars β 1225- β 1266.
In the preface to this series, Burnham mentions that the number of measures made per night "means continuous observing, without interruption, for eight or ten hours."
1892. **Glasenapp**, S. de. Mesures d'Étoiles Doubles faites à Hoursouf. 8vo. St. Pétersbourg.
Made with a 6.4-inch Repsold refractor in 1890.
Nearly all are southern stars.
1892. **Grossmann**, Ernst. Untersuchung über systematische Fehler bei Doppelsternbeobachtungen ausgeführt in Verbindung mit einer Bahnbestimmung des Doppelsterns " η coronae borealis." Inaugural-Dissertation. 4to. Göttingen.
1892. **Hall**, Asaph. Observations of Double Stars, Part II. 4to. Washington.
(*Washington Observations*, 1888, Appendix I. pp. E.1-E.203.)
A continuation of his measures with the 26-inch equatorial. The observations cover the period 1880-1891.
There is a considerable number of southern pairs in this fine series.
1892. **Haverford College Observatory**. Double Star Observations. 8vo.
(*Proceedings of the Observatory*, pp. 11-41.)
Made in 1891-92 with the 10-inch refractor.
The observations are divided into two parts—the first part being chiefly due to F. P. Leavenworth and W. H. Collins, the second part to Geo. L. Jones.

1892. **Leavenworth, F. P.**, and others. Measures of Double Stars. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xii. No. 278.)
Made at the Haverford College Observatory with the 10-inch refractor in 1892, by F. P. Leavenworth, W. H. Collins, J. H. Dennis, E. H. Gifford, and G. L. Jones. Many southern stars.
1892. **Leavenworth, F. P.** Parallax of $\ddot{O}A$. 14,320. 8vo.
(*Proceedings of Haverford College Observatory*, pp. 1-5.)
This star and a neighbouring star 5' S. of it have a common proper motion of $3''.75$. Its position for 1900 is
R.A. $15^h 4^m 45^s$. S.D. $15^\circ 54'1$.
The parallax found is negative.
1892. **Maw, W. H.** Double-Star Observations, 1888-91. 4to. London.
(*Mems. R. A. S.*, vol. 1. pp. 75-112.)
Observations of 153 pairs made with a 6-inch Cooke refractor.
Some southern pairs are included. The observations seem to be very good. On an average, each pair has been measured on three nights.
1892. **Seabroke, Smith, and Highton.** Fifth Catalogue of Micrometrical Measures of Double Stars, made at the Temple Observatory, Rugby. 4to. London.
(*Mems. R. A. S.*, vol. 1. pp. 1-28.)
1892. **Tebbutt, John.** Results of Double-Star Measures with the 8-inch Equatorial at Windsor, N.S.W., in 1891. 8vo. London.
(*M. N. R. A. S.*, vol. lii. pp. 386-388.)
Eight southern pairs.
1893. **Burnham, S. W.** Double Star Observations made at the Lick Observatory in 1892. 4to. Kiel.
(*Astr. Nachr.*, Band 131, Nos. 3141-42.)
Contains his 19th catalogue of new double stars, viz., β 1267 to β 1274.
1893. **Lewis, T.** Double Star Astronomy. 8vo. London.
(*The Observatory*, vol. xvi. Nos. 204-5-6-7.)
A very valuable *précis* of the subject.
1893. **Searle, Geo. M.** Observations of Double Stars. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xiii. No. 299.)
A few measures made with a Clausen double image micrometer.
1893. **See, T. J. J.** Die Entwicklung der Doppelstern-Systeme. 4to. Berlin.
Prof. See's well-known Inaugural Dissertation.
1893. **Seeliger, H.** Ueber Herrn Burnham's "Invisible Double Stars" und insbesondere über ϵ Hydrae. 4to. Kiel.
(*Astr. Nachr.*, Band 132, No. 3165.)

1893. **Sellors, R. P.** Observations of Double Stars made at Sydney Observatory (communicated by H. C. Russell, B.A., F.R.S., Government Astronomer). 8vo. London.
(*M. N. R. A. S.*, vol. liv. pp. 123-4.)
A list of 14 new pairs, all under $2''$ = Sellors 1 to 14.
1893. **Sellors, R. P.** Measures of Double Stars. 4to. Kiel.
(*Astr. Nachr.*, Band 132, No. 3154.)
Made with the $11\frac{1}{2}$ -inch Schröder refractor of the Sydney Observatory between April 1890 and December 1891. Several new pairs found by Mr Sellors are included in this list.
1893. **Tarrant, Kenneth J.** Micrometrical Measures of Double Stars made in the years 1889, 1890, 1891, and 1892. 4to. Kiel.
(*Astr. Nachr.*, Band 133, No. 3185-86.)
Continued from *Astr. Nachr.*, No. 2991.
No R.A.'s or Dec.'s are given.
1893. **Wilsing, J.** Ueber die Bestimmung von Bahnelementen enger Doppelsterne aus spectroscopischen Messungen der Geschwindigkeits-Componenten. 4to. Kiel.
(*Astr. Nachr.*, Band 134, No. 3198.)
1894. **Burnham, S. W.** Proper Motions of Double Stars. 8vo. Northfield, Minn.
(*Astronomy and Astro-Physics*, vol. xiii. No. 121.)
Determinations of proper motion from micrometric measures of a number of optical double stars.
1894. **Burnham, S. W.** How to find the Orbit of a Double Star by a Graphical Method. 8vo. Northfield, Minn.
(*Popular Astronomy*, vol. i. pp. 243-248 and 349-358.)
It may be said that the only difficulty in this method is that inherent in all methods, *i.e.*, drawing the apparent ellipse. In this connection, reference may be made to the section on the "Orbit of a Binary Star" in Ball's *Atlas of Astronomy*, London, 1892.
1894. **Burnham, S. W.** Double Star Observations made with the 36-inch and 12-inch Refractors of the Lick Observatory, from August, 1888, to June, 1892. 4to. Sacramento.
(*Publications of the Lick Observatory*, vol. ii. pp. 2-254.)
These observations for the greater part had previously appeared in various journals; they are here collected in a convenient form. Probably the most notable contribution to Double Star Astronomy in recent years.
1894. **Cohn, Fritz.** Messungen von Doppelsternen am Heliometer zu Königsberg. 4to. Kiel.
(*Astr. Nachr.*, Band 135, No. 3240.)
Of easy stars—they do not seem to be superior to filar micrometer measures.
1894. **Collins, Wm. H., and Jones, George L.** Double Star Measures. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xiii. No. 312.)
Made, chiefly by the latter observer, in 1893, with the 10-inch equatorial of the Haverford College Observatory. Mostly northern stars.

1894. **Glazenapp, S. de.** Observations Astronomiques faites à Abastouman. 8vo. St. Pétersbourg.
(*Deuxième série des mesures d'étoiles doubles.*)
Made with a $9\frac{1}{2}$ -inch Reinfeldter and Hertel refractor in 1892-1893, in continuation of his measures of 1890, but fewer southern stars are included in this series.
1894. **Hagen, J. G.** Messungen von Doppelsternen mittelst Photographie. 4to. Kiel.
(*Astr. Nachr.*, Band 136, No. 3258.)
There is a comparison between the results obtained by photography and Dr Cohn's Heliometer measures in *Astr. Nachr.*, No. 3240.
1894. **Hall, A.** The Orbits of Double Stars. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xiv. No. 324.)
On the computation of orbits with a numerical example.
1894. **Hough, G. W.** New Double Stars, discovered in 1893, and measures at the Dearborn Observatory. 8vo. London.
(*M. N. R. A. S.*, vol. liv, p. 251.)
Eight southern pairs in addition to others; quoted in the Annual Report of the Council of the R. A. S.
1894. **Hough, G. W.** Catalogue of 187 New Double Stars discovered with the $18\frac{1}{2}$ -inch Refractor of the Dearborn Observatory of Northwestern University, and Measures of 152 Double Stars. 4to. Kiel.
(*Astr. Nachr.*, Band 135, Nos. 3233-34.)
Contains Hough 304 to Hough 490, found in 1889 to 1893, and measures of miscellaneous stars, a good many of which are south of the equator.
1894. **Howard, Charles P.** A Graphical Method for Determining the Apparent Orbits of Binary Stars. 8vo. Northfield, Minn.
(*Astronomy and Astro-Physics*, vol. xiii, No. 126.)
A detailed explanation of his method, an outline of which appeared in the *Astronomical Journal* in 1891.
1894. **Lehmann-Filhés, R.** Ueber die Bestimmung einer Doppelsternbahn aus spectrokopischen Messungen der im Visionsradius liegenden Geschwindigkeitscomponente. 4to. Kiel.
(*Astr. Nachr.*, Band 136, No. 3242.)
1894. **Lewis, Turner, and Edney.** Results of Micrometer Measures of Double Stars with the $12\frac{3}{4}$ -inch Metz Refractor, at the Royal Observatory, Greenwich, during the year 1893. (Communicated by the Astronomer Royal.) 8vo. London.
(*M. N. R. A. S.*, vol. liv, pp. 314-317.)
A few pairs south of the equator are included.

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LIST OF WORKS AND PAPERS ON DOUBLE STARS.

1894. **Scott, J. L.** Double Star Measures. 8vo. London.
(Journal of the British Astronomical Association, vol. v. pp. 75-77.)
 Made at Shanghai in 1892-1893.
 All but one or two are southern stars.
1894. **Sellers, R. P.** Recent Measures of Double Stars made at Sydney. 4to. Kiel.
(Astr. Nachr., Band 135, No. 3240.)
 A continuation of the work given in *Astr. Nachr.*, No. 3154. The observations were made between Dec. 1891 and Dec. 1893 with the 11½-inch refractor.
1895. **Aitken, R. G.** Double-Star Measures. 8vo. San Francisco.
(Publications of the Astr. Soc. of the Pacific, vol. vii. pp. 305-310.)
 Made in 1895 with the 12-inch refractor of the Lick Observatory.
1895. **Bigourdan, G.** Mesures Micrométriques d'Étoiles Doubles, faites à l'Observatoire de Paris, du 11 Juillet 1890 au 31 Décembre 1894. 8vo. Paris.
(Bulletin Astronomique, t. 12, pp. 298-312.)
 Made with the Martin refractor of 12-inches.
 Stars from various catalogues.
1895. **Boyd, J. Harrington.** The Determination of the Apparent Position of the Orbit of the Companion of a Binary Star. 8vo. Northfield, Minn.
(Popular Astronomy, vol. iii. pp. 19-21.)
1895. **Callandreau, O.** Mesures Micrométriques d'Étoiles Doubles, faites à l'Observatoire de Paris, en 1894. 8vo. Paris.
(Bulletin Astronomique, t. 12, pp. 522-3.)
 A few Σ stars.
1895. **Doberck, W.** Approximate Values of v , M and $\frac{r}{a}$ for different values of e . 4to. Kiel.
(Astr. Nachr., Band 139, No. 3316.)
 These tables are of great use in computing double star ephemerides, etc.
 See also: 1878, Doberck.
1895. **Doberck, W.** On the Axes and Periods of Double Stars. 4to. Kiel.
(Astr. Nachr., Band 138, No. 3293.)
 A very short but interesting paper: "close binaries are farther from us than wide (binaries), or the mass is smaller in close pairs."
1895. **Ebell, Martin.** Beobachtungen von Doppelsternen. 4to. Kiel.
(Astr. Nachr., Band 139, No. 3321.)
 Made at the Royal Observatory, Berlin, with the 9.6-inch refractor in 1893-1895, mostly of Σ stars.

1895. **Glazenapp**, S. de. Mesures Micrométriques d'Étoiles Doubles faites à St. Pétersbourg et à Domkino. 8vo. St. Pétersbourg.
(*Troisième série des mesures d'étoiles doubles.*)
Made with refractors from 4-inches to $9\frac{1}{2}$ -inches aperture in 1893 and 1894. Very few southern pairs.
1895. **Innes**, R. T. A. A List of Probably New Double Stars. 8vo. London.
(*M. N. R. A. S.*, vol. lv. pp. 312-315.)
Contains 26 stars found to be double with a $6\frac{1}{4}$ -inch refractor.
There is a list of errata on p. 544.
1895. **Knorre**, V. Beobachtungen von Doppelsternen. 4to. Kiel.
(*Astr. Nachr.*, Band 138, No. 3300.)
The southern stars measured are 11 Monocerotis and ζ Aquarii.
1895. **Seabroke**, G. M., and **Highton**, H. P. Further Measures of Double Stars made at the Temple Observatory, Rugby, during the Years 1890-1895. 4to. London.
(*Mems. R. A. S.*, vol. li. pp. 267-276.)
1895. **See**, T. J. J. Micrometrical Measures of Double Stars, made with the 26-inch Refractor of the Leander McCormick Observatory. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xv. No. 349.)
Includes 5 southern binaries.
Followed in No. 359 by a further list of measures made at the Washburn Observatory by the same observer.
1895. **See**, T. J. J. Theory of the Determination, by means of a single spectroscopic observation, of the absolute dimensions, etc. (of Binary Systems). 4to. Kiel.
(*Astr. Nachr.*, Bd. 139, No. 3314.)
Followed, in No. 3332 of the same journal, by some remarks by Prof. R. Lehmann-Filhés.
1895. **Sellors**, R. P. Recent Measures of Double Stars made at Sydney. 4to. Kiel.
(*Astr. Nachr.*, Band 138, No. 3303.)
A continuation of the observations published in the *Astr. Nachr.*, No. 3240.
Made in 1894 with the $11\frac{1}{2}$ -inch refractor.
1895. **Tebbutt**, John. Results of Double-star Measures with the 8-inch Equatorial at Windsor, N.S.W., in 1894. 8vo. London.
(*M. N. R. A. S.*, vol. lv. pp. 308-311.)
A continuation of previous series.
1896. **Burnham**, S. W. The Binary Systems. 8vo. Northfield, Minn.
(*Popular Astronomy*, vol. iv. pp. 169-177.)
On the probable number of physical or binary systems now known. Burnham insists on the futility of retaining wide faint pairs in double star catalogues. Upwards of 10,000 pairs have been registered, and it may be safely said that 7000 of these will never repay micro-metrical observation.

1896. **Collins, W. H.** Double-Star Observations. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xvi. No. 378.)
Made at Haverford College Observatory in 1894-1896 with the 10-inch refractor. **Mostly northern pairs.**
1896. **Comstock, G. C.** Observations of Double Stars. 4to. Madison, Wis.
(*Publications of the Washburn Observatory*, vol. x. pt. i. pp. 1-77.)
Very few southern stars are included in these observations made during 1892-1896.
1896. **Doberck, W.** A Formula to Correct Double-Star Observations for Refraction. 8vo. London.
(*The Observatory*, vol. xix. pp. 268-270.)
1896. **Doberck, W.** On the Orbit of η Coronae Borealis. 4to. Kiel.
(*Astr. Nachr.*, Bd. 141, No. 3370.)
Followed by some tables giving the probable errors of double star observers.
1896. **Doberck, W.** Double Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Bd. 141, No. 3378.)
Continued from *Astr. Nachr.*, No. 3023.
Many southern pairs, observed at Hong Kong.
Distances are not always given.
1896. **Everett, Alice.** Galactic Longitude and Latitude of Poles of Binary-Star Orbits. 8vo. London.
(*M. N. R. A. S.*, vol. lvi. pp. 462-466.)
An interesting paper with a table, but the author remarks that the data on which it is founded are not satisfactory.
1896. **Innes, R. T. A.** New Double Stars. 8vo. London.
(*Journ. Brit. Astr. Asscn.*, vol. vi. pp. 261-262.)
Found with a silver on glass reflector made by an amateur.
Includes Nos. 27 to 42.
1896. **Leavenworth, F. P.** Double-Star Observations. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xvi. No. 382.)
¹ Made with the 16-inch refractor of the Goodsell Observatory in 1893.
1896. **Lewis, T., and others.** Results of Micrometer Measures of Double Stars made with the 28-inch Refractor at the Royal Observatory, Greenwich, in the years 1894 and 1895. 8vo. London.
(*M. N. R. A. S.*, vol. lvi. pp. 358-367.)
The only southern stars in this list are α 42 Ceti, Σ 2173, β 631, and 4 Aquarii, which were observed by Mr Lewis.

1896. **Schwarzschild, Karl.** Ueber Messung von Doppelsternen durch Interferenzen. 4to. Kiel.
(*Astr. Nachr.*, Bd. 139, No. 3335.)
Followed by measures of some well-known pairs.
1896. **See, T. J. J.** Researches on the Evolution of the Stellar Systems, vol. i. 4to. Lynn, Mass., U.S.A.
This important work contains three chapters: I. On the Development of Double Star-Astronomy, and on the Mathematical Theories of the Motions of Binary Stars; II. On the Orbits of Forty Binary Stars; III. Results of Researches on the Orbits of Forty Binary Stars, with General Considerations Respecting the Stellar Systems. There are many plates. The mass of information gathered together in this volume renders it very valuable. Professor See's previous investigations on double stars are therein collected.
1896. **Sellors, R. P.** Measures of Double-stars made at Sydney. 4to. Kiel.
(*Astr. Nachr.*, Bd. 141, No. 3369.)
Continued from *Astr. Nachr.*, No. 3303. Made in 1895 with the 11½-inch refractor.
Includes the new pairs Sellors 15-21.
1896. **Tebbutt, John.** Results of Double-star Measures with the 8-inch Equatorial at Windsor, N.S.W., in 1895. 8vo. London.
(*M. N. R. A. S.*, vol. lvi. pp. 353-357.)
A continuation of previous measures.
1896. **Zwiers, H. J.** Ueber eine neue Methode zur Bestimmung von Doppelsternbahnen. 4to. Kiel.
(*Astr. Nachr.*, Bd. 139, No. 3336.)
An application of the method to the orbit of Sirius is made.
1897. **Aitken, R. G.** Double Star Measures made at the Lick Observatory. 4to. Kiel.
(*Astr. Nachr.*, Bd. 142, Nos. 3395-96.)
A fine series, about half being southern pairs.
1897. **Aitken, R. G.** Double Star Measures made at the Lick Observatory. 4to. Kiel.
(*Astr. Nachr.*, Bd. 145, Nos. 3465-3466.)
Measures made with the 12 and 36-inch telescopes in continuation of those given in the *Astr. Nachr.*, Nos. 3395-3396. The stars measured are of three classes.
1. Stars discovered at the Lick Observatory.
2. A list of close stars sent by Mr Burnham.
3. Miscellaneous stars, including a number of neglected wide pairs.
The measures are followed by a comparison with Professor See's ephemerides of 15 pairs.
See also *Pub. Ast. Soc. of the Pacific*, vol. viii. No. 53.
1897. **Cape Royal Observatory.** New Double Stars found at the Cape Observatory in 1896. 8vo. London.
(*M. N. R. A. S.*, vol. lvii. pp. 533-541.)
A revised list of stars taken from the lists in *Astr. Nachr.*; Nos. 3406 and 3419.

1897. **Chofardet and Petit.** Mesures d'Étoiles Doubles. 4to. Kiel. 8vo. Paris.
(*Astr. Nachr.*, Bd. 144, No. 3450, and *Bulletin Astronomique*, 1897, p. 404.)
Made at the Besançon Observatory. All are Σ stars.
1897. **Doberck, W.** Double Star Observations. 4to. Kiel.
(*Astr. Nachr.*, Bd. 145, No. 3466.)
Measures made at Columbus, Ohio, with a 12-inch refractor. Only three pairs have south declination.
1897. **Doolittle, Eric.** The Effect of Refraction on the Measures of Double Stars. 8vo. Northfield, Minn.
(*Popular Astronomy*, vol. v. pp. 143-151.)
With tables for latitude 40° .
1897. **Gale, W. F.** New Double Stars and Ring Nebula. 4to. Kiel.
(*Astr. Nachr.*, Bd. 143, No. 3426.)
Five double stars found in 1894 with an $8\frac{1}{2}$ -inch reflecting telescope by With.
1897. **Glazenapp, S. de.** Mesures Micrométriques d'Étoiles Doubles. Série iv. 8vo. St. Pétersbourg.
1897. **Innes, R. T. A.** Lists of New Double Stars discovered at the Royal Observatory, Cape of Good Hope. 4to. Kiel.

First List,	<i>Astr. Nachr.</i> ,	No. 3406.	}	Bd. 142-145.
Second List	" "	3419.		
Third List	" "	3438.		
Fourth List	" "	3462.		

Found in 1896 and 1897 with the 6.9-inch Merz refractor.
Including several pairs found incidentally by Messrs Cox and Power at the Transit Circle.
See also *M. N. R. A. S.*, vol. lvii. pp. 533-541, where numbers are assigned to the stars.
In *Astr. Nachr.*, No. 3467, there are corrections to previous lists.
1897. **Lagarde, I.** Sur les Méthodes Graphiques propres à Déterminer les Éléments des Orbites des Étoiles Doubles. 8vo. Paris.
(*Bulletin Astronomique*, t. xiv. pp. 129-132.)
1897. **Lehman, D. A.** Double-Star Measures. 8vo. San Francisco.
(*Publications of the Astr. Society of the Pacific*, vol. ix. pp. 141-144.)
Made in 1897 with the 12-inch refractor of the Lick Observatory. Thirteen stars, of which 5 are south of the equator.
1897. **Pickering, W. H., and Bailey, Solon I.** Southern Double Stars. 8vo. Cambridge, Mass.
A list of the Argentine General Catalogue numbers of 151 stars south of Dec.- 30° of the sixth magnitude or brighter with companions estimated to be within $30''$ distance, stars already announced as double by *h* or Russell not being included.

Found in 1891 with a 13-inch refractor at Arequipa. All were discovered by Prof. Bailey, except those between 12h and 18h of R.A., which are due to Prof. W. H. Pickering. When two or more companions were noted the letter T is inserted after the number.

Published by Prof. E. C. Pickering in *Harvard College Observatory Circular*, No. 18, 1897, July 29, and reprinted in *Astr. Nachr.*, Bd. 144, No. 3447, and elsewhere.

The absence of all detail of any value in the above publication is the subject of a paper by the present writer in the *Astr. Journal*, No. 417, Nov. 1897. Many of the stars are very wide—at least as far as can be ascertained with the 6.9-inch telescope of the Cape Observatory—but it seemed better to give them in their places in the Reference Catalogue, excepting several wide pairs which have been placed in the list of rejected stars. Many of the close pairs have been found by other observers, including *h* and Russell, and were known to astronomers before the appearance of the circular.

1897. **Scott, J. L.** Measures of Double Stars. 8vo. London.

(*Journ. Brit. Astr. Assocn.*, vol. viii. pp. 66–69.)

Made in 1896–1897 at Shanghai with a 5-inch refractor.

A continuation of his measures published in 1894.

1897. **See, T. J. J.** Discovery of Three Close Southern Binaries. 4to. Kiel.

(*Astr. Nachr.*, Bd. 143, No. 3412.)

New Double Stars in the Southern Hemisphere, discovered at the Lowell Observatory. 4to. Kiel.

(*Astr. Nachr.*, Bd. 143, No. 3432.)

Found with the Lowell 24-inch Clark refractor in Mexico. The above lists are merely preliminary announcements of the important work undertaken by Prof. See.

Similar notices appeared contemporaneously in several other astronomical journals.

1897. **Sellors, R. P.** Measures of Double Stars made at Sydney, 1896. 4to. Kiel.

(*Astr. Nachr.*, Bd. 143, No. 3423.)

A continuation of the work published in the *Astr. Nachr.*, No. 3369.

Made with the 11½-inch Schröder refractor.

Three new pairs are included.

Followed by a short paper, "New Double Stars," found on the 19th January 1897, but these two stars had been found in 1896 at the Cape.

1897. **Tebbutt, John.** Results of Double-Star Measures with the 8-inch Equatorial at Windsor, N.S.W., in 1896. 8vo. London.

(*M. N. R. A. S.*, vol. lvii. pp. 584–5.)

Measures of eight southern pairs.

1898. **Aitken, R. G.** Double-Star Measures. 4to. Boston, Mass.

(*Astr. Journ.*, vol. xviii., No. 429.)

Made with the 12 and 36-inch refractors of the Lick Observatory.

Several are southern pairs, which urgently required remeasurement.

1898. **Barnard, E. E.** Micrometrical Measures of Double Stars, etc. 4to. Boston, Mass.

(*Astr. Journ.*, vol. xix., No. 447.)

1898. **Belopolsky, A.** Ueber einen Versuch die Geschwindigkeiten im Visionsradius der Componenten von γ Virginis und γ Leonis zu bestimmen. 4to. Kiel.
(*Astr. Nachr.*, Bd. 147, No. 3510.)
An important application of the Fox Talbot method proposed in 1871.
1898. **Doberck, W.** On Double Star Orbits: their Periods and Eccentricities. 4to. Kiel.
(*Astr. Nachr.*, Bd. 147, No. 3519.)
1898. **Doolittle [Eric].** The Double Star Work of the Flower Observatory. 8vo. Chicago.
(*Astrophysical Journal*, vol. viii. pp. 247-9.)
1898. **Knorre, V.** Beobachtungen von Planeten und Doppelsternen. 4to. Kiel.
(*Astr. Nachr.*, Bd. 147, No. 3518.)
1898. **Innes, R. T. A.** Fifth List of New Double Stars discovered at the Royal Observatory, Cape of Good Hope. 4to. Kiel.
(*Astr. Nachr.*, Bd. 146, No. 3501.)
Contains Nos. 260-305, found with the 6.9-inch Merz refractor. Stars numbered over 305 in the Reference Catalogue have been found since the date of this list and are otherwise unpublished.
1898. **Monck, W. H. S.** The Brilliancy of Binary Stars. 8vo. London.
(*Journ. Brit. Astr. Assocn.*, vol. viii. pp. 132-134.)
1898. **Morgan, Herbert R.** Observations of Double-Stars, made with the 26-inch Refractor of the Leander McCormick Observatory. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xix. No. 439.)
1898. **Russell, Henry Norris.** A New Graphical Method of Determining the Elements of a Double-Star Orbit. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xix. No. 434.)
1898. **See, T. J. J.** Discoveries and Measures of Double and Multiple Stars in the Southern Hemisphere made with the 61-cm. Refractor of the Lowell Observatory. 4to. Boston, Mass.
(*Astr. Journ.*, vol. xviii. Nos. 431-2.)
Found with a 24-inch equatorial between August 1896 and December 1897, mostly by Prof. See, but a few by Mr W. A. Cogshall. This is the most important list of discoveries of southern double stars in recent years, and it is preceded by an interesting introduction containing Prof. See's views on various questions in Double Star Astronomy.
The pairs in this list are numbered $\lambda_1 1$ to $\lambda_1 500$, it being Prof. See's intention to number his second catalogue $\lambda_2 1$, etc., and finally to rearrange all his stars, using λ alone. This will certainly lead to much confusion, unless the R.A. and Dec. of each pair are always quoted. It was probably the fear of confusion which deterred HJ, Σ , h , β and other astronomers from adopting a similar course. The prefix λ has alone been used in the foregoing catalogue.

It may be noticed that in many cases Prof. See's identifications have not been adopted. Should the alterations made be confirmed it must be remembered that the destruction of many of Prof. See's papers by a fire at Flagstaff in 1897 must have proved a great inconvenience.

1898. **See**, T. J. J. *Micrometrical Measures of Double and Multiple Stars in the Southern Hemisphere made with the 61-cm. Refractor of the Lowell Observatory.* 4to. Kiel.
(*Astr. Nachr.*, Band 146, Nos. 3495-6.)
Measured whilst engaged on the work of the preceding entry. An important contribution, from the fact that many of the pairs are here measured for the first time.
In addition to the measures extracted from Prof. See's lists many unpublished ones will also be found in the foregoing catalogue. I am greatly indebted to Prof. See for his kindness in communicating all his measures, practically as they were made, in MS., with permission to make use of them forthwith.
Messrs Cogshall and Boothroyd were associated with Prof. See in this work.
1898. **Solá**, José Comas. *Beobachtungen von Doppelsternen.* 4to. Kiel.
(*Astr. Nachr.*, Band 146, No. 3497.)
Made with an $8\frac{3}{4}$ -inch refractor at San Feliu de Guixols, in Catalonia, in 1897 by Messrs Comas Solá and Patxot—mostly northern Σ stars.
1899. **Hough**, G. W. *Catalogue of 132 New Double Stars discovered with the 18 $\frac{1}{2}$ -inch Refractor of the Dearborn Observatory . . . and Measures of 255 Double Stars.* 4to. Kiel.
(*Astr. Nachr.*, Bd. 149, Nos. 3557-58.)
Contains Hough 491—Hough 622. Former Catalogues have been published in the *Astr. Nachr.*, Nos. 2778-9, 2977-8, and 3233-4. Professor Hough has rejected some of the close pairs of his earlier Catalogues which have been found to be single or doubtful, but as he does not state their names or positions, it has not been possible to point out any which are included in the Reference Catalogue.
1899. **Solá**, J. Comas. *Mesures d'étoiles multiples.* 2^e et 3^e Sér. 4to. Kiel.
(*Astr. Nachr.*, Bd. 148, No. 3529, and Bd. 149, No. 3563.)
Continued from *Astr. Nachr.*, No. 3497.
Include about 30 southern pairs.

ADDENDA:—I.

List of Double Stars accidentally omitted from the Reference Catalogue, or found while it was passing through the press.

(23rd Aug. 1899.)

Nos. 2a, 7a, 8a, 9a, 12a, 23a, 36a, 41a, 43a, 45a, 48a, 51a, 53a, and 54a are stars which should have been inserted in the catalogue, or which were mis-identified therein; the remainder are new, those found by Prof. See and the stars found at the Cape being otherwise unpublished.)

<p>No. 1a. Innes 311. Lac. 700. 8.4 $2^h 1^m 48^s$ $-82^\circ 46'.6$ 8.9 and 9.4 1898.9 $45^\circ \pm 1.5 \pm$ Innes i n The pr. star of a triangle in the finder field.</p>	<p>No. 7a. Harvard . . . Lac. 2710. 5.8 $7^h 11^m 54^s$ $-46^\circ 40'.4$ Double:—vide <i>Harvard Circular</i>, No. 18.</p>
<p>No. 2a. Cordoba [75]. Lal. 10,169. 7.3 $5^h 19^m 25^s$ $-22^\circ 24'.0$ Marked "dpl" in the C. G. A.</p>	<p>No. 8a. Innes 312. Lac. 2846. 7.7 $7^h 18^m 41^s$ $-75^\circ 41'.1$ 8.4 and 8.5 1899.1 $330^\circ \pm 0.9 \pm$ Innes i n A 9.6 mag. star N.f. = C. P. D. - 75°, 438.</p>
<p>No. 3a. Hough 513. Lal. 11,802. 8.5 $6^h 6^m 24^s$ $-20^\circ 19'.9$ 8.7 and 10.2 1898.2 355.8 1.34 Hough i n</p>	<p>No. 9a. Harvard 114. O.A. 8200. 8.6 $8^h 8^m 0^s$ $-23^\circ 52'.5$ 8.8 and 10.3 1870.2 333.0 $2. \pm$ Harvard i n 1898.2 260.7 1.67 See i Taken from the list of Rejected Stars on page 242A, but the identification is uncertain.</p>
<p>No. 4a. Cape 23. C. Z. 6 h. 499. 8.5 $6^h 11^m 49^s$ $-49^\circ 4'.8$ 8.9 and 9.7 1899.2 $50^\circ \pm 4 \pm$ Innes i n Found by Mr W. H. Cox with the Transit Circle.</p>	<p>No. 10a. Cordoba [76]. C. Z. 8 h. 995. 8.2 $8^h 13^m 6^s$ $-34^\circ 32'.9$ 8.8 and 9.1 1897.5 $135^\circ \pm 3 \pm$ Innes i n</p>
<p>No. 5a. H. N. 123. π Canis Majoris. 4.5 $6^h 51^m 17^s$ $-20^\circ 0'.5$ <i>Comes</i> = 10 1897.8 1.3 11.8 See i n No change.</p>	<p>No. 11a. Innes 194. C. Z. 8 h. 1367. 9.0 $8^h 17^m 2^s$ $-59^\circ 52'.9$ 9.4 and 10.4 1897.3 $135^\circ \pm 1.8 \pm$ Innes i n The brighter and more southern of two stars in the field. In the finder:—between two pairs of stars.</p>
<p>No. 6a. Hough 517. Lal. 13,486. 7.0 $6^h 52^m 40^s$ $-19^\circ 18'.3$ <i>Comes</i> = 13.0 1890.1 $330^\circ \pm 3 \pm$ Hough i n</p>	

ADDENDA.

305A

- No. 12a. Hough 526. C. P. D. MAG. 9.6
 —26° 33'23.
 8^h 18^m 14^s — 26° 9'.5.
 Both = 10.4
 1890.3 84.6 1.34 Hough 1 n
 Lac. 3283, mag. 6.5, is 8' N., and 22 secs. f.
- No. 13a. Innes 313. Lac. 3372. 7.2
 8^h 27^m 13^s — 41° 10'.7.
 7.4 yellow and 9.4 bluish
 1899.4 220.0 ± 4.0 ± Innes 1 n
- No. 14a. Cordoba [77]. C. Z. 8 h. 2389. 8.2
 8^h 29^m 18^s — 50° 37'.8.
 8.5 yellow and 10.0 bluish
 1880.2 159.1 11.5 Cordoba 3 n
 1899.1 100.0 ± 4.0 ± Innes 1
- No. 15a. Innes 314. Lac. 3456. 6.7
 8^h 35^m 33^s — 36° 15'.3.
 6.8 and 9.8
 1899.4 240.0 ± 0.9 ± Innes 1 n
- No. 16a. λ C. G. A. 11,753. 9.5
 8^h 37^m 7^s — 52° 41'.8.

 Prof. See:—Apparently dpl. in 120°, 0".28.
 Lac. 3476, mag. 6.0, is about 15" S.pr., and with
 the above star forms the old pair *h* 4126.
- No. 17a. Hough 529. Ö.A. 8877. 7.6
 8^h 37^m 31^s — 17° 4'.3.
 Both = 8.4
 1894.2 343.0 0.44 Hough 1 n
- No. 18a. Innes 315. C. Z. 8 h. 3089. 8.5
 8^h 38^m 26^s — 42° 14'.3.
 9.1 and 9.4
 1898.4 160.0 ± 1.0 ± Innes 1 n
 C. Z. 8 h. 3082, mag. 9.0, is 5 secs. pr.
- No. 19a. Innes 316. C. Z. 8 h. 4047. 9.0
 8^h 50^m 38^s — 42° 5'.6.
Comes = 9.8
 1898.4 300.0 ± 1.8 ± Innes 1 n
 Colour? C. P. D. mag. = 10.4.
- No. 20a. Innes 317. Bris. [2267]. 8.5
 8^h 51^m 33^s — 43° 5'.0.
 8.7 and 10.2
 1899.4 300.0 ± 1.8 ± Innes 1 n
- No. 21a. Innes 318. *b*₂ Carinae. 5.2
Yellow
 8^h 56^m 57^s — 58° 42'.0.
Comes = 11.5
 1899.4 20.0 ± 30.0 ± Innes 1 n
 Retained on account of the p.m. of the chief star,
 viz.: 0".29 towards 327°.0.
- No. 22a. Innes 319. C. P. D.—82°, 305. 9.1
 9^h 10^m 22^s — 82° 37'.2.
 9.7 and 10.0
 1899.4 100.0 ± 2.0 ± Innes 1 n
 C. P. D. — 82°, 304, mag. 9.0, is 60" ± N.pr., and
 C. P. D. — 82°, 302, which is about 7' S.pr., has a
comes, 11th mag., 270° ±, 5". ±.
- No. 23a. Innes 320. Gilliss P. Z. 6390. 8.6
 9^h 36^m 20^s — 66° 14'.7.
 9.1 and 9.5
 1899.0 65.0 ± 0.8 ± Innes 2 n
 This pair is 2' S.pr. Gilliss P. Z. 6395, mag. 8.8,
 which has a distant *comes*.
 Mags. from the C. P. D.
- No. 24a. Innes 321. Gilliss 1129. 9.3
 9^h 36^m 52^s — 58° 49'.0.
 Both = 10.1
 1899.4 210.0 ± 1.0 ± Innes 1 n
 Mag. from C. P. D.
 Closely N.pr. Gilliss 1130, mag. 8.0.

2 Q

<p>No. 25a. Cordoba [78]. C. Z. 9h. 3385. 9.0 $9^h 44^m 49^s - 44^\circ 26'1.$ 9.5 and 10.1 1899.4 $100.^\circ \pm 1.2 \pm$ Innes 1 n</p>	<p>No. 32a. Triple. C. Z. 14 h. 602. 8.7 $14^h 11^m 16^s - 68^\circ 10'2.$ A = 8.7 B = 9.5 C = 10.0 A and B 1899.5 $60.^\circ \pm 48." \pm$ Innes 1 n Innes 325 = B and C = C. P. D. - 68°, 2106 1899.5 $230.^\circ \pm 3." \pm$ Innes 1 n</p>
<p>No. 26a. Innes 322. C. P. D. - 61°, 1383. 9.0 $9^h 55^m 23^s - 62^\circ 4'9.$ 9.7 and 9.8 1898.4 N.f. $1." \pm$ Innes 1 n Closely N.f., Lac. 4109, mag. 7.5.</p>	<p>No. 33a. Innes 326. Lac. 5902. 7.2 $14^h 21^m 22^s - 75^\circ 49'6.$ 7.4 and 10.0 bluish 1898.7 $123.6 2.03$ Innes 1 n</p>
<p>No. 27a. Hough 531. 1st Munich 5164. 8.0 $10^h 15^m 4^s - 3^\circ 50'5.$ 8.1 and 10.7 1894.3 $133.4 2.03$ Hough 2 n</p>	<p>No. 34a. α Centauri. (No. 59 of 14^{hrs} on page 134 A.) In observing this pair, with the 18-inch McClean refractor, on the 7th June 1898, the writer noticed a <i>comes</i> of the 11.3 mag. considerably closer than any star previously found. From A (the brighter star) it was estimated $225^\circ 50''$ and from B (the lesser star) $250^\circ 36''$ Mr J. Lunt also picked up an 11.0 mag. <i>comes</i>, distant 80", direction 40° from A. The two large stars were absolutely round on the above occasion. The great p.m. of α Centauri will soon show if these faint stars form a part of the system.</p>
<p>No. 28a. Aitken. Lal. 21,535. 8.7 $11^h 11^m 44^s - 4^\circ 36'4.$ 9.3 and 9.7 1899.3 $339.4 0.67$ Aitken 3 n Aitken also sees a 14th mag. 37".5 distant, 7".5. (Pub. Ast. Soc. of the Pacific, No. 68, p. 128.)</p>	
<p>No. 29a. λ B. D. - 16°, 3400. 9.4 $12^h 4^m 28^s - 17^\circ 1'0.$ and 1898.4 $305.9 1.24$ See 1 n B. D. - 16°, 3399, mag. 9.1, is 23" N.pr., and with the above pair forms the old pair $\frac{h}{1212}$.</p>	
<p>No. 30a. Innes 323. C. Z. 12 h. 1236. 8.5 $12^h 21^m 23^s - 76^\circ 6'7.$ 9.2 and 9.3 1899.4 $142.^\circ \pm 2." \pm$ Innes 2 n The N.f. of two stars.</p>	<p>No. 35a. Hough 546. W. B. 14 h. 787. 8.3 $14^h 44^m 46^s - 6^\circ 45'0.$ 8.4 and 11.0 1897.4 $91.^\circ 2.82$ Hough 2 n</p>
<p>No. 31a. Innes 324. Gilliss P. Z. 8791. 8.5 $12^h 36^m 59^s - 83^\circ 6'8.$ 9.0 and 9.5 1898.9 $270.^\circ \pm 3." \pm$ Innes 1 n</p>	<p>No. 36a. Innes 327. C. Z. 14 h. 2950. 8.0 $14^h 48^m 33^s - 66^\circ 27'9.$ Comes = 10.5 1899.5 $100.^\circ \pm 3." \pm$ Innes 1 n</p>

ADDENDA.

307A

- No. 37a. Innes 328. Gilliss P. Z. 10,411. 9.0
 $14^{\text{h}} 49^{\text{m}} 5^{\text{s}}$ — $84^{\circ} 46'.2$
 9.5 and 10.0
 1899.4 $17.0 \pm 1.5 \pm$ Innes in
 The estimated mags. were 8.5 and 9.0.
 There is a bright star $23' N$.
- No. 38a. Harvard. Piazzzi 14 h. 204. 5.3
 $14^{\text{h}} 49^{\text{m}} 36^{\text{s}}$ — $33^{\circ} 26'.9$
 According to *Harvard Circular*, No. 18, this is a triple system.
- No. 39a. Innes 329. Lac. 6241. 6.6
 $15^{\text{h}} 5^{\text{m}} 53^{\text{s}}$ — $60^{\circ} 57'.9$
 6.8 and 8.3
 1898.7 $329.6 \ 0.5 \pm$ Innes in
 A more distant *comes* N.pr. = C. P. D. -60° , 5679, mag. = 9.0.
- No. 40a. Innes 330. C. Z. 15 h. 285. 8.0
 $15^{\text{h}} 6^{\text{m}} 52^{\text{s}}$ — $74^{\circ} 12'.3$
 8.5 and 9.0
 1899.4 $10.0 \pm 1.1 \pm$ Innes in
 Lac. 6252, mag. 6.8, is N.f.
- No. 41a. Innes 331. C. Z. 15 h. 443. 8.0
 $15^{\text{h}} 8^{\text{m}} 41^{\text{s}}$ — $68^{\circ} 12'.6$
 8.3 and 9.8
 1898.4 $5.0 \pm 1.7 \pm$ Innes in
 N.pr. and in the field with γ Triang. Austr., mag. 3.0.
- No. 42a. Innes 332. Lac. 6268. 6.6
 $15^{\text{h}} 11^{\text{m}} 32^{\text{s}}$ — $67^{\circ} 7'.0$
 6.7 and 9.7
 1898.4 $95.0 \pm 1.2 \pm$ Innes in
 C. Z. 15 h: 651, mag. 8.5, is 9 secs. f.
- No. 43a. λ 244. Bris. 5429. 7.9
 $15^{\text{h}} 35^{\text{m}} 30^{\text{s}}$ — $31^{\circ} 31'.5$
 8.3 and 9.3
 1897.4 $29.3 \ 0.89$ See in
- No. 44a. Innes 333. Lac. 6484. 6.7
 $15^{\text{h}} 45^{\text{m}} 58^{\text{s}}$ — $77^{\circ} 43'.9$
 7.3 and 7.6
 1898.7 $311.2 \ 0.65 \pm$ Innes in
 The p.m. is insensible.
- No. 45a. Russell 269. C. Z. 15 h. 3258. 8.7
 $15^{\text{h}} 48^{\text{m}} 46^{\text{s}}$ — $65^{\circ} 27'.2$
 9.2 and 9.7
 This position is to take the place of that given on p. 153A, No. 99.
 Russell 268 = C. Z. 15 h. 3228, mag. 8.5, a wide pair, is $18' N$.pr. in the same field.
 The positions given by Mr Russell are much in error.
- No. 46a. Innes 334. C. Z. 15 h. 3581. 9.0
 $15^{\text{h}} 53^{\text{m}} 41^{\text{s}}$ — $71^{\circ} 37'.1$
Comes = 11.0
 1899.4 $140.0 \pm 1.5 \pm$ Innes in
 Estimated mags. were 8.0 and 10.0.
 The pr. of 3 stars, the brightest and S.f. star being Lac. 6591, mag. 7.0.
- No. 47a. Washburn 126. B. D. 8.9
 $15^{\text{h}} 54^{\text{m}} 45^{\text{s}}$ — $20^{\circ} 10'.1$
 $-20^{\circ} 43'79.$
 9.1 and 11.1
 1898.5 $36.0 \ 2.65$ See in
 Washburn 125, a pair of 9-10 mag. stars, $3''.4$ apart, is 35 secs. pr. $2' N$.
- No. 48a. Innes 335. C. Z. 16 h. 443. 8.5
 $16^{\text{h}} 8^{\text{m}} 50^{\text{s}}$ — $71^{\circ} 12'.1$
 9.0 and 9.7
 1899.5 $200.0 \pm 2.5 \pm$ Innes in
 There are some signs of a p.m. in R.A.

No. 49a. Innes 336. Lac. 6831. ^{MAG.} 7.4
 16^h 22^m 51^s — 62° 4'.3.

8.1 and 8.2

1898.7 5.4 " ± Innes 1 n
 The pr. star of a triangle.
 A coarse pair is in the same field.

No. 50a. h. 4865. C. P. D.—83° 611. 8.9
 16^h 41^m 7^s — 83° 49'.8.

9.3 and 10.3

1835.4 314.4 2. ± h 1 n
 1899.6 310. ± 4. ± Innes 1

This neat pair was omitted from the Catalogue on account of Mr Russell's remark in the *Sydney Observations*:—"1872, July 20. Two 8^m stars here; neither has a close companion; the following star has two distant companions." These two stars are about 20' S. of *h*'s position.

No. 51a. λ Yarnall, 7144. 8.3
 16^h 51^m 45^s — 30° 4'.0.

and

1898.3 189.8 1.33 See 1 n
 A 10th mag. star is 19" f., and with the new pair forms *h* 4903.

No. 52a. Cape 24. C. Z. 17 h. 2676. 8.6
 17^h 41^m 16^s — 44° 59'.6.

9.0 and 10.0

1896.8 315. ± 2. ± Innes 1 n
 Found by Mr R. T. Pett at the Transit Circle.

No. 53a. Sellors 13. C. Z. 18 h. 309. 8.5
 18^h 6^m 11^s — 35° 14'.0.

8.9 and 9.9

1891.7 43.7 1.5 ± Sellors 1 n

No. 54a. Barnard. Lal. 34,422 ^{MAG.} 8.2
 18^h 30^m 55^s — 12° 3'.7.

8.6 and 9.4

1895.6 130.3 0.24 Barnard 3 n
 1898.5 123.5 0.32 Aitken 3

No. 55a. Hough 88. 1st Munich 17,346. 9.0
 18^h 40^m 33^s — 9° 34'.7.

Both = 9.8

1885.6 208.1 2.03 Hough 1 n
 1895.6 208.6 1.96 " 1

No. 56a. Schjellerup. Lal. 37,426. 8.7
 19^h 38^m 7^s — 9° 18'.3.

9.1 and 10.1

1895.2 308.3 2.36 Hough 2 n
 Also registered as Hough 579. There is a 9.5 mag. star 61" S.f.

No. 57a. Triple. Gilliss P. Z. 14,669. 8.9
 20^h 45^m 25^s — 87° 27'.0.

A = 9.3 B = 10.2 C = 9.1
 Innes 337 = A and B

1898.9 270. ± 1.2 ± Innes 1 n
h 5192 = A + B and C = Gilliss P.Z. 14,664
 1837.8 327.0 22" ± h 2 n
 1871.2 327.6* 18.1 Russell 2
 1879.8 325.5 18.2 Hargrave 1
 Gilliss P.Z. 14,770, mag. 8.8, is S.f.

No. 58a. Innes 338. C. Z. 21 h. 1645. 8.0
 21^h 54^m 3^s — 56° 57'.0.

8.2 and 9.7

1898.6 270. ± 0.8 ± Innes 1 n
 In the field with the large p.m. star, ϵ Indi, orange-yellow, mag. 4.8 (C.P.D. mag. = 6.7).

No. 59a. Innes 339. C. Z. 22 h. 117. 8.5
 22^h 5^m 49^s — 75° 29'.4.

9.0 and 9.6

1898.9 180. ± 2. ± Innes 1 n
 The pr. of a row of four stars in the finder.

ADDENDA.

309A

No. 60a. Innes 340. Lac. 9268. ^{MAG.} 6.0
 22^h 45^m 41^s — 63° 43'.0.

6.1 and 9.1

1898.9 20.± 1.3± Innes 1 n

The p.m. of the chief star is 0".052 towards 194°.9.
 The C.P.D. mag. is 7.2.

No. 61a. Cape 25. C. P. D.—45° 10.474. ^{MAG.} 8.2
 23^h 41^m 27^s — 45° 36'.8.

Both = 9.0

1898.7 155.± 1.5± Innes 1 n

Found by Mr W. H. Cox at the Transit Circle.

The addition of the five following wide pairs is suggested by the change since the time of Sir John Herschel's *Cape Observations*. The later measures are all by Professor T. J. J. See.

No. 1b. h. 3845. Piazzzi 6 h. 59. ^{MAG.} 7.0
 Orange
 6^h 12^m 51^s — 22° 40'.3.

Comes = 9.6

1836.1 51.5 25.± h 2 n
 1898.1 21.3 35.0 See 1

The change is due to the p.m. of the large star.

$$\alpha = +0^{\circ}.007 \quad \delta = -0^{\circ}.26$$

The comes is C.P.D. — 22°, 1141.

bear out a p.m. which would account for the change shown, viz. :—

$$\alpha = +0^{\circ}.02 \quad \delta = +0^{\circ}.08$$

but this p.m. is very poorly determined.

No. 2b. h. 3938. Lal. 14,105. ^{MAG.} 6.8
 7^h 9^m 35^s — 22° 44'.0.

7.1 and 8.5

1837.1 252.6 18.± h 1 n
 1898.2 235.7 13.8 See 1

This change is not accounted for by the p.m. of the chief star, which is only

$$\alpha = +0^{\circ}.002 \quad \delta = +0^{\circ}.02$$

The fainter star has only been observed on the meridian at Cordoba in 1877.

No. 4b. h. 4410. Ö.A. 11,162 ^{MAG.} 7.9
 11^h 3^m 17^s — 15° 25'.1.

Comes = 12.0

1836.4 205.3 15.± h 1 n
 1898.3 220.5 20.8 See 1

The change may be due to p.m., but this star has only been observed on the meridian once.

No. 3b. h. 4003. Ö.A. 4003. ^{MAG.} 9.2
 7^h 43^m 40^s — 23° 56'.3.

Comes = 9.7

1837.1 127.8 15.± h 1 n
 1898.2 119.4 30.8 See 1

The scanty meridian observations of the chief star

No. 5b. h. 4907. Ö.A. 16,183. ^{MAG.} 8.8
 16^h 53^m 53^s — 24° 3'.1.

9.3 and 9.8

1837.5 49.1 15.± h 1 n
 1898.5 40.4 8.04 See 1

The scanty meridian observations indicate a p.m. of the chief star in the sense shown by the micro-metrical measures.

ADDENDA:—II.

RECENT MEASURES.

Professors T. J. J. See and Eric Doolittle, with the greatest kindness, forwarded lists of their recent and so far unpublished measures of Southern Double Stars. A great number of these measures will be found below. They are very opportune, and, in a great many cases, enable us to say if the pair measured is in motion or fixed.

Professor See's measures were made at the Lowell Observatory with the 24-inch Clark refractor, and, as a rule, are the means of two separate sets of observations taken on one night. Professor Doolittle's were made at the Flower Observatory, Philadelphia, with an 18-inch refractor by Brashear.

The numbers in the first column refer to the Reference Catalogue. The remarks were added here.

No. in Catalogue.	Name.	Date.	Pos. Ang.	Distance.	Observer.	Nights.	Remarks.	
0 ^h No. 11	β 393	1897.7	18.° ±	0.3 ±	See	1	"Not separated." See. Misidentified? as Lal. 552 by Prof. See.	
17	ζ 1964	1897.7	114.1	7.31	"	1		
21	ζ 1968	1897.7	109.8	2.40	Doolittle	2		
		1897.7	121.9	93.33	"	3	A and B. A and C, and we have also the old measure. See note.	
1 ^h No. 21	ζ 2036	1891.8	121.3	93.36	β	3	Change? Comes = 14 ^m . Fixed. Fixed. Common p.m. Omitted from Catalogue.	
4 ^h No. 33	β 746	1897.8	13.0	1.71	Doolittle	3		
36	β 747	1898.1	13.0	1.23	See	1		
37	β 747	1898.1	219.1	3.79	"	1		
40	β 185	1898.2	236.4	3.09	"	1		
42	β 1236	1898.2	115.9	1.24	"	1		
48	α Cæli	1898.1	113.6	4.60	"	1		
63	β 312	1898.1	344.7	3.26	"	1		
5 ^h No. 14	β 314	1898.2	329.2	0.98	"	1		
	Rigel's Companion	1879.69	126.0	...	β	5		
		1894.25	183.0	...	Brenner	1	} <i>Astr. Nachr.</i> , No. 3559.	
		1895-6	Round	...	"	...		
		1898.86	177.8	0.16	Aitken	3		<i>Pub. A. S. of the Pacific</i> , No. 66., pp. 45-6.
19	Howe	1898.2	232.6	2.45	See	1	Fixed.	
26	ζ 3750	1898.2	280.0	4.35	"	1	ζ 's angle erroneous? Fixed.	
28	Washburn 73	1898.2	51.3	3.13	"	1	} No change in either. See note.	
35	β 319	1898.1	227.7	4.26	"	1		
47	α Leporis	1898.1	157.0	35.26	"	1		
49	ζ 3770	1898.2	20.3	4.17	"	1		
65	β 321a	1898.2	143.1	0.86	"	1		
66	β 321b	1898.2	358.8	1.43	"	1		
68	β 322	1898.1	103.4	2.76	"	1		
70	α Columbæ	1898.2	13.3	8.10	"	1		Comes = 13.8 mag.

ADDENDA:

311A

No. in Catalogue.	Name.	Date.	Pos. Ang.	Distance.	Observer.	Nights.	Remarks.
5 th No. 74	γ Leporis	1897.7	349.5	96.23	Doolittle	5	Common p.m.
94	South 504	1898.2	69.4	3.74	See	1	
95	Innes 155	1898.1	19.6	1.98	"	1	
97	h 3823	1898.1	113.6	3.01	Doolittle	3	
6 th No. 1	h 3831	1898.2	132.6	3.12	See	1	
2	Argelander [1]	1898.2	293.7	4.70	"	1	No change.
12	β 1017	1898.2	159.2	0.67	Doolittle	4	Angle decreasing?
16	β 567	1898.1	242.4	4.41	"	2	Slight change.
21	Hough 338	1898.2	290.2	2.92	See	1	
22	Σ 3116	1898.1	23.3	4.28	Doolittle	3	Fixed.
24	β 568	1898.2	158.8	0.58	See	1	Probably no change in this close pair.
25	β 97	1898.2	260.7	1.20	Doolittle	3	Fixed.
26	β 569	1898.1	115.5	2.07	"	3	Fixed?
33	β 753	1898.2	43.1	1.14	See	1	Fixed?
34	h 3863	1898.2	119.0	2.62	"	1	No change.
35	h 3866	1898.2	135.9	4.34	"	1	Fixed.
38	β 98	1898.1	142.6	0.88	Doolittle	3	No certain change.
41	Innes 178	1898.2	225.3	0.36	See	1	
49	β 19	1898.2	165.2	3.92	"	1	Fixed.
50	β 195	1898.2	212.9	5.98	"	1	Another star, 34".
54	Sirius	1898.3	168.4	4.82	"	2	
		1898.3	170.0	4.67	Boothroyd	2	
55	Innes 179	1898.2	223.1	4.35	Hough	2	Measured as Hough 516. See note.
60	O. Stone....	1898.2	141.6	2.60	See	1	
62	β 20	1898.2	31.3	3.42	"	1	
63	A. Clark 4	1898.3	290.6	0.84	"	1	
66	β 324	1898.1	203.3	1.93	Doolittle.	3	Probably no change. { Fixed. Doolittle adds a 13th mag. star, 2°.4, 30".3.
		1898.1	203.4	2.60	See		
68	β 898a	1898.2	266.8	2.11	"	1	Some change?
69	β 898b	1898.2	354.8	3.40	"	1	
74	β 325	1898.1	30.3	1.79	Doolittle	3	Angles discordant.
80	O. Stone...	1898.1	98.0	3.77	See	1	Fixed.
7 th No. 18	Hough 344	1898.1	4.0	1.64	"	1	Change?
22	Lalande...	1898.2	60.3	27.74	Doolittle	3	Change indicated.
24	τ Canis Majoris	1898.1	92.2	8.42	See	1	Very slow increase in angle.
26	h 3949	1898.2	75.8	2.81	"	1	Fixed.
28	Lalande 53	1898.2	346.8	4.00	"	1	A and B.
40	β 199	1898.2	20.7	1.71	Hough	1	A and C. New.
		1898.2	120.2	6.10	"	1	
43	O. Stone....	1898.2	75.7	5.06	See	1	
45	β 578	1898.2	46.8	2.30	"	1	Angle decreasing?
52	Howe 7	1898.2	203.2	2.19	"	1	No change.
58	Argelander [2]	1898.2	332.7	3.46	"	1	
64	Washburn 91	1898.2	215.1	2.10	"	1	
74	ξ Argus.	1898.2	223.9	4.3 \pm	"	1	Motion 35° in 9 years.
99	β 333	1898.2	36.8	1.62	Doolittle	2	Angle decreasing?
8 th No. 10	Hough 352	1898.3	184.7	5.99	See	1	
12	O. Stone....	1898.2	260.7	3.38	"	1	Fixed.
21	Innes 193	1898.3	103.5	2.59	"	1	The only measure.
23	β 454	1898.3	16.0	2.49	"	1	
27	β 905	1898.2	14.5	3.94	"	1	
31	β 906	1898.3	188.1	3.43	"	1	Fixed.
48	β 205	1898.2	62.5*	0.75	"	1	Binary.
51	β 206	1898.2	280.2	1.93	"	1	Fixed.
53	β 207	1898.2	101.5	4.47	"	1	Probably fixed.

No. in Catalogue.	Name.	Date.	Pos. Ang.	Distance.	Observer.	Nights.	Remarks.
8 ^h No. 67	β 586	1898.2	56.9	0.63	See	1	This close and difficult pair is evidently fixed.
71	Hough 356	1898.2	270.2	1.46	"	1	Change?
73	ζ 4143	1898.2	130.3	3.41	"	1	Fixed.
85	β 103	1898.2	71.0	3.11	Doolittle	3	Perhaps slow change.
9 ^h No. 7	β 410	1898.2	163.7	2.13	See	1	Fixed?
10	β 336	1898.2	236.3	1.92	Doolittle	3	Fixed.
		1898.2	236.7	1.85	See	1	
25	ζ 4200	1898.3	70.7	3.70	"	1	
26	Innes 170	1898.3	36.1	1.32	"	1	
37	β 339	1898.3	218.0	1.34	"	1	Fixed.
54	Cincinnati	1898.3	266.5	2.98	"	1	Prof. See also measures a star 24" S.pr.
57	β 214	1898.2	258.8	3.55	"	1	
62	Washburn 99	1898.3	212.8	2.09	"	1	Change?
64	Innes 205	1898.3	22.0	2.04	"	1	
65	ζ 4249	1898.4	123.3	4.28	"	1	Fixed.
69	β 215	1898.3	346.0	1.72	"	1	Fixed?
70	β 592	1898.3	193.0	9.95	"	1	
72	β 216	1898.2	162.2	4.00	"	1	Fixed.
10 ^h No. 8	β 217	1898.2	282.0	1.90	"	1	
10	β 218	1898.3	122.7	0.92	"	1	Fixed.
11	β 911	1898.3	310.0	4.80	"	1	Fixed, but common p.m.
17	Howe 13	1898.3	302.4	3.59	"	1	
29	β 219	1898.2	187.7	2.77	"	1	Fixed.
56	β 1075	1898.2	283.1	2.92	"	1	Change?
61	Washburn 108	1898.2	25.3	1.14	"	1	
72	" 110	1898.3	274.6	2.42	"	1	Fixed.
88	Innes 211	1898.2	180.1	1.89	"	1	
89	Σ 1500	1898.3	311.8	1.94	Doolittle	3	Slow motion.
94	Howe 15	1898.2	336.2	2.67	See	1	
11 ^h No. 5	β 220	1898.2	138.8	0.44	"	1	Slow decrease in angle.
9	β 916	1897.2	354.5	0.72	Doolittle	1	
12	ζ 4423	1899.4	276.3	2.66	See	1	
21	γ Crateris	1897.4	96.7	5.15	Doolittle	3	Very slow change with common p.m.
		1898.2	94.0	5.46	See	1	
27	β 601	1898.4	220.9	0.95	"	1	Measures discordant.
39	Howe 16	1898.4	100.7	3.38	"	1	
67	β 1079	1898.3	148.3	11.55	"	1	No change since 1889.
68	β 457	1898.2	82.1	1.24	Doolittle	2	Increase in distance?
		1898.3	86.2	1.27	See	1	
12 ^h No. 5	β 412	1898.4	162.5	2.35	"	1	Fixed.
29	ζ Corvi	1898.4	42.5	4.36	"	1	
39	β 606	1898.2	95.3	1.43	Doolittle	2	Angle decreasing.
40	β 922	1898.2	157.8	0.77	"	2	Angle decreasing?
50	δ Corvi	1898.3	214.2	24.40	See	1	
55	Leavenworth ...	1898.3	31.9	1.60	"	1	Fixed.
79	O. Stone....	1898.4	33.1	3.18	"	1	
94	β 341	1898.3	135.4	0.65	"	1	
13 ^h No. 8	Washburn 174	1898.3	183.1	2.96	"	1	
20	β 342	1898.4	34.7	4.23	"	1	Fixed.
24	β 222	1898.3	14.6	1.80	"	1	
31	β 610	1898.3	19.4	3.92	"	1	No change.
34	β 460	1898.4	33.6	2.29	"	1	
36	O. Stone....	1898.3	354.5	1.72	"	1	Fixed.
39	β 1107	1898.4	136.2	0.94	"	1	
58	Cape 14	1898.4	285.4	3.36	"	1	The only measure.
62	Wilson ...	1898.3	66.1	2.27	"	1	The only measure.
66	Howe 23	1898.5	187.2	1.64	"	1	

ADDENDA.

313A

No. in Catalogue.	Name.	Date.	Pos. Ang.	Distance.	Observer.	Nights.	Remarks.
13 ^h No. 82	γ Centauri	1898.3	83.3	1.22	See	1	Fixed.
95	h 2692	1898.2	320.6	3.48	Doolittle	3	Fixed.
97	β 344	1898.3	123.9	3.74	See	1	Fixed.
14 ^h No. 1	β 938	1898.3	114.2	0.59	"	1	
11	h 4661	1898.3	229.3	4.46	"	1	Fixed.
15	β 939	1898.3	147.5	0.71	Doolittle	3	
18	h 1249	1898.4	164.0	5.27	See	1	Probably fixed. This is the first complete measure.
19	Ö.A. 13,520	1898.3	137. \pm	0.25	"	1	A and B = λ
		1898.3	118.3	3.41	"	1	A + B and C = Howe 28.
21	β 1246	1898.3	188.0	2.35	"	1	The distant star (1898.3-38".5) is evidently not connected with the closer system.
24	Washburn 18	1898.3	354.5	3.51	"	1	
27	Cordoba [34]	1898.4	208.9	1.87	"	1	
34	β 225	1897.4	101.3	1.58	Doolittle	3	Fixed.
		1898.4	99.5	1.42	See	2	
38	Hough 386	1898.4	321.8	4.27	"	1	
44	β 117	1898.4	93.0	2.24	Doolittle	4	
		1898.4	92.1	2.46	See	1	
50	Harvard...	1898.5	130.2	26.86	"	1	Only measure published. This pair is so wide that it should be rejected.
58	β 804	1898.4	161.6	1.37	Doolittle	3	
60	β 226	1898.3	88.9	0.98	See	1	
62	β 805b	1898.3	241.7	1.95	"	1	
76	Washburn 19	1898.5	196.5	1.40	"	1	
87	β 346	1898.3	249.6	1.73	"	1	Angle increasing.
90	μ Libræ	1897.3	343.6	1.84	Doolittle	2	Very slow motion.
92	h 4707	1899.5	130. \pm	0.8 \pm	Innes	1	Binary.
97	β 347	1898.3	319.5	13.90	See	1	Fixed.
114	Washburn 22	1898.3	1.2	2.30	"	1	
15 ^h No. 1	β 119	1898.5	303.4	1.63	Doolittle	3	{ Change shown; at present inexplicable.
8	h 4740	1898.3	8.3	3.35	"	4	
14	β 618	1898.5	17.3	1.83	See	1	Angle decreasing.
30	h 4756	1898.5	321.4	1.05	Doolittle	2	Certain change. Binary?
65	β 121	1898.5	275.1	1.66	"	2	Fixed.
69	β 122	1898.5	208.5	2.24	See	1	Angle increasing slowly.
76	β 354	1898.3	286.2	5.70	"	1	Fixed.
83	β 620	1898.5	162.0	0.40	"	1	Measures discordant.
110	β 37	1898.3	43.5	3.03	"	1	No change.
111	β 38	1898.3	351.0	4.29	"	1	No change.
118	Washburn 127	1898.3	130.5	2.26	"	1	
16 ^h No. 30	σ Scorpii	1898.3	271.8	20.67	"	1	
31	β 624	1898.4	320.3	1.42	"	2	Fixed.
32	h 4845	1898.3	135.5	2.25	"	1	
33	h 4848	1898.3	153.6	6.31	"	1	Fixed.
51	Σ 3105	1898.4	45.4	0.48	Doolittle	5	
91	Piazzini.....	1898.3	230.3	5.06	See	1	Fixed.
17 ^h No. 34	\circ Ophiuchi	1898.3	354.0	10.64	"	1	
37	β 126	1898.5	262.0	2.21	"	1	Fixed.
85	β 631	1898.5	64.4	0.57	Doolittle	2	
123	τ Ophiuchi	1896.7	258.2	1.96	Morgan	4-3	

No. in Catalogue.	Name.	Date.	Pos. Ang.	Distance.	Observer.	Nights.	Remarks.
18 ^h No. 21	β 131	1898.5	277.3	3.20	See	1	Fixed.
30	β 285a	1898.7	318.6	1.63	Doolittle	3	Fixed.
31	β 285b	1898.7	18.0	1.99	"	3	Fixed?
35	β 639	1898.5	355. \pm	elongated?	"	3	{ Binary. p.m., $\alpha = -0^s.005$ $\delta = 0^s.00$.
53	β 965	1898.6	106.4	1.44	"	3	{ Is 1 st Mun. 16,251. 18 ^h 21 ^m 7 ^s - 17 ^o 15'.3. Comes = 12.0.
63	β 419	1898.5	46.9	1.54	"	3	Angles discordant.
71	β 967	1898.5	194.4	2.21	"	3	Fixed.
19 ^h No. 6	β 138	1898.7	277.2	1.05	"	2	Fixed.
31	ζ 5120	1898.7	171.8	4.92	"	2	Distance increasing.
53	β 827	1898.6	248.6	1.10	"	5	Angle decreasing.
57	β 467	1898.6	133.5	3.07	"	3	Fixed.
65	β 148	1898.7	321.4	0.95	"	3	Angle decreasing.
20 ^h No. 47	β 668	1898.7	26.4	4.66	"	4	Common p.m. Fixed.
71	β 153	1898.7	274.2	1.38	"	4	
78	β 154	1898.6	59.6	2.88	"	3	Fixed.
92	β 678	1898.7	197.8	2.37	"	3	Angle increases 3° in 5 years.

NOTES TO CATALOGUE AND ADDENDA.

0^h No. 21. If C had been fixed, its distance should have decreased by 1".5 through the p.m. of A; therefore A and C have common p.m. The mag. of C, taking the mean between β and Doolittle, is 10.8.

27. β Toucani. β_1 = pale yellow. β_2 = pale orange yellow. (*Journ. Brit. Astr. Assc.*, vol. viii., p. 28.)

5^h Nos. 65 and 66. These form ζ 3780 (5 stars). The two close pairs were not distinguished by ζ .

6^h Nos. 55 and 58. The measures of these two stars seem to be mixed.

7^h No. 36. Is Hough 521.

13^h No. 61. Chief star = 7.0 mag., yellow. 1899.60.

14^h No. 43. Doolittle estimates the distant star (15") as 9.8 mag.

14^h No. 105. Mr W. de Sitter finds the parallax of this pair to be $0''.17 \pm 0''.01$, and the distance as follows:—

1898.59	16."680	3 n
1899.11	16.764	6
1899.60	16.899	3

These distances, derived from the parallax observations, may be taken as accurate within about 0."03.

16^h No. 45. The colours should be Y² and BG². See *Journ. Brit. Astr. Assc.*, vol. vi. p. 419. Again verified, 1899.6, by H. Wright at Sydney, N.S.W.

16^h No. 50. Not found on two nights (1899.4). There are several minute pairs under 3" within 1° of the position given by Russell, and a wide pair will be found 2^m 15^s f. and 20' N.

16^h No. 53. There is no star as close as 20". There is a 12th mag. star about 33" distant.

17^h No. 38. β 127 = C. Z. 17^h 897, mag. 7.7. Noted as double at Cordoba.

18^h No. 45. Is Hough 566.

19^h No. 50. Not found on two nights (1899.5).