Ptolemy's Catalogue of Stars

A Revision of the Almagest

BY

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Director of Hamilton College Observatory
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PREFACE.

The following work embraces the results of the whole of the long and laborious researches of the late Dr. Christian Heinrich Friedrich Peters on the Catalogue of Stars in Ptolemy's Almagest. Some account of this investigation, which he began about the year 1876, will be found in the opening pages. Quite unknown to each other, I had myself taken up the same subject in 1876, but it was not until a few years later that some communications I made to the Royal Astronomical Society brought Dr. Peters into direct correspondence with me, and on learning that he was engaged in the same investigation of Ptolemy's Catalogue of Stars, I offered to place all of my materials at his disposal, and accordingly I sent him, for his free use, the collations of all the manuscripts I had made. These had been prepared with rather an undue amount of labor, as being closely engaged in manufacturing business far from London, it was only on rare days that I could visit the British Museum and other public libraries.

When Dr. Peters and myself met in Paris in April 1887, we had some long conversations on the subject. He told me he did not intend to visit England, and it was agreed that I should investigate all the sources of information possessed in the libraries there, and I particularly undertook to examine the Greek Selden Almagest at Oxford, and several Arabic manuscripts, and send him the results. In this and the following year many letters and discussions passed between us. In a letter dated August 14, 1888, received by Dr. Peters August 25, I asked what steps he had taken towards publication, and considering the contributions I had made from the manuscripts in this country, I asked "How far he would like, and would think it right, that my name should be associated with his as a joint author?" But I assured him "I was quite single-minded in the matter, and that my interest was removed from any idea of a personal character." This letter remained unanswered, probably because no steps had been taken towards preparing any part of the work for publication.

On July 18, 1890, Dr. Peters died. It is unnecessary here to give an account of his life, which has been so fully dealt with in the addresses delivered on that occasion by Dr. Isaac H. Hall and Professor Oren Root, and in the pages of the monthly notices of the Royal Astronomical Society.

On September 3, 1890, I addressed a letter to the executors of Dr. Peters, asking to be informed in what state his work on the Almagest remained with reference to publication, and requesting that the manuscripts might be sent to me to complete, and on November 9, 1891, all of his manuscripts and notes relating to this work, with some important exceptions, were sent to me.

The various subjects and sections of the investigation were each contained in a separate envelope. These were at once marked by letters and have been preserved in that state to the present day.

The following is the schedule:

Cahier A. Ulugh Beg. Collations and notes on various manuscripts by Peters and Knobel.
    B. Aboul Hhassan. Notes and comparisons of his catalogues, all in pencil.
    C. Collations of Greek, Latin, and Arabic manuscripts by Knobel.
    D. Ptolemy's Catalogue of Stars. Final places with variants in 28 authorities, and comparison of the catalogue with modern observations.
    E. Rough-draft catalogue of which revised copy is contained in D.
    F. Reductions of the right ascension and declination of all stars to longitude and latitude.
    G. Collations and notes of 24 manuscripts by Peters and 4 manuscripts by Knobel.
    H. Translations of 6 chapters of the Almagest from Greek into German, minute German script in pencil.
    I. Calculations and notes on various catalogues, all in pencil.
    J. Computation of proper motions; and comparison of the zodiacal stars in the Almagest with modern observations.
    K. Comparison of Ptolemy's and other magnitudes with Harvard Photometry, all in pencil.

The examination of the manuscripts made it at once apparent that no preparation whatever had been made for publication. All the collations of manuscripts, notes, tables, and computations, were in very minute, close writing, and much of it in pencil, necessitating the copying out of most portions of the work for study, and in form for printer, involving much labor. Many notes were written in minute German script which have been troublesome and unduly expensive to translate. Among others are found several chapters from Books III, V, and VII of the Almagest, written in pencil in minute German script, being translations by Dr. Peters from the Greek into German, which have proved very difficult to decipher. No assistance towards the expense involved was obtainable in this country, and it seemed highly improbable that any society would undertake the publication of the work in the complete form which I considered indispensable. What to do under these circumstances has been a source of great anxiety.

On June 6, 1899, I met Professor Simon Newcomb in London, when he at once said he wished to see me about Dr. Peters' manuscripts. We adjourned to my club and discussed the matter fully for over half an hour. I explained my difficulties about publication and proposed that the work should be published in the United States. Professor Newcomb, referring to the Arabic and Greek, expressed a doubt whether they had the necessary type. No suggestion, however, was made for carrying out my proposal. I need only add that many years ago I made provision in my will that, on my death, the whole of the manuscripts and researches should be sent to the National Academy at Washington.

The present work is limited to the investigation of Ptolemy's Catalogue of Stars, but Dr. Peters also took up the question of Ulugh Beg's Catalogue, and for that purpose he collated several Persian manuscripts. I have added to this by collating all the Persian manuscripts of Ulugh Beg and the Arabic manuscripts of Al Sûfi to be found in this country. This it is hoped to publish in the future as a separate memoir.

It has been my object to make this investigation as exhaustive as possible, but where so much material has had to be examined, analyzed, and checked, and where the whole work has had to be done single-handed, it is hardly possible to

avoid some mistakes. The present investigation has shown how prone are all copyists to make mistakes; every care has been taken, and I can only hope that no very serious errors will be found.

I desire to record my obligations to the late Earl of Crawford, for kindly lending me the very valuable manuscript of the Almagest in his library; to the late Mr. Nicholson, Bodley's Librarian at Oxford, for the exceptional favor of sending the Bodleian Arabic Almagest to London for my examination; and to the late Dr. Rieu, Keeper of Oriental Manuscripts in the British Museum, for much valuable assistance.

I am much indebted to Prof. H. H. Turner for his kindness in supervising the reduction of the star places to the epoch B. C. 130.

I desire to express my gratitude to the Hon. Elihu Root, to Professor E. C. Pickering, and to the Executive Committee of the Carnegie Institution of Washington, for their sympathy and interest in the work of the late Dr. Peters, and for the generosity which has now enabled his laborious and exhaustive researches on the most ancient Catalogue of Stars we possess, to be added to astronomical literature.

E. B. KNOBEL.

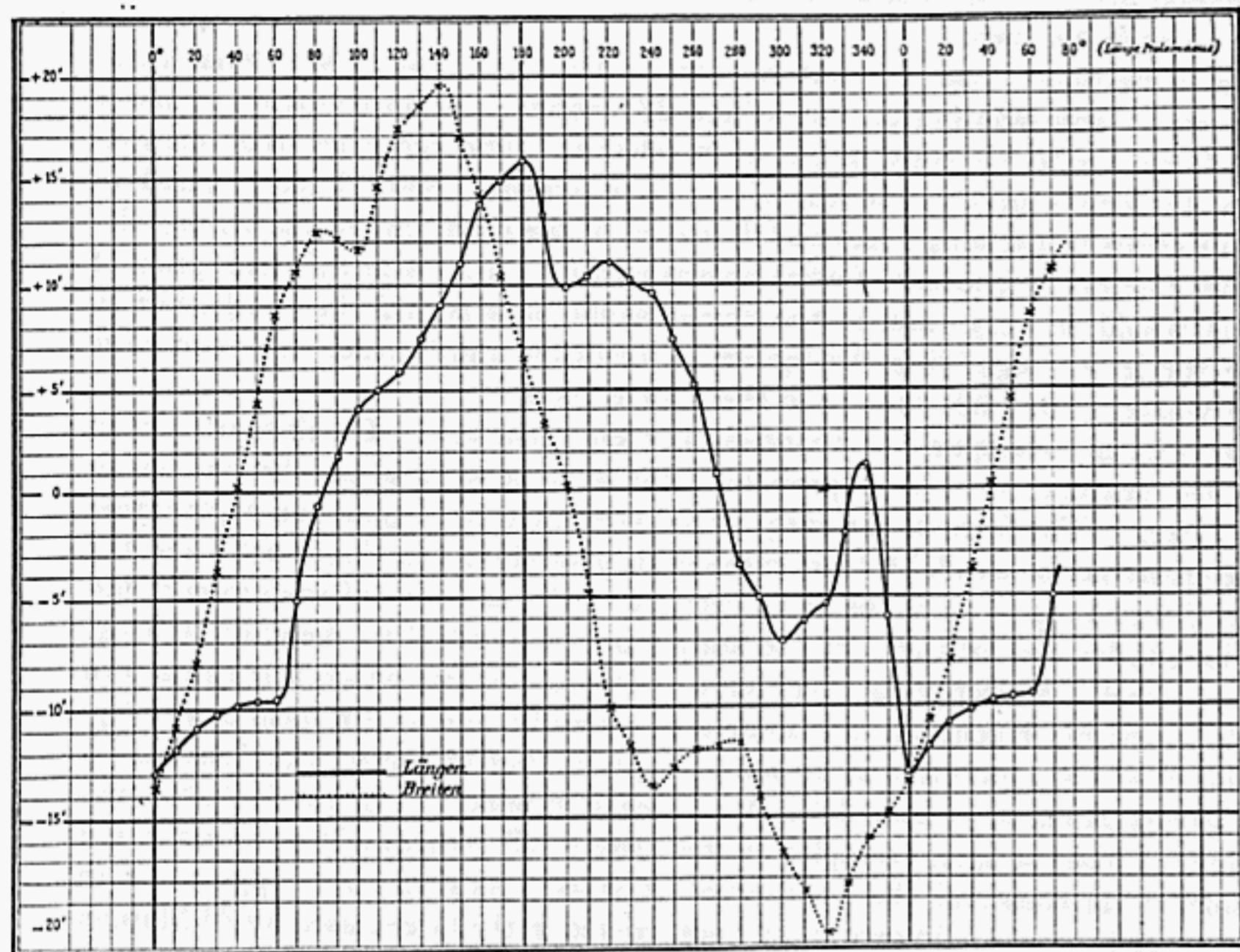32 TAVISTOCK SQUARE, LONDON, W. C.,
October 1914.

Fig. 1.—*Diagram (referred to on page 8) showing the errors in longitude and latitude of Ptolemy's Zodiacal Stars computed for the Epoch A.D. 100.*

HISTORICAL.

The Catalogue of Stars contained in the seventh and eighth books of Ptolemy's Μεγάλη Σύνταξις, commonly called The Almagest, must always be considered of unique interest. It is the first and most ancient document we possess which gives a description of the heavens of sufficient exactness to admit of comparison with modern observations. For many centuries it was held in the highest repute, and indeed, until the time of Tycho Brahe it was practically the only source of information of the positions of the stars which the world possessed; for though in the fifteenth century Ulugh Beg prepared a much more accurate catalogue of Ptolemy's stars, it never came into general use. Ptolemy's catalogue has accordingly been the subject of many researches and investigations. Up to the present time six editions of the catalogue have been printed in Greek, viz.: Grynæus, Halley, Montignot, Halma, Baily, and Heiberg; also several editions in Latin, particularly those of Trapezuntius, Schreckenfuchs, and Flamsteed, translated from the Greek; those of Liechtenstein and Copernicus, translated from the Arabic by Gerard of Cremona, and the Alfonsine Tables, also translated from the Arabic. The translation into French from the Arabic of Abd Al Rahman Al Sûfi, by Schjellerup, is simply Ptolemy's catalogue for a different epoch; and recently an edition of the Almagest has been published in German by Dr. Karl Manitius.

Dr. Peters began his study of Ptolemy's catalogue probably in 1876 or the early part of 1877. In the latter year he wrote:*

"A close examination of the exactitude of the catalogue of stars by Hipparchus, transmitted to us by Ptolemy, has never yet been made. Flamsteed, Lalande, and Bode have contented themselves with a merely superficial comparison of the separate positions of the stars. By happy conjectures Baily has corrected several of the figures which had been corrupted in the manuscripts; and for this same purpose a comparison will be found useful with the catalogue of Al Sûfi, which is formed from the catalogue of Ptolemy by the addition of a constant to the longitudes. Nevertheless, many stars are left, the identification of which has not been possible or is doubtful. But if we wish to compare the condition of the starry sky at the time of the ancients with the present day, if we desire to recognize what has really changed in the sky during the last two thousand years, it is above all things necessary to know in how far a position of Ptolemy could be in all probability faulty."†

Dr. Peters was not content with the wealth of material offered by those editions of Ptolemy's catalogue which up to his time had been printed, and so, about the year 1883, he determined to investigate, as exhaustively as possible, all the various manuscripts containing the catalogue of stars which might exist in the libraries of Europe. In February 1884 he wrote: "During a journey made in Europe within the last few months, an opportunity was given me of examining in various libraries

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*Ueber die Fehler des Ptolemäischen Sternverzeichnisses. Vierteljahrsschrift Ast. Gesell. 1877.
†Cf. Pliny (A. D. 77) Nat. Hist., Lib. II, cap. 26. "Hipparchus . . . . discovered a new star that had appeared in his own age and, by observing its motions on the day on which it shone, he was led to doubt whether it does not often happen that those stars have motion which we suppose to be fixed. And the same individual attempted what might seem presumptuous even in a deity, viz.: to number the stars for posterity and to express their relations by appropriate names; having previously devised instruments by which he might mark the places and the magnitudes of each individual star. In this way it might be easily discovered, not only whether they were destroyed or produced, but whether they changed their relative positions, and likewise whether they were increased or diminished; the heavens being thus left an inheritance to anyone who might be found competent to complete his plan."

the manuscripts of the Almagest which they contained." He began his investigations at Vienna, proceeding thence to Venice, Florence, and Rome. No further examination of manuscripts was made by him till the year 1887, when, taking advantage of a visit to Paris to attend the International Astrographic Congress, he then collated the important Greek manuscripts found in the Bibliothèque Nationale. The manuscripts he examined are given in the Table of Manuscripts Collated.

The investigation of Peters differs from all those hitherto made, for in order to assist in the identification of the stars, and to determine the actual errors of their positions, he began by calculating from modern observations the longitudes and latitudes of all of Ptolemy's stars, using for this purpose Piazzi's catalogue reduced to the epoch he assumed of A. D. 100, rather than to the epoch Ptolemy gives, which is the first year of Antoninus Pius, A. D. 138. These lengthy and laborious computations finally embraced every probable star near Ptolemy's places, corrected as far as possible for proper motion.

In his paper cited above, Peters compares 349 of Ptolemy's zodiacal stars, taken from the printed editions, with their computed positions for A. D. 100, and he arrives at the conclusion that the equinox requires a correction of $+34'.9$, equal to a precession of 42 years. He also deduces that the errors in longitude as well as in latitude give evidence of considerable periodicity. He illustrates this with a diagram,* and says: "It will be seen that the curve of errors in longitude has its chief maximum close to 180°, and its chief minimum near to 0°: the curve of errors in latitude has a maximum near to 140°, and a minimum near 320°." And he adds that "the conclusions arrived at from this as to the faulty erection of the instrument, and the position of the axes and circles of the armillary sphere which was used, will be seen more clearly when the comparison has been further extended to the stars outside the zodiac," but he did not pursue this interesting inquiry in that direction.

Dr. Peters brought into the whole investigation of Ptolemy's catalogue a rare ability, which it would be difficult to equal. Besides a fluent acquaintance with most European languages, he had an excellent knowledge of Greek, Latin, Hebrew, Arabic, Persian, and Turkish; and to these qualifications he added a high mathematical power and a facility and accuracy in computation which can only be fully appreciated by the examination of his papers. It is truly said that he was wonderfully swift in his perceptions, and this penetrating acumen is visible in the notes he made whilst collating and discussing the various authorities. Every manuscript was studied with scrupulous care, and every point of doubt investigated exhaustively. Nothing escaped his acute examination, and it is to be deplored that he was not spared to complete the publication of labors in which he had shown himself so preeminent.

Of the writer's share in the investigations contained in the present volume, it may be mentioned that in 1876 he first came to the determination of collating as many manuscripts as possible of Ptolemy's catalogue in order to obtain a more correct edition than we possessed. He commenced the work by the publication in

*Reproduced on page 6.

1876 of the Catalogue of Aboul Hhassan, which consists of 240 of Ptolemy's stars reduced to A. D. 622;* followed in 1879 by the collation of a Persian manuscript of Ulugh Beg.† In 1881 he collated three Latin manuscripts of the Almagest and the important Arabic Almagest in the British Museum, followed in 1885 by the collation of the Arabic Almagest contained in the Bodleian Library at Oxford, which Bodley's librarian had kindly sent to London for his investigation. Various other manuscripts were subsequently collated, and the whole of the material thus obtained was sent to Dr. Peters, and was discussed and used by him in the resulting catalogue. The manuscripts collated, together with some examined since Dr. Peters' death, are given in the Table of Manuscripts. One or two manuscripts of the Almagest are said to exist at the Escurial and at Toledo, but it has not been possible to examine them.

It may be safely asserted that no correct copy of Ptolemy's original catalogue exists in any manuscript, and where all codices contain so many errors it is difficult to say which copy is the most reliable. The centuries that elapsed between Ptolemy's period and the oldest manuscripts known have resulted in numerous errors in the longitudes and latitudes of the stars, due to the scribe, who was either careless or ignorant of what he was writing. Errors in the description of the stars would be very rare, as the scribe would understand the words, but in copying the letters signifying the figures of longitude and latitude he would have nothing whatever to guide him as to their correctness.

The original catalogue was doubtless written in the uncial Greek characters of the second century, for it is improbable that such a work would be written in cursive Greek. The form of the early uncial Greek letters suggests an explanation of some errors not so available from consideration of the Paris Codex 2389 and the Vatican Codex 1594, both of the ninth century. The majority of the errors found in the longitudes and latitudes of the stars must be ascribed to the early writing. All other Greek manuscripts are written in minuscule letters which first came into use only in the ninth century, and some errors may be due to this form of writing.

The most common error in all manuscripts is that of confounding the uncial Greek letters alpha $A=1$ and delta $\Delta=4$ (see Facsimiles). In the Table of the Collations of Manuscripts, examples of this error in all codices will be found in the longitudes of 44 stars and the latitudes of 36 stars. As such errors appear also in the Arabic codices, it would seem that they existed in the Greek used by Al Mamon for his translation about A. D. 827. Errors are found also from confusion between the alpha $A=1$ and the lambda $\Lambda=30$; such errors in Nos. 766 and 767 have been repeated by Grynæus and Halma, also errors of the lambda for the delta. On reference to the photograph of the Paris Codex 2389, the possibility of such confusion will be seen in the longitude and latitude of the twenty-second star of Ursa Major, which is not the case in the photograph of the Vatican Codex 1594. Another common error is mistaking the epsilon $\epsilon=5$ for theta $\Theta=9$, of which examples will be found in many manuscripts, in the longitudes of 12 stars, and the

*Chronology of Star Catalogues. Mems. R. A. S., vol. XLIII.   †Mon. Nots. R. A. S., vol. XXXIX.

latitudes of 5 stars. In the Greek uncials of the second century these letters were circular in shape, with little difference between thick and fine strokes (see Fac-similes), and the opening in the epsilon for the cross-stroke was narrow; thus confusion between the two letters was very probable.

About the ninth century the kappa $\kappa = 20$ began to be written with the angular part of the letter removed from the vertical stroke. (See Facsimiles and the photo-graph of Venice Codex 313.) The effect of this was that the angular part was taken to be the character for $\H{\eta}\mu\iota\sigma\upsilon = \frac{1}{2}$. Thus we find in most Greek manuscripts instances (Nos. 179, 277, 441, 572) where $\kappa\Gamma'$ has been taken to be $20°\frac{1}{3} = 20°\ 20'$, instead of $\iota = 10°\ < = \frac{1}{2}\ \Gamma' = \frac{1}{3} = 10°\ 50'$. This is the explanation of the two read-ings of the latitude of No. 572 in the Paris Codex 2389.

Another error found in some manuscripts, particularly the Vatican Codex Reg. 90, and the Bodleian Codex 3374, where the minuscule $\nu = 50$ is written for the $\eta = 8$ or vice versa (which in form are quite dissimilar), is derived from the uncial letters, which sometimes closely resemble each other. This appears in the photograph of the Paris manuscript 2389, in the latitude of the eighteenth star of Ursa Major, where the uncial ν may easily be taken for the uncial $\eta = H$, but not so in Vat. 1594.

The above sources of difficulty in determining the probable original figures apply mainly to the *degrees* of longitude or latitude. As is well known, the min-utes are always represented in Greek as fractions of a degree, where the significant letter with an accent expresses the denominator of the fraction. Innumerable errors occur from the omission of the accent, which then converts the letter into a whole number, affecting the degrees. Examples are given in the Facsimiles. The origin of the sign for $\H{\eta}\mu\iota\sigma\upsilon = \frac{1}{2}$ is rather obscure. As is seen in the Facsimiles, it takes various forms, becoming in later manuscripts and in printed Greek a form closely resembling the stigma ς. One feature should be mentioned upon which Dr. Peters held a decided opinion, but which the writer finds it difficult to accept: The Greeks usually represented $40'$ by $\bar{\rho}$ or $\bar{\rho}\beta = \frac{2}{3}$, the o in the first case being simply a contraction for β. They represented $50'$ by the combination of $\frac{1}{2} + \frac{1}{3}$. But in several Greek manuscripts is found the combination of $\frac{1}{2} + \frac{1}{10} = 40'$ (see Facsimiles). Dr. Peters thought that this should be read as $\frac{1}{2}$, with variant $\frac{1}{10}$. But in no case is it written as all other variants yet noted, where the variant is always written above, or in the margin, or with some separation; and as this expression is found in so many manuscripts, it seems more probable that the characters should be read as a combination, and so they have been taken in the Table of Collations.

For nearly three centuries the only available edition of the Almagest in Greek was that published at Basel by Grynæus in 1538, but great uncertainty exists as to the manuscript he used. It is stated that the manuscript belonged to Regio-montanus, to whom it was given by Cardinal Bessarion, and that it was deposited at Nürnberg. No Greek manuscript of the Almagest exists at Nürnberg. Dr. Peters investigated the work of Doppelmayer (*Histor. Nachricht. von der Nüren-bergischen Mathematicis und Künstlern, Nürnberg, 1730*), on which he made several notes. It appears that Regiomontanus devoted considerable study to the Almagest and to the other works of Ptolemy, and particularly to the commentary of Theon,

all of which he found in Rome in the original Greek. Bessarion presented to him the manuscript of Theon, which contained the following inscription in the Cardinal's writing: "Theonis in Ptolemæum liber meus Bessar. Cardin. Tuscul.," under which Regiomontanus wrote "nunc Johannis de Regiomonte." Doppelmayer states that Bessarion valued the Almagest so highly that he would not have exchanged it for a province, and he adds that this is attested by Camerarius in the dedication which he placed at the commencement of the Almagest printed at Basel in 1538 (Grynæus edition). On this point Doppelmayer is in error, for the dedication of Camerarius is to the commentary of Theon, and not to the Almagest. In the year 1450 one or two Greek codices of the Almagest had been found in Greece and brought to Rome. The first translation of them was made by Georgius Trapezuntius about 1460, subsequently published at Venice in 1528; this translation was not considered very correct, and Regiomontanus undertook a new translation, which, however, was never printed. When Regiomontanus died in Rome, July 6, 1476, Walther bought all his library and works and refused to allow any of the manuscripts to be printed or any inspection of the works. After the death of Walther, his library was dis-persed, except a portion which was bought by a magistrate at Nürnberg.

The work given by Cardinal Bessarion to Regiomontanus was clearly the commentary of Theon, and there is no reliable evidence that Bessarion gave him a copy of the Almagest, which "he would be unwilling to exchange for a province." Doppelmayer states that Camerarius (real name Liebhard, born 1500, died 1574) caused the Commentary of Theon to be added to the Almagest of Ptolemy in the edition published by Grynæus in 1538, "after the codex of Regiomontanus," presumably the codex of Theon.

The only further material evidence on the question is found in Montignot (*Etat des Etoiles Fixes au second siècle par Claude Ptolemée, Nancy, 1786*). He says: "The manuscript of the work of Ptolemy is an original document, carefully pre-served in the library of Nürnberg. It was brought from Greece by Cardinal Bessarion, after the siege of Constantinople." (A. D. 1453.) "I ought to state that I had requested M. Moers to supply, from the manuscript of Nürnberg, some omissions of the catalogue, and to verify some longitudes which lead me to suspect mistakes of printing. I have followed very exactly the print of the Greek edition Basel 1538." Dr. Peters remarks: "As in the edition of Grynæus the latitudes of 15, 16, and 17 Ophiuchi are missing, and also the longitude and latitude of 21 Tauri, why did not Montignot supply them from the manuscript? The notes of Montignot about the manuscript said to be existing in Nürnberg must be regarded with dis-trust. Who was M. Moers? In the edition of Montignot there are absolutely no sure signs of a correction of the edition of Grynæus after an original manuscript." Delambre considered Montignot's edition "peu exacte."

The M. Moers referred to is no doubt Christophorus Theophilus de Murr, who in 1786 published at Nürnberg a work entitled "*Memorabilia Bibliothecarum pub. Norimbergensium.*" This work is not in the British Museum, but a copy exists in the Bodleian with manuscript notes by the author. It is quite clear that he men-tions no manuscript of the Almagest at Nürnberg. The manuscript of Theon's

commentary on the Almagest, which he describes, has the following sentences: "Τοῦ Θεῶνος εἰς τὴν μεγάλην σύνταξιν Βίβλος ἐμόν βησσαριῶνος χαρδινάλιός τοῦ τῶν τουσκλῶν." "Theonis in ptolemæum liber meus b. Card. Tusculani, nunc Ioannis de regiomonte. Donaverat nimirum Bessarion Regiomontano codicem." From the description by Zanetti (Græca D. Marci Bibliotheca) of the Venice Codex 310, which bears the autograph of Cardinal Bessarion, it has been considered that Grynæus based his edition on this manuscript. This is open to doubt, inasmuch as in this Venice Codex $\frac{2}{3}$ is always represented by gamma over beta, and never by gamma alone or beta alone, as in Grynæus. The oft-repeated statement that Grynæus based his edition on a manuscript given by Bessarion to Regiomontanus and deposited at Nürnberg is due to an erroneous reading of the above Greek sentence, which refers only to Theon's commentary.

In the Grynæus edition the whole number 3 is given by γ or Γ. The use of the character Γ′ is twofold. Throughout the work it represents $\frac{1}{3} = 20'$, but from the commencement to the end of Sagittarius (with the exception of the 15th star in Bootes) it also represents $\frac{2}{3} = 40'$. From Capricornus to the end, $\frac{2}{3} = 40'$ is represented by β′. In the Paris Codex 2389, $\frac{2}{3}$ is represented by Γ′β or Γ′o, where o is an abbreviation for β. This is in conformity with the manner of expressing fractions by the Greeks, viz., to write the denominator as an exponent. Thus, for example, in Archimedes, $\frac{9}{11}$ is expressed by $\theta^{ι\alpha}$, the numerator below the denominator. In our case $\frac{2}{3}$ is conformable to $\overline{\beta}''$ or in uncials $_\beta\Gamma'$ or more simply $\overline{\Gamma}_\beta'$ finally Γ_β'.

The Paris Codex Græcus 2394 exhibits many points of resemblance to the Grynæus edition. This manuscript is a copy, made in 1733 for the Bibliothèque du Roi, of a thirteenth century manuscript at Constantinople belonging to the Prince of Walachia, apparently afterwards destroyed by fire. The Paris manuscript has all the errors of print in Grynæus, but it has some omissions and it also gives some latitudes (248–250) which are wanting in Grynæus. It is significant that $\frac{2}{3}$ is represented in the first part of the catalogue by γ′, and from Capricornus to the end by β′, precisely as in Grynæus. This offers a strong probability that the manuscript used by Grynæus and the archetype of Paris 2394 had the same origin.

The Latin manuscripts are of less importance, though the translation from the Greek by Trapezuntius elucidates several doubtful points. It is uncertain which was the actual Greek manuscript used by Trapezuntius; it is stated to have been a copy of a Greek manuscript in the Vatican. The remaining Latin manuscripts are all copies of the translation from the Arabic by Gerard of Cremona, and may best be considered in connection with the Oriental codices. The principal error in all Latin manuscripts of the Middle Ages is confounding the figures 1 and 2, which sometimes are identical.

The Arabic manuscripts are especially valuable for comparison with the Greek, as the errors are of a different kind. Unlike the Greeks, who wrote the minutes of longitude and latitude in fractions of a degree, the Arabs wrote the minutes in figures, and thus these two different methods form a valuable check one on the other. In numerous cases where the Greek reading is vitiated by the omission of an accent, the correct value is found in the Arabic sources.

Two different and independent Arabic translations from the Greek are known: First, that of the British Museum Codex 7475. This is written in a very cursive character with a lamentable neglect of diacritical points, rendering it difficult to decipher. It is not written in the Maghribi or African character, but clearly it has been derived from a manuscript in that character. Secondly, that of the codices Bodleian 369, Laurentian 156, British Museum Reg. 16, and the manuscripts of Al Sûfi, which are all from the same source, generally recognized as the translation from the Greek made by Al Mamon about A. D. 827. These manuscripts are written in the character called Neskhi, and in considering the probable errors of their texts it should be borne in mind that Neskhi, which is the ordinary form of Arabic writing, was only invented about the beginning of the fourth century of the Hejira = A. D. 912. Consequently the original translation of Al Mamon was probably in Cufic Arabic, and rewriting this into Neskhi would give an opening for very many errors. This adds a further difficulty to the problem of arriving at Ptolemy's original catalogue.

In the year 1887 Dr. Peters thus expressed to the writer his views on the value of the Arabic manuscripts:

"On the whole the Arabic sources agree all pretty well together in the figures of Ptolemy's catalogue. The Arabs were altogether much more accurate than the Greek scribes, so that I am able to reconstruct the version of Al Mamon's copy almost without doubt. We must try to reduce all that has come down to us of the catalogue of the Almagest to two sources: (1) the direct Greek tradition; and (2) the Arabic, which represents the copy of certainly high antiquity that Al Mamon brought home and had translated. We know that there were two translations of the Almagest made at Baghdad,[*] or that the first reduction was revised and improved upon several years later. This may account for some of the variants that are sustained, from both sides, by more than one of the sources of Arabic origin: I mean variants that do not come from the very frequent mistakes of the diacritical points."

The most common error in Arabic manuscripts is the omission of a diacritical point: thus the numbers 10 and 50 in combination differ only by a point; e. g., ح = 18 and ح = 58. Many such mistakes will be found in the manuscripts of Gerard of Cremona. Another common error is confusion between the Jeem ج = 3 and the Hā ح = 8, which seems to be due to the omission of a point, but in none of the manuscripts examined is the ج = 3 written in a form resembling the ح = 8, and it is more probable that the error may be traced to the Cufic original, where both letters are written exactly alike without any point. The letter Ya ى = 10, when signifying *ten*, is most frequently written in the pure Cufic form. Confusion also occurs between the letters Tā ط = 9, and Kaf ك = 20, possibly due to the original Cufic letters here shown, which might easily be confounded. In the British Museum Codex 7475 there are several mistakes between 3 and 4, which in some writing might easily be made, and it is clear that the scribe was sometimes doubtful which was correct, as in those cases he has written both letters; and in the same manuscript there are several mistakes of 10, 30, and 50 in combination; the absence of the point making 10 and 50 alike, and writing the Lām ل = 30 rather short makes it indistinguishable from either. In all manuscripts there is frequently confusion between

*The first by Abu Jafar Almansur (ob. A. D. 775), the predecessor of Harun Al Rashid, and the second by Al Mamon (ob. A. D. 833), who was the son of that celebrated Khalif.

the letters Zā ز=7 written without a point, and Waw و=6. Examples of all these errors will be found in the Table of Collations, and it will be noted that such mistakes are quite different to those that occur in Greek.*

A curious series of mistakes, which appears to have escaped notice, is found in all manuscripts of Gerard of Cremona (A. D. 1114–1187), which were almost certainly made by him, and not by the copyist. The *latitudes* of 1 star in Ursa Minor, 5 in Draco, 8 in Cepheus, 9 in Hercules, 6 in Lyra, and 6 in Cygnus—that is to say, all stars of true latitude 60 and odd degrees—were all written as 300 and odd degrees. In some manuscripts a more recent scribe has altered these latitudes by erasure. It is not difficult to find an explanation. In all probability Gerard of Cremona learned his Arabic from the Moors. In the Maghribi or African numerical value of the letters, the letter Sin س=300, but in the Neskhi or usual Arabic, that letter =60. The inference is that Gerard of Cremona used a manuscript from the East; that he was ignorant of the fact that the numerical value of the letters differed from that of the Moors or Western Arabs,† and had not sufficient knowledge of the subject to detect the gross mistake in the latitudes.‡ The edition of the Almagest printed by Liechtenstein in 1515 is the translation of Gerard of Cremona in which these errors are corrected.

Baily's investigation of Ptolemy's catalogue (Memoirs Royal Astronomical Society, Vol. XIII) is limited to the printed editions of the Almagest, which he most carefully examined, and his notes on these editions and his identification of the stars are of great value and assistance. All references in the present work are to the ordinal numbers of his catalogue.

Ptolemy's Catalogue of Stars has been very fully discussed by Delambre, who has pointed out the error in the latitude adopted for Alexandria and the defects in the position of the armillary sphere employed, and he has also remarked on the neglect of the influence of refraction; so that it is only necessary to refer to the valuable appendix he contributed to Halma's translation. Colonel Drayson§ has discussed the method of observation adopted by Ptolemy, which he assumes as measuring the difference of longitude, first between the sun and the moon, and then that between the moon and the star.   In the case of either of these bodies being near the horizon, he shows how it would be possible to introduce errors in the longitudes of the stars of as much as 1° due to the neglect of the influence of refraction.

One interesting feature was remarked by Dr. Peters, viz.: that the instrument used for the longitudes of the original catalogue was graduated differently to that used for the latitudes. With three exceptions, all in the constellation Virgo,

*Professor Nallino, in his important and exhaustive work on the "Opus Astronomicum" of Al Battani, has fully discussed the mistakes he found in translating the Arabic manuscripts of that author.
†The difference between the numerical value of letters with Eastern and Western Arabs is as shown in the table at the right.
‡Roger Bacon (A. D. 1214–1292) wrote: "Though we have numerous translations of all the sciences by Gerard of Cremona, Michael Scot, Alfred the Englishman, Hermann the German, and William the Fleming, there is such a falsity in their works that none can sufficiently wonder at it. · · · Not one of these translators had any true knowledge of the languages or of the sciences."
§Monthly Notices, Vol. XXVIII.

	Eastern.	Western.
60	س	ص
90	ص	ض
300	ش	س
800	ض	ظ
900	ظ	غ
1000	غ	ش

the minutes of longitude are either 10′, 20′, 30′, 40′, or 50′; whereas in the latitudes there are 144 stars where the minutes are either 15′ or 45′, clearly indicating a difference in the graduation of the instruments.

It is not, however, at all clear from Ptolemy's description how his instruments were used, and it is needless to inquire very closely into that question, if the views of Delambre, Peters, and the writer are substantiated, that the catalogue is that of Hipparchus transmitted to us by Ptolemy.   Dr. Peters made some calculations of the position of stars for B. C. 200, rather before the time of Hipparchus, but quite incomplete. In Catalogue III will be found the whole catalogue reduced to the epoch of Hipparchus B. C. 130, by deducting 2° 40′ from Ptolemy's longitudes, being the difference which Ptolemy states he found between the longitudes of Hipparchus and those of his time, and leaving the latitudes unaltered. The catalogue thus reduced is compared with modern observations computed for the epoch of Hipparchus, and a subsidiary table (Table I) is added, showing the average errors in the longitudes for the two epochs A. D. 100 and B. C. 130. In the construction of this table stars of very uncertain identification and those with large errors in longitude or latitude are omitted. Notwithstanding Ptolemy's statement that he "observed as many stars as it was possible to perceive, even to the sixth magnitude," it will be seen that the above evidence confirms the theory that the catalogue is in all probability that of Hipparchus reduced by the addition of a constant to the longitudes, and retaining his original latitudes. The descriptions of the stars were probably amended by Ptolemy.

Reference has been made to Dr. Peters' early paper on the errors of Ptolemy's catalogue, and to the results which he derived from the printed editions of the Almagest. As many of the figures differ from the finally adopted catalogue now submitted, a new table of the mean errors of zodiacal stars has been made (Table II), and for comparison is appended the mean errors of the same stars for the epoch of Hipparchus B. C. 130 (Table III).   It will be seen that all the inferences drawn by Dr. Peters in his original paper are not affected. The comparison of the longitudes of zodiacal stars only for A. D. 100 shows a mean error of +34′.9, equivalent to 42 years, making the true epoch of Ptolemy's Catalogue A. D. 58, which is not very dissimilar to A. D. 63 adopted by Bode. The year A. D. 58 is 187 years after the epoch of Hipparchus, which gives a difference of precession of 2° 36′, agreeing closely with the difference 2° 40′ which Ptolemy states he found between the longitudes of Hipparchus and those of his time. It is clear that his correction to Hipparchus could not represent observed positions in A. D. 138, and the conclusion is obviously in support of the view that the catalogue is simply that of Hipparchus modified by a constant added to the longitudes.

TABLE I.—*Comparison of the average errors of the longitudes in Ptolemy's Catalogue for the assumed epoch A. D. 100, and the errors of Ptolemy's longitudes −2° 40' for the epoch of Hipparchus B. C. 130.*

Constellation.	No. of stars.	Mean latitude.	Longitude, average error.		Error × cos. lat.	
			A.D. 100.	B.C. 130.	A. D. 100.	B. C. 130.
		° ′	′	′	′	′
Northern.						
Ursa Minor.........	8	+72 35	87.0	88.5	26.0	26.5
Ursa Major.........	35	+37 36	49.2	28.6	39.0	22.7
Draco.............	31	+78 48	143.4	133.9	27.8	26.0
Cepheus...........	13	+66 7	49.6	41.5	20.1	16.8
Bootes............	22	+44 16	57.4	35.0	41.1	25.1
Corona Borealis......	8	+46 56	66.5	35.2	45.4	24.0
Hercules...........	27	+56 41	76.5	51.8	42.0	28.4
Lyra.............	10	+58 42	97.1	69.1	50.4	35.9
Cygnus...........	16	+57 8	23.3	20.0	12.6	10.8
Cassiopeia.........	11	+48 7	67.8	39.1	45.2	26.1
Perseus...........	27	+25 14	43.3	18.1	39.2	16.4
Auriga............	10	+18 38	33.2	11.0	31.5	10.4
Ophiuchus.........	27	+14 11	57.0	27.7	55.3	26.8
Serpens...........	14	+24 36	56.5	36.0	51.4	32.7
Sagitta...........	5	+38 56	53.4	34.0	41.5	26.4
Aquila............	12	+26 20	57.5	36.1	51.5	32.3
Delphinus..........	8	+30 45	27.2	21.2	23.4	18.2
Equuleus..........	4	+23 2	40.5	14.0	37.3	12.9
Pegasus...........	20	+25 2	35.9	19.0	32.5	17.2
Andromeda........	23	+31 21	26.0	20.7	22.2	17.7
Triangulum........	4	+18 51	18.2	27.7	17.2	26.2
Zodiacal.	335				Mean 36.65	Mean 22.87
Aries.............	17	+5 32	26.9	14.4		
Taurus............	41	−2 43	30.8	21.5		
Gemini...........	20	+0 31	32.1	10.2		
Cancer............	11	0 0	43.4	22.4		
Leo..............	31	+4 45	41.9	18.0		
Virgo.............	27	+3 53	47.7	20.0		
Libra.............	17	+1 35	46.9	19.0		
Scorpius...........	24	−9 24	46.2	17.7		
Sagittarius.........	25	−2 43	45.2	17.0		
Capricornus........	27	−0 11	19.3	25.3		
Aquarius..........	42	−4 26	32.2	14.1		
Pisces............	33	+4 39	26.0	14.3		
Southern.						
Cetus.............	18	−18 16	16.0	20.9		
Orion.............	38	−18 41	26.5	25.6		
Eridanus..........	26	−34 58	13.7	30.0		
Lepus............	11	−39 36	24.8	52.9		
Canis Major........	26	−48 52	30.5	35.3		
Canis Minor........	2	−14 42	38.5	8.5		
Argo Navis.........	29	−54 12	59.5	35.2		
Hydra............	24	−20 23	40.8	16.1		
Crater............	7	−17 2	39.4	11.5		
Corvus............	7	−16 29	42.4	13.0		
Centaurus..........	24	−26 55	66.3	38.6		
Lupus............	17	−22 4	51.3	29.3		
Ara.............	om.					
Corona Australis.....	13	−17 5	47.0	19.2		
Piscis Austrinus......	11	−19 21	22.5	16.4		

TABLE II.—*Zodiacal stars. Mean errors of Ptolemy's longitudes from comparison with modern observations reduced to A. D. 100.*

Longitude, Ptolemy.	No. of stars.	Sums.		Mean value.		$\Delta l - 34'.9$
		Δl	Δb	Δl	Δb	
° °		′	′	′	′	′
0– 20	14	+318	−137	+22.7	− 9.8	−12.2
20– 40	16	+446	− 85	+27.9	− 5.3	− 7.0
40– 60	11	+277	+154	+25.2	+14.0	− 9.7
60– 80	10	+257	+168	+25.7	+16.8	− 9.2
80–100	10	+427	+ 96	+42.7	+ 9.6	+ 7.8
100–120	9	+336	+125	+37.3	+13.9	+ 2.4
120–140	13	+566	+257	+43.5	+19.7	+ 8.6
140–160	11	+481	+240	+43.7	+21.8	+ 8.8
160–180	9	+499	+ 71	+55.4	+ 7.9	+20.5
180–200	8	+386	+ 44	+48.2	+ 5.5	+13.3
200–220	14	+608	− 69	+43.4	− 4.9	+ 8.5
220–240	13	+619	−251	+47.6	−19.3	+12.7
240–260	13	+546	−108	+42.0	− 8.3	+ 7.1
260–280	11	+432	−151	+39.2	−13.7	+ 4.3
280–300	14	+237	−168	+16.9	−12.0	−18.0
300–320	20	+608	−444	+30.4	−22.2	− 4.5
320–340	15	+433	−278	+28.8	−18.5	− 6.1
340– 0	7	+144	− 66	+20.6	− 9.4	−14.3
	218	+7620		$\frac{+7620}{218} = +34.9$		

TABLE III.—*Mean errors of Ptolemy's longitudes −2° 40' from comparison with modern observations reduced to B. C. 130.*

Longitude, Ptolemy −2° 40'.	No. of stars.	Sums.		Mean value.		$\Delta l - 4'.6$
		Δl	Δb	Δl	Δb	
° °		′	′	′	′	′
0– 20	14	−102	− 91	− 7.3	− 6.5	−11.9
20– 40	16	− 34	−103	− 2.1	− 6.4	− 6.7
40– 60	11	− 52	+146	− 4.7	+13.3	− 9.3
60– 80	10	− 43	+149	− 4.3	+14.9	− 8.9
80–100	10	+127	+ 80	+12.7	+ 8.0	+ 8.1
100–120	9	+ 66	+106	+ 7.3	+11.8	+ 2.7
120–140	13	+163	+245	+12.5	+18.8	+ 7.9
140–160	11	+150	+240	+13.6	+21.8	+ 9.0
160–180	9	+228	+ 76	+25.3	+ 8.4	+20.7
180–200	8	+127	+ 52	+15.9	+ 6.5	+11.3
200–220	14	+160	− 50	+11.4	− 3.6	+ 6.8
220–240	13	+239	−225	+18.4	−17.3	+13.8
240–260	13	+145	− 91	+11.1	− 7.0	+ 6.5
260–280	11	+110	−134	+10.0	−12.2	+ 5.4
280–300	14	−183	−154	−13.0	−11.0	−17.6
300–320	20	+ 3	−430	+ 0.1	−21.5	− 4.5
320–340	15	− 23	−278	− 1.5	−18.5	− 6.1
340– 0	7	− 66	− 71	− 9.4	−10.1	−14.0
	218	+1015		$\frac{+1015}{218} = + 4.6$		

TABLE IV.—*List of manuscripts collated.*
P=Peters. K=Knobel.

No.	Title.	Codices.	No.	Collated by
		Greek.		
1	Almagest	Codex Parisinus, Græcus	2389	P., K.
2	...do...	do	2390	P.
3	...do...	do	2391	P.
4	...do...	do	2392	P.
5	...do...	do	2394	P.
6	...do...	Codex Viennæ, Græcus	14	P.
7	...do...	Codex Venitiis, Græcus	302	P.
8	...do...	do	303	P.
9	...do...	do	310	P.
10	...do...	do	311	P.
11	...do...	do	312	P.
12	...do...	do	313	P.
13	...do...	Codex Laurentianus, Græcus, Plut. 28	1	P.
14	...do...	do Plut. 28	39	P.
15	...do...	do Plut. 28	47	P.
16	...do...	Codex Laurentianus, Græcus, Plut. 89	48	P.
17	...do...	Codex Vaticanus, Græcus	1038	P.
18	...do...	do	1046	P.
19	...do...	do	1594	K.
20	...do...	Codex Vaticanus, Reginensis, Græcus	90	P., K.
21	...do...	Codex Bodleian, Selden, Græcus	3374	K.
		Latin.		
22	Almagest	Codex Viennæ, Trapezuntius	24	P.
23	...do...	Codex Laurentianus	6	P.
24	...do...	do	45	P.
25	...do...	Codex British Museum, Burney	275	K.
26	...do...	Codex British Museum, Sloane	2795	K.
27	...do...	Codex Crawford	148-9	K.
28	...do...	Codex New College, Oxford	281	K.
29	...do...	Codex All Souls College, Oxford	95	K.
		Arabic.		
30	Almagest	Codex Laurentianus	156	P.
31	...do...	Codex British Museum	7475	K.
32	...do...	Codex Bodleian, Pocock	369	K.
33	Al Sûfi	Codex India Office	2389	K.
34	...do...	Codex British Museum	7488	K.
35	...do...	do	1407	K.
36	...do...	do	5323	K.
37	...do...	Codex Parisinus	2488	K.
38	...do...	do	2489	K.
39	...do...	do	2490	K.
40	...do...	Codex Bodleian, Pocock	257	K.
41	...do...	Codex Bodleian, Huntingdon	212	K.
42	...do...	Codex Bodleian, Marsh	144	K.
43	Nassir Al Din Al Tûsi (Compendium of Almagest).	British Museum, Regis	16	
		Persian.		
44	Ulugh Beg	Codex Parisinus	366	P.
45	...do...	do	164	P.
46	...do...	do	172	P.
47	...do...	Codex Royal Astronomical Society		K.
48	...do...	Codex British Museum	16742	K.
49	...do...	do	7699	K.
50	...do...	do	11637	K.
51	...do...	Codex Crawford	709	K.
52	...do...	Codex Bodleian	548	K.
53	...do...	Codex Bodleian, Marsh	396	K.
54	...do...	Codex Bodleian, Pocock	226	K.
55	...do...	Codex Bodleian, Gravius	5	K.

NOTES ON THE MANUSCRIPTS OF THE ALMAGEST.

GREEK.

1. *Paris Codex 2389.* This, and No. 19, Codex Vaticanus Græcus 1594, are the oldest manuscripts of the Almagest yet discovered. Codex 2389 was probably originally in the Laurentian library at Florence, and it was bought by Catherine de Medici, who brought it to Paris; on her death it probably came to the library, now the Bibliothèque Nationale. It bears the stamp in gold of Henri IV. The manuscript is assigned to Sæc. IX and is very clearly written in uncial Greek. Halma attributed it to the seventh or eighth centuries, but Dr. Peters was not inclined to this view. He remarks that it can not be older than the end of the ninth century, and says further:

"Besides, it remains to be examined whether the writing is not, at least in parts, perhaps nothing but a copy of the older way of writing, and whether the handwriting itself is not of a considerably later date. To be noted is the transition of the sign for ἥμισυ into a later cursive (minuscule) form. A curious form of delta which occurs a few times was also taken into consideration."

The manuscript of the catalogue is in two forms of uncial Greek, and has apparently been written by two scribes. From the commencement to the end of the constellation Virgo, that is, to the end of Book VII of the Almagest, the writing is in the well-recognized characteristic form of uncial Greek of the ninth century. (Plate II.) The contrast of light and heavy strokes and a decline in regularity are characteristic. From the commencement of Book VIII, with the constellation Libra, to the second star in the constellation Hydra, the writing is in round uncials of a much older type. It is far more regular and is beautifully written. The letters Є, Θ, O, and C, which in the first part are oval, are here circular. (Plate III.) It is probably from the consideration of this portion of the manuscript that Halma assigned it to the seventh or eighth centuries, as it certainly resembles writing of an earlier period. The peculiar form of delta noticed by Dr. Peters occurs only in this portion of the manuscript. It is apparently an ancient cursive form of the delta employed as far back as the second century. In the margin also are found a few examples of an old cursive form of the alpha. Dr. Peters remarks upon a variant to the longitude of the twenty-sixth star of Capricornus as if it was a small H which had been cancelled, but it is really an old cursive form of the letter η. The later form of the sign for ἥμισυ referred to has not been detected, though this sign is written in several varying forms. From the third star in Hydra to the end, the writing is the same as the first part of the catalogue. M. Omont states that "the manuscript is homogeneous from beginning to end, and is written throughout by one scribe who varied his writing, inasmuch as the two forms of writing referred to are intermixed in various places, or possibly a second scribe was employed." The highest authorities assign the whole manuscript to the ninth century. Variants are in many cases added to the longitudes and latitudes of the stars, which indicate that the scribe copied from more than one manuscript or was doubtful of the exact character. For instance, in some cases where two readings are given of alpha and delta in the usual

letters, the scribe has written in the margin an old cursive alpha as explanatory.* The magnitudes are given very correctly.   Writing 25 cm. high, 18 cm. wide.

2. *Paris Codex 2390.*   About Sæc. XII.   Clearly and neatly written in small characters with many abbreviations.   Halma states that he used in his edition the Florence manuscript 2390.   There is no manuscript of the Almagest at Florence so numbered.   He thus describes it: "Il est au commencement du 12ᵐᵉ siècle; charactères très menus; très difficile à lire à cause du grand nombre de ligatures et d'abréviations de l'écriture."   The mistakes he found, which are given by Baily, show an identity with Paris 2390, and there can be little doubt that its designation as a Florence manuscript is erroneous.

3. *Paris Codex 2391.*   About Sæc. XV.   Complete.   Neatly written.

4. *Paris Codex 2392.*   About Sæc. XV.   Incomplete.   The catalogue terminates with the third star of Corona Borealis.   A very bad copy.

5. *Paris Codex 2394.*   "Codex chartaceus Constantinopoli nuper in Bibliothecam Regiam illatus.   Is codex descriptus est exemplari sæculo decimo tertio exarato, quod in illustrissima Valachiæ Principio Bibliotheca asservatur."   The manuscript is a copy made in 1733 for the Bibliothèque du Roi.   This copy shows that the resemblance with Grynæus is very close.   It contained all the errors of print of Grynæus, but having omissions, it can not be the manuscript used by Grynæus.   It also had the latitudes of Baily's stars 248–250, which are wanting in the edition of Grynæus.

6. *Vienna Codex 14.*   About Sæc. XVI.   Contains only the longitudes of the stars.   It seems a copy of No. 14, the Laurentian Codex 39.   The extreme errors seem to be the same as No. 20, the Vatican Codex Reg. 90.

7. *Venice Codex 302.*   About Sæc. XV.   In rather small minuscules, but the figures and accents are well and accurately written.

8. *Venice Codex 303.*   About Sæc. XIV.   Writing is distinct and some variants are written above the longitude and latitude.   Some stars are omitted.   The words μείζων and ἐλάσσων are omitted after Bootes and the magnitudes were not compared.   It seems to be more correct than No. 10.   Venice Codex 311.

9. *Venice Codex 310.*   About Sæc. XIV.   Written in very clear and neat minuscules.   The positions of the stars show much similarity to No. 12, Venice Codex 313, and particularly to No. 16, Laurentian Codex 48.

10. *Venice Codex 311.*   Given in Zanetti's catalogue as about Sæc. XII, but in Peters' opinion it is undoubtedly later.   It is suggested by Morelli that this manuscript is a copy of Venice 313, or perhaps Venice 303.   It is carelessly written, the μείζων and ἐλάσσων being repeatedly omitted, and there is some confusion.

11. *Venice Codex 312.*   Zanetti gives the date about Sæc. XII; Morelli as about Sæc. XIII.   The longitudes of the catalogue are those of Ptolemy increased by 17°.   It is observable that the true longitudes of Ptolemy were first written and then the modified longitudes written over the first figures.   Various errors in the zodiacal signs have resulted.   In examining the volume Peters discovered some correspondence, dating from the year 1817, between Morelli and the Abbé Halma, from which it appears that Halma never had in his hands the Venice Codex, which he erroneously calls 313 instead of 312.   At his request Morelli sent him as a specimen a comparison of the positions of the stars in Ursa Minor and Ursa Major with Grynæus.   A list of the positions where these differ is found in the original of one of Morelli's letters, and it is this list which Halma gives in his list of variants (vol. II, p. 435).

*Photographs of the whole Catalogue in this manuscript are deposited at the Carnegie Institution of Washington.

12. *Venice Codex 313.*   Attributed by Zanetti to about Sæc. X, but considered by Morelli as Sæc. XI.   This important manuscript is complete for the catalogue.   Some few variants are given in the margin by the same hand.   The magnitudes are given as correctly as in any other known manuscript.   See further under No. 19, Vatican Codex 1594.

13. *Laurentian Codex.   Pluteus 28, 1.*   About Sæc. XIII.   Catalogue complete.

14. *Laurentian Codex.   Pluteus 28, 39.*   About Sæc. XI.   Contains only Books VII and VIII.   Catalogue gives descriptions and longitudes only, omitting the latitudes and magnitudes; the writing is large and clear.   This seems to originate from the same source as Vienna Codex 14 and the Vatican Codex Reg. 90, the mistakes and omissions being the same, but the Vatican Codex contains the latitudes and is complete.

15. *Laurentian Codex.   Pluteus 28, 47.*   About Sæc. XIV.   Badly written, and ink much faded.   Seems to have been written by a learned man who paid more attention to the matter than to beauty of style.

16. *Laurentian Codex.   Pluteus 89, 48.*   About Sæc. XI.   Beautifully written with great exactness, and with the additions of μείζων and ἐλάσσων to the magnitudes.   Much similarity between this manuscript and Codex Venetiis 310.

17. *Vatican Codex 1038.*   About Sæc. XII.   The figures are clearly and plainly written, but sometimes without care.   The copyist seems to have written vertically, so that the fractions are often displaced by one line.   Halma (Preface, page lii) speaks of a manuscript at the Vatican numbered 560, which contains the Almagest following a manuscript of Euclid.   As the first portion of the Vatican Codex 1038 is occupied by a manuscript of Euclid, it is probable that this is the manuscript referred to as 560.

18. *Vatican Codex 1046.*   Sæc. XVI.   Somewhat carelessly written.   Contains the whole Almagest, but in the catalogue the figures for the positions and magnitudes are given only up to the thirteenth star of Draco.   In a note the copyist complains of the contractions and illegibility of the archetype.   Hence each book terminates with the remark Θεῶ Χάρις (God be thanked).   This may perhaps be the manuscript referred to by Halma as No. 184.   (Preface, page lii.)

19. *Vatican Codex 1594.*   Sæc. IX.   The most beautifully written Greek manuscript of the Almagest thus far discovered.*   (Plate IV.)   This was investigated by Heiberg in his Greek edition of the Almagest, 1898–1903, and by Manitius in his German translation of the Almagest, 1912.   The manuscript is written in small uncial characters with great regularity.   Some variants are inserted in the margin.   Notes in the margin are in very early form of minuscules.   The whole of the catalogue appears to be written by one hand.   The μείζων and ἐλάσσων are correctly added to the magnitudes, and, with the exception of three stars in Cetus, agree with Codex Venetiis 313.   Several errors in the longitudes and latitudes are found equally in Venice Codex 313, indicating a common origin.

20. *Vatican Codex, Reg. 90.*   This codex is probably not very old, as the writer has used many contractions (*vide* Nos. 6 and 14).

21. *Bodleian Codex, Selden 3374.*   Early Sæc. XIV.   A perfect copy, beautifully written, without variants.

LATIN.

22. *Vienna Codex 24 (Trapezuntius).*   A fine codex written for Matthias Corvinus, but somewhat carelessly done, as the signs and notations of the latitudes are frequently omitted.   The title is "Magnæ compositionis Claudii Ptolomæi libri a

*Photographs of the whole Catalogue in this manuscript are deposited at the Carnegie Institution of Washington.

Georgio Trapezuntio traducti." It is the translation from the Greek used for the Trapezuntius Almagest printed in 1528. The codex does not seem to be a copy of No. 23 Codex Laurentianus 6. The date is given at the end, "Finis 17 Marcii, 1467."

23. *Laurentian Codex 6.* Translation from the Greek by Georgius Trapezuntius. This Codex is dedicated to Pope Sixtus IV by Andreas Trapezuntius (son of the translator), which fixes the date between 1471 and 1484. It is carefully and clearly written.

24. *Laurentian Codex 45.* About Sæc. XIV. Beautifully written manuscript. Many variants added, some by the same hand, and others at a subsequent date. This, like the three following manuscripts, is a copy of the translation from the Arabic by Gerard of Cremona. There is a good deal of confusion in places and it does not appear to be a very accurate copy. As is found in other copies of Gerard of Cremona's translation, the μείζων and ἐλάσσων are indicated by the letters *em* and *el*.

25. *British Museum Codex. Burney 275.* Sæc. XIV. Translation from the Arabic by Gerard of Cremona. Formerly belonged to Pope Gregory XI (1370–1378) and was given by Clement VII to the Duc de Berri in 1387. It is a complete copy of the Almagest, beautifully written throughout, with handsome illuminations. The μείζων and ἐλάσσων are entirely omitted from the magnitudes.

26. *British Museum Codex, Sloane 2795.* Translation from the Arabic by Gerard of Cremona. The date of this manuscript is placed by Sir Edward Maunde Thompson as "circa 1300, possibly earlier, but hardly before the accession of Edward I, 1272." It is clearly written, but with many mistakes. The letters *em* and *el* for μείζων and ἐλάσσων are only in some cases appended to the magnitudes. The manuscript is imperfect, wanting several books.

27. *Crawford Codex.* A very fine illuminated manuscript of the complete Almagest, belonging to the Earl of Crawford. Sæc. XV. Translation from the Arabic by Gerard of Cremona. The original from which this manuscript was copied was evidently difficult to decipher, for the scribe has left blank spaces for many words, sometimes giving only the initial letters. There is no indication as to latitudes being north or south. The second page begins with the following sentence not found in the Liechtenstein Almagest: "Liber hic præcepto Maimonis regis Arabum qui regnavit in Baldach (Baghdad) ab Alhazen filio Josephi filio Maire, Arithmetici, et Sergio filio Elbe, cristiano, in anno XII et CC sectæ Saracenorum (A. D. 827) translatus est." Weidler describes a manuscript "Peirescianus" of Ptolemy which has this sentence at the end. It is to be noted in the Crawford manuscript that the word "stellam" in the original has been written "terram," which offers an explanation of Liechtenstein's curious description of the second star in Orion; "quæ appropinquat ad terram (? stellam) in humero Orionis."

28. *New College, Oxford, No. 281.* A very imperfect copy of Gerard of Cremona's translation. It contains the catalogue of stars. Descriptions are given to the stars only in the first eight constellations. The manuscript is carelessly written and contains numerous mistakes.

29. *All Souls College, Oxford, No. 95.* Baily quotes a reference to this manuscript by Fabricius. It is clearly the translation of Gerard of Cremona, but the catalogue of stars in Books VII and VIII is omitted, and it is evident that this was intentional, as the text follows on from Book VII, cap. 9, to Book VIII, cap. 2, which is on the Milky Way.

ARABIC.

30. *Codex Laurentianus 156.* A carefully written manuscript in Neskhi or ordinary Arabic characters. Presumably a copy of the translation made by Al Mamon about A. D. 827.

31. *British Museum 7475.* An incomplete copy of the Almagest, wanting the first six books. Dated A. H. 615 = A. D. 1218. It is written in rather cursive Arabic, not in the Maghribi characters, but probably derived from an African manuscript; there is a lamentable absence of diacritical points, which makes the decipherment difficult. It is evidently a different translation from the Greek to No. 30 or No. 32. Whereas in these two manuscripts the μείζων and ἐλάσσων are expressed by the initials of the Arabic words كبير (Kabir) and صغير (Saghir) signifying "great" and "small," in British Museum 7475, the initials of the Greek words ʃ (Mim) and ʃ (Lām) are given. Many of the longitudes and latitudes differ from all other authorities.

32. *Bodleian Arabic Almagest, Pocock 369.* Dated A. H. 799 = A. D. 1396. A well-written complete copy in Neskhi or ordinary Arabic. It compares with No. 30 in being presumably a copy of Al Mamon's translation.

33. *British Museum Arabic Manuscript, Reg. 16, A. VIII.* A compendium of the Almagest by Nassir Al Din Al Tusi, commonly called "Nassir Eddin." A very beautiful and accurately written codex in Neskhi characters. The most carefully written Arabic manuscript yet examined. Sæc. XV or XVI. On the first page is written, "This booke belonged to Sultan Ahmed ye Turkish Empr. and cost about 100 crownes at ye first." The catalogue is complete, and several resemblances with Bodleian Pocock 369 indicate that these two manuscripts had a common origin, though the copy of Nassir Eddin is more accurate. From the identity in the descriptions of the stars, the catalogue is taken from the translation of Al Mamon.

TABLE V.—*Errors in manuscripts.*

Stars.

Errors of $s=6°$ and $s'=10'$.	Longitudes.	3, 281, 305, 354, 439, 508, 685, 716, 777, 861, 1022.
	Latitudes.	1, 121, 233, 376, 436, 476, 501, 509, 513, 596, 686, 913, 980.
Errors of $\Gamma=3°$ and $\Gamma'=20'$.	Longitudes.	180, 207, 375, 448, 452, 478, 686, 849, 899, 992.
	Latitudes.	42, 66, 129, 134, 154, 432, 449, 487, 572, 625, 701, 733, 748, 757, 954, 958, 1000, 1012.
Errors of $\Delta=4°$ and $\Delta'=15'$.	Longitudes.	533.
	Latitudes.	83, 86, 103, 138, 141, 395, 399, 402, 471, 645, 752, 769.
Errors of $\epsilon=5°$ and $\Theta=9°$.	Longitudes.	19, 75, 90, 329, 341, 458, 524, 569, 570, 604, 605, 973.
	Latitudes.	281, 558, 755, 810, 855.
Errors of $\Lambda=1°$ and $\Lambda=30°$.	Longitudes.	121.
	Latitudes.	766, 767, 980, 983, 994.
Errors of $\Lambda=30°$ for $\Delta=4°$	Longitudes.	1013, 1015.
Errors of $\Lambda=1°$ and $\Delta=4°$.	Longitudes.	29, 155, 157, 158, 234, 265, 376, 382, 383, 402, 415, 463, 464, 465, 485, 486, 488, 495, 534, 539, 542, 544, 623, 644, 675, 682, 745, 749, 775, 782, 783, 797, 804, 829, 890, 912, 915, 970, 971, 983, 999, 1008, 1020, 1025.
	Latitudes.	52, 71, 73, 76, 111, 166, 167, 185, 193, 196, 212, 266, 308, 335, 357, 369, 429, 497, 534, 606, 662, 698, 715, 729, 739, 758, 759, 760, 813, 879, 897, 955, 959, 969, 998, 1028.

ʒ, Ɫ, ʕ, ⟨, ⟨, ⟨, ⟨, ʕ.	$= \frac{1}{2} = 30'$	$\mathcal{C}, \mathcal{u}.$	$= 2$
Γ́, Γ́, γ̄,	$= \frac{1}{3} = 20'$	$K, \overline{u}.$	$= 20$
Δ́, Δ́, δ.	$= \frac{1}{4} = 15'$	$H, h.$	$= 8$
s', s, τ'.	$= \frac{1}{6} = 10'$	$Z, З.$	$= 7$
ϖ, ß, ω'', ε, ϛ, s'.	$= \frac{2}{3} = 40'$	$\Theta, \theta.$	$= 9$
ς Δ́.	$= \frac{1}{2}\frac{1}{4} = 45'$	$\epsilon, \epsilon, \mathcal{G}.$	$= 5$
		$H N, \mu.$	$= 50$

No. 18. $M \Delta' = 37° 15'$ No. 572. $K \Gamma' = 20° 20'$

         $M \Delta = 44° 0'$ $K \Gamma' = 10° 50'$

$\lambda = 1. \quad \Delta = 4 \quad \lambda = 30$

$\lambda = 1 \quad \lambda = 30$

5th Cent.

FIG. 2.—*Facsimiles from various manuscripts.*

PHOTOGRAPH C. PARIS, 2389.   IX CENTURY.

PLATE III

οεπτοπαριστεραιοπιςοομηρω
τωηεντηαριςτερακνημηβ ονοτιωτεροϲ
οβορειωτεροϲαυτωνϋποτογονυ
τ επιτ ρυϲεωϲτουϋδατοϲαποτχειροϲοπ ρ
οεχομενοϲεκνοτουτουπροειρημενου
οτουτ εχομενοϲμετατηικαμπηη
οϲπ τουτωπεπομενοϲ
οτουτ εηκαμπηηαπομεϲημβριαϲ
τ απομεϲημβριαϲ αυτου βοβορειωτεροϲ
οηοτιωτεροϲτωηδυο
ολιεϲτωϲαυτωηπροϲμεϲημκ ρμοναχοϲ
τωνμεταυτονεϲυνεχωνοπρονγουμενοϲ
οεπομενοϲαυτων
τ εντηεχομενιϲυϲτροφηγοβορειοϲ
ομεϲοϲτωντριων
οεπομενοϲαυτων
ομοιωϲτωνεφεξηϲτοβορειοϲ
οηοτιωτεροϲτ τριων
ομεϲοϲαυτων
τ εντηιλοιπηιϲυϲτροφηγ οηγουμενοϲ
τωηλοιπωνβονοτιωτεροϲ
οβορειωτεροϲαυτων
οεϲχατοϲτ ϋδατιϲκαιεπιτϲτοματοϲτ ηϊχθυος
αϲτεροϲμκ ωηαμεγεοαγοαμεγϲα
οιπεριτονϋδροχοοναμορφωτοι
τ επομ τηικαμπητουϋδατοϲ οηγουμεν
τ λοιπωνβ οβορειωτεροϲ
οηοτιωτεροϲαυτων
αϲτερεϲ γμεγεοα μ
ϊχθυωναϲτεριϲλιοϲ
οεπτωιϲτοματιτουπρονγουμϊχθυος
τ εντωηκρανιωιλαυτουβ οηοτιωτεροϲ
οβορειωτεροϲαυτων
τωηεντωηωτωβ οπρονγ
οεπομενοϲαυτων
τ εντηικοιλιαβ οπρονγ
οεπομενοϲαυτων
οεντηουρατουλυτουϊχοος
τ καταπολινοηλυτουοπρωτοϲαποτ θυραϲ
οεπομενοϲαυτων
τ εφεξηϲλαμπρωη ϲοπρονγ
ομεϲοϲαυτων
οεπομενοϲτωη τριων
τ ϋπαυτ ϲενικαμπημικρωηβ οβορειωτερ
οηοτιωτεροϲαυτων

Gr. 2389

ΕΚΘΕΣΙΣ ΚΑΝΟΝΙΚΗ ΤΩΝ ΚΑΤΑ ΤΟ ΒΟΡΕΙΟΝ ΗΜΙΣΦΑΙΡΙΟΝ ΑΣΤΕΡΙΣΜΩΝ

μοιρ. φ. ωσ. εϲ

THE CATALOGUE.

The longitudes, latitudes, and identifications of the stars in the following catalogue are almost entirely those decided on by Dr. Peters from a full consideration of all the materials. In selecting from the different readings in the manuscripts, he took into consideration not only the agreement with the computed position, but also the fair accordance with the general errors in Ptolemy's longitudes of the particular constellation. From this it is inferred that the original observations of the stars were made by constellations, and not indiscriminately. As has already been mentioned, he computed from Piazzi the positions of all stars which might possibly be those observed by Ptolemy, reduced from A. D. 1800 to A. D. 100, which he assumed as the epoch of Ptolemy's longitudes.

The formula employed was

$$l' = l - 23° \ 30'.1 + 13''.6 \cos l \tan b - 0''.7 \sin l \tan b \qquad b' = b - 13''.6 \sin l - 0''.7 \cos l$$

The computed positions are corrected as far as possible for proper motion from the following considerations:

For computing the influence of Proper Motions.

Generally

$$db = \cos \eta . d\delta - \sin \eta . \cos \delta da \qquad dl = \frac{\sin \eta}{\cos b} . d\delta + \frac{\cos \eta}{\cos b} . \cos \delta da$$

where

$$\cos b \sin \eta = \sin \epsilon \cos a \qquad \cos b \cos \eta = \cos \epsilon \cos \delta + \sin \epsilon \sin \delta \sin a$$

or

$$\sin \eta = \frac{\cos a}{\cos b} . \sin \epsilon \qquad \cot \eta = \frac{\cos \delta}{\cos a} \cot \epsilon + \tan a \sin \delta$$

$$\cos \delta \sin \eta = \sin \epsilon \cos l \qquad \cos \delta \cos \eta = \cos \epsilon \cos b - \sin \epsilon \sin b \sin l$$

or

$$\sin \eta = \frac{\cos l}{\cos \delta} . \sin \epsilon \qquad \cot \eta = \frac{\cos b}{\cos l} \cot \epsilon - \tan l \sin b$$

Put

$$S \sin \varphi = \cos \delta . da \qquad S \cos \varphi = d\delta \qquad \text{(} S \text{ and } \varphi \text{ from Mädler's Bradley.)}$$

then

$$\Delta b = S \cos (\eta + \varphi) \qquad \cos b \Delta l = S \sin (\eta + \varphi)$$

or

$$\Delta l = \frac{S \sin (\eta + \varphi)}{\cos b}$$

For computing η, put

$$\left. \begin{array}{l} m \sin M = \sin \epsilon \sin a \\ m \cos M = \cos \epsilon \end{array} \right\} \tan M = \sin a \tan \epsilon. \quad \text{(} \cos M \text{ always positive).}$$

or

$$\left. \begin{array}{l} n \sin N = \sin \epsilon \sin l \\ n \cos N = \cos \epsilon \end{array} \right\} \tan N = \sin l \tan \epsilon. \quad \text{(} \cos N \text{ always positive).}$$

then

$$\cos b \sin \eta = \cos a \sin \epsilon \qquad\qquad \cos \delta \sin \eta = \cos l \sin \epsilon$$

$$\cos b \cos \eta = \frac{\cos (M-\delta)}{\cos M} \cdot \cos \epsilon \qquad \cos \delta \cos \eta = \frac{\cos (N+b)}{\cos N} \cdot \cos \epsilon$$

If S is given in seconds for 1 century (as in Mädler), Δb and Δl are desired in minutes for the time of n centuries *before* the epoch; S is to be multiplied by the factor $-\frac{n}{60}$. For example, if $n = 20$ (which is about the time of Hipparchus), S is to be multiplied by $-\frac{20}{60} = -\frac{1}{3}$.

Usually η is between $0°$ and $\pm 90°$, and may be computed simply from

$$\sin \eta = \frac{\cos l}{\cos \delta} \cdot \sin \epsilon$$

But when $\cos (N+b)$, i. e., $\cos \eta$ negative, η is between $\pm 90°$ and $180°$. Computing (roughly) N from $\tan N = \sin l \tan \epsilon$, it is easily seen, when $N+b > \pm 90°$—which will be only for stars near the pole of the ecliptic.

The following table gives N from $10°$ to $10°$ computed with $\tan \epsilon = 9.6376$ (for 1800):

$$\tan N = \sin l \tan \epsilon$$

l	N	l	N	l	N
°	° ′	°	° ′	°	° ′
± 0	± 0 0	± 70	± 22 11	± 130	± 18 23
10	4 19	80	23 9	140	15 35
20	8 27	90	23 28	150	12 15
30	12 15	100	23 9	160	8 27
40	15 35	110	22 11	170	4 19
50	18 23	120	20 36	180	0 0
60	20 36				

PTOLEMY'S CATALOGUE OF STARS.
CATALOGUE I.

The first column gives the number of the star in Baily's edition of Ptolemy's catalogue; the second gives Ptolemy's number and the description of the star in Latin, the text being taken from the Trapezuntius Almagest 1528, and revised from the Greek; the third gives the modern name; the fourth gives the longitude in signs, degrees, and minutes; the fifth the latitude; and the sixth the magnitude.

An asterisk (*) is appended to those longitudes and latitudes which differ from Baily.

No. in Baily.	Ptolemy.	Modern name.	Long.	Lat.	Mag.
	Northern Constellations.				
	URSA MINOR.		° ′	° ′	
1	1. Quæ est in extremitate caudæ..............	1 α....	♓ 0 10	+66 0	3
2	2. Quæ post ipsam in cauda est..............	23 δ....	2 30	70 0	4
3	3. Quæ post istam prope radicem caudæ........	22 ε....	*10 10	74 20	4
4	4. Australis stella præcedentis lateris figuræ quadrilateræ	16 ζ....	29 40	75 40	4
5	5. Borealis ejusdem lateris.................	21 η....	♋ 3 40	77 40	4
6	6. Australis earum quæ in sequenti latere sunt........	7 β....	*17 10	72 50	2
7	7. Borealis ejusdem lateris.................	13 γ....	26 10	+74 50	2
	INFORMATA.				
8	1. Australissima extra figuram in recta sequentis lateris	5 λ.....	♋ 13 0	+71 10	4
	URSA MAJOR.				
9	1. Quæ est in extremitate rictus..............	1 ο....	♓ 25 20	+39 50	4
10	2. Præcedens earum quæ in duobus oculis sunt........	2 λ....	25 50	43 0	5
11	3. Sequens earum......................	4 π²....	26 20	43 0	5
12	4. Præcedens earum quæ in fronte sunt..........	8 ρ....	*26 10	47 10	5
13	5. Sequens earum......................	13 σ²....	*27 40	47 0	5
14	6. Quæ in extremitate præcedentis auris est..........	24 d....	28 10	50 30	5
15	7. Præcedens earum quæ in collo sunt..........	14 τ....	♋ 0 30	43 50	4
16	8. Sequens earum......................	23 h....	2 30	44 20	4
17	9. Borealior de duabus quæ in pectore sunt..........	29 υ....	9 0	42 0	4
18	10. Australior ipsarum...................	30 φ....	11 0	*37 15	4
19	11. Quæ in genu sinistro est.................	25 θ....	10 40	35 0	4–5
20	12. Borealis earum quæ in anterioris extremitate pedis sinistri sunt.	9 ι....			3
21	13. Australior ipsarum...................	12 κ....	5 30	29 20	3
22	14. Quæ supra genu dextrum est..............	18 ε....	6 20	28 20	3
23	15. Quæ infra genu dextrum est..............	15 f....	5 40	36 0	4
24	16. Earum quæ sunt in quadrilatera figura, illa in dorso est	50 α....	5 50	33 0	4
25	17. Quæ de istis in ursæ latere est..............	48 β....	17 40	49 0	2
26	18. Quæ in radice caudæ.................	69 δ....	*22 10	44 30	2
27	19. Reliqua quæ est in posteriori sinistra coxa..........	64 γ....	♌ *3 10	51 0	3
28	20. Præcedens earum quæ in extremitate posteriorum sinistri pedis sunt.	33 λ....	3 0	46 30	2
29	21. Quæ istam sequitur.................	34 μ....	♋ 22 40	29 20	3
30	22. Quæ est in poplite sinistro..............	52 ψ....	24 10	28 15	3
31	23. Borealium earum quæ in extremitate posterioris dextri pedis sunt.		♌ 1 40	35 15	4–3
32	24. Australior earum...................	54 ν....	9 50	25 50	3
33	25. De tribus in cauda locatarum, prima post caudæ radicem.	53 ξ....	♌ 10 20	25 0	3
34	26. Media ipsarum....................	77 ε....	12 10	53 30	2
35	27. Tertia, et in ipsa extremitate caudæ..............	85 η....	18 0	55 40	2
			29 50	+54 0	2

No. in Baily.	Ptolemy.	Modern name.	Long.	Lat.	Mag.
	Northern Constellations—continued.		° ′	° ′	
	INFORMATÆ.				
36	1. Quæ sub cauda procul ad austrum est..........	12 Can. Ven...	♌ 27 50	+39 45	3
37	2. Quæ istam præcedit obscurior.................	8 Can. Ven...	20 10	41 20	5
38	3. Australior quæ inter anteriores ursæ pedes et caput Leonis est........	40 Lyncis....	⊗ 15 0	17 15	4
39	4. Borealior hac....	38 Lyncis...	13 20	19 10	4
40	5. Sequens reliquarum trium obscurarum	10 Leo Min....	16 10	20 0	obs.
41	6. Præcedens istam...	IX 115...	*15 0	*22 45	obs.
42	7. Hanc etiam præcedens...........	{36 Lyncis / VIII 245}	11 10	*20 20	obs.
43	8. Quæ inter anteriores pedes et Geminos est......	31 Lyncis	0 0	+22 15	obs.
	DRACO.				
44	1. Quæ in lingua draconis est....	21 μ	♎ 26 40	+76 30	4
45	2. Quæ in ore est...	{24 / 25} ν	♏ 11 50	78 30	4-3
46	3. Quæ supra oculum...	23 β	13 10	75 40	3
47	4. Quæ in maxilla...	32 ξ	27 20	80 20	4
48	5. Quæ supra caput...	33 γ	29 40	75 30	3
49	6. Borealis de tribus quæ sunt in recta linea et in prima flexione colli...	39 b	♐ 24 40	82 20	4
50	7. Australis ipsarum...	46 c	♑ 2 20	78 15	4
51	8. Media ipsarum...	45 d	♐ 28 50	80 20	4
52	9. Sequens istas versus ortum...	47 o	♑ 19 30	81 10	4
53	10. Quæ in sequenti fluxu est, australior earum quæ sunt in præcedente latere quadrilateræ	58 π	♓ 8 0	81 40	4
54	11. Borealior earum quæ sunt in antecedente latere.	57 δ	20 30	83 0	4
55	12. Borealis earum quæ sunt in latere sequente	63 ε	♈ 7 40	78 50	4
56	13. Australis lateris sequentis.	67 ρ	♓ 22 50	77 50	4
57	14. Australis sequenti fluxu, trianguli.	61 σ	♈ 10 40	80 30	5
58	15. Præcedens de reliquis duabus trianguli	52 υ	21 40	*81 40	5
59	16. Sequens de ipsis.	60 τ	26 10	80 15	5
60	17. Sequens de tribus quæ in antecedente deinceps triangulo sunt...	31 ψ	♊ 13 20	84 30	4
61	18. Australis de reliquis duabus trianguli	44 χ	♉ 20 20	83 30	4
62	19. Borealior reliquis duabus.	43 φ	11 50	84 50	4
63	20. Quæ de duabus parvis ad occidentalem partem trianguli sequitur.	27 f	⊗ 28 40	87 30	6
64	21. Præcedens de ipsis.	28 ω	21 40	86 50	6
65	22. Australior de tribus quæ deinceps per rectam lineam sunt...	18 g	♍ 9 0	81 15	5
66	23. Media ipsarum.	19 h	9 20	83 0	5
67	24. Borealior ipsarum.	22 ζ	8 20	84 50	5
68	25. Borealior duarum quæ deinceps ad occasum sunt.	14 η	10 0	78 0	3
69	26. Australis ipsarum.	13 θ	13 0	74 40	4-3
70	27. Quæ de istis in flexu caudæ ad occasum est.	12 ι	12 40	70 0	3
71	28. Præcedens de duabus satis ab ista distantibus.	10 i	♌ 7 20	64 40	4
72	29. Quæ ipsas sequitur.	11 α	11 10	65 30	4
73	30. Quæ istis prope caudam adhæret.	5 κ	⊗ 19 10	61 15	3
74	31. Reliqua quæ in extremitate caudæ est.	1 λ	13 10	+56 15	3
	CEPHEUS.				
75	1. Quæ in pede dextro est.	1 κ	♉ *5 0	+75 40	4
76	2. Quæ in pede sinistro.	35 γ	3 0	64 15	4
77	3. Quæ ad cingulum est in dextro latere.	8 β	♈ 7 20	71 10	4
78	4. Quæ super dextrum humerum est tangens ipsum.	5 α	♓ 16 40	69 0	3
79	5. Quæ supra dextrum cubitum tangens ipsum.....	3 η	9 20	+72 0	4

No. in Baily.	Ptolemy.	Modern name.	Long.	Lat.	Mag.
	Northern Constellations—continued.		° ′	° ′	
	CEPHEUS—continued.				
80	6. Quæ sub hoc cubito ipsum quoque tangens......	2 θ	♓ 10 0	+74 0	4
81	7. Quæ in pectore...	17 ξ	28 30	65 30	5
82	8. Quæ in sinistro brachio...	32 ι	♈ 7 30	62 30	4-3
83	9. Australis de tribus quæ in tiara sunt.	23 ε	♓ 16 20	60 15	5
84	10. Media ipsarum...	21 ζ	17 20	61 15	4
85	11. Borealis ipsarum...	22 λ	19 0	+61 20	5
	INFORMATÆ.				
86	1. Præcedens tiaram...	μ	♓ 13 40	+64 0	5
87	2. Sequens tiaram...	27 δ	21 20	59 30	4
	BOOTES.				
88	1. Præcedens de tribus quæ sunt in manu sinistra.	17 κ	♍ 2 20	+58 40	5
89	2. Media et australior de tribus.	21 ι	4 10	58 20	5
90	3. Sequens de tribus.	23 θ	5 40	60 10	5
91	4. Quæ in sinistro cubito est.	19 λ	9 40	54 40	5
92	5. Quæ est in humero sinistro.	27 γ	19 40	49 0	3
93	6. Quæ est in capite.	42 β	♎ 26 40	53 50	4-3
94	7. Quæ in humero dextro.	49 δ	♎ 5 40	48 40	4-3
95	8. Borealior ipsarum et in collorobo.	51 μ	5 40	53 15	4
96	9. Adhuc borealior ista et in extremitate collorobi	{52 ν¹ / 53 ν²}	5 0	57 30	4
97	10. Borealior duarum quæ sunt in clava sub humero.	2 η Coronæ...	7 40	*46 30	4-3
98	11. Australior ipsarum.	1 o Coronæ...	8 30	45 30	5
99	12. Quæ in extremitate dextræ manus est.	45 c	8 10	41 40	5
100	13. Præcedens de duabus quæ in vola manus sunt.	43 ψ	6 40	41 40	5
101	14. Sequens ipsarum.	46 b	7 40	42 30	5
102	15. Quæ in extremitate capuli collorobi.	41 ω	7 40	40 20	5
103	16. Quæ in crure dextro juxta cingulum.	36 ε	0 0	40 15	3
104	17. Sequens de duabus quæ in cingulo sunt.	28 σ	♍ 25 40	41 40	4
105	18. Præcedens ipsarum.	25 ρ	25 0	42 10	4-3
106	19. Quæ est in dextro calcaneo.	30 ζ	♎ 5 20	28 0	3
107	20. Borealis de tribus quæ sunt in sinistra tibia.	8 η	♍ 21 20	28 0	3
108	21. Media ipsarum.	4 τ	20 30	26 30	4
109	22. Australis ipsarum.	5 υ	21 20	+25 0	4
	INFORMATA.				
110	1. Quæ est inter crura et vocatur Arcturus subrufa.	16 α	♍ 27 0	+31 30	1
	CORONA BOREALIS.				
111	1. Fulgens earum quæ sunt in corona.	5 α	♎ 14 40	+44 30	2-1
112	2. Quæ omnes istas præcedit.	3 β	11 40	*46 10	4-3
113	3. Borealior quæ istam sequitur.	4 θ	11 50	48 0	5
114	4. Sequens istam et borealior ista.	9 π	13 40	50 30	6
115	5. Quæ fulgentem a meridie sequitur.	8 γ	17 10	44 45	4
116	6. Quæ istam propius sequitur.	10 δ	19 10	44 50	4
117	7. Quæ post istas rursus sequitur.	13 ε	21 20	46 10	4
118	8. Sequens cunctas quæ in corona sunt.	14 ι	21 40	+49 20	4
	HERCULES.				
119	1. Quæ in capite.	64 α	♏ 17 40	+37 30	3
120	2. Quæ in humero dextro penes axillam seu scapulam.	27 β	3 40	43 0	3
121	3. Quæ in brachio dextro.	20 γ	1 40	40 10	3
122	4. Quæ in cubito dextro.	7 κ	♎ 28 0	37 10	4
123	5. Quæ in humero sinistro.	65 δ	♏ 16 40	48 0	3
124	6. Quæ in brachio sinistro.	76 λ	22 0	+49 30	4-3

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	HERCULES—continued.				
125	7. Quæ in sinistro cubito	86 μ	♏ 27 40	+52 0	4–3
126	8. De tribus quæ sunt in sinistra manus vola illa quæ sequitur	103 o	♐ 5 30	52 50	4–3
127	9. Borealis de duabus reliquis	94 ν	1 40	54 0	4–3
128	10. Australior ipsarum	92 ξ	1 30	53 0	4–3
129	11. Quæ in dextro latere	40 ζ	♏ *3 50	*53 10	3
130	12. Quæ in latere sinistro	58 ε	10 10	53 30	4–3
131	13. Borealior ista in vertebro sinistræ coxæ	59 d	10 0	*56 10	5
132	14. Quæ in capite cruris ejusdem	61 c	11 10	58 30	5
133	15. Præcedens de tribus quæ sunt in sinistro crure	67 π	14 0	59 50	4
134	16. Sequens istam	69 e	15 20	60 20	4
135	17. Quæ adhuc istam sequitur	75 ρ	16 20	61 15	4–3
136	18. Quæ in genu sinistro	91 θ	♐ 0 50	61 0	4
137	19. Quæ in sinistra sura	85 ι	♏ 22 10	69 20	4
138	20. Præcedens de tribus quæ sunt in extremitate pedis sinistri	74	15 20	70 15	6
139	21. Media de tribus	77 x	16 50	71 15	6
140	22. Sequens ipsarum	82 y	19 40	*72 0	6
141	23. Quæ in vertebro coxæ dextræ	44 η	0 40	60 15	4–3
142	24. Borealior ista in eodem crure	35 σ	♎ 25 20	63 0	4
143	25. Quæ in genu dextro	22 τ	15 40	65 30	4–3
144	26. Australior duarum quæ in genu dextro sunt	11 φ	13 40	63 40	4
145	27. Borealior ipsarum	6 υ	10 10	64 15	4
146	28. Quæ in tibia dextra	1 χ	11 10	60 0	4
147	29. Quæ in extremitate dextri pedis est ipsa eadem in extremitate collorobi	{52 ν¹ / 53 ν²} Bootis	5 0	+57 30	4
	INFORMATA.				
148	1. Australior illa quæ est in brachio dextro	24 ω	♏ 2 40	+38 10	5
	LYRA.				
149	1. Fulgens quæ in testa est et vocatur Lyra	3 α	♐ 17 20	+62 0	1
150	2. Borealis de duabus quæ isti adhærent	{4 ε¹ / 5 ε²}	20 20	62 40	4–3
151	3. Australior ipsarum	{6 ζ¹ / 7 ζ²}	20 20	61 0	4–3
152	4. Quæ istas sequitur et media inter ortum cornuum	12 δ²	23 40	60 0	4
153	5. Borealior de duabus contiguis quæ sunt ad orientalem testæ partem	20 η	♑ 2 0	61 20	4
154	6. Australior ipsarum	21 θ	*2 40	60 20	4–5
155	7. Borealior duarum præcedentium quæ in jugo lyræ sunt	10 β	♐ 21 0	56 10	3
156	8. Australior ipsarum	9 ν²	20 50	55 0	4–5
157	9. Borealior duarum sequentium quæ in jugo lyræ sunt	14 γ	24 10	55 20	3
158	10. Australior ipsarum	15 λ	24 0	+54 45	4–5
	CYGNUS.				
159	1. Quæ est in ore	6 β	♑ 4 30	+*49 20	3
160	2. Quæ istam sequitur et est in capite	12 φ	9 0	50 30	5
161	3. Quæ in medio collo	21 η	16 20	54 30	4–3
162	4. Quæ in pectore	37 γ	28 30	57 20	3
163	5. Fulgens quæ in cauda est	50 α	♒ 9 10	60 0	2
164	6. Quæ in cubito alæ dextræ est	18 δ	♑ *19 40	64 40	3
165	7. Australis de tribus quæ sunt in pectine dextræ alæ	13 θ	22 30	69 40	4
166	8. Media de tribus	10 ι	21 10	+71 30	4–3

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	CYGNUS—continued.				
167	9. Borealis ipsarum quæ est in extremitate pectinis	1 κ	♑ 16 40	+74 0	4–3
168	10. Quæ in cubito alæ sinistræ	53 ε	♒ 0 50	49 30	4
169	11. Borealior ipsarum et in medio ejusdem alæ	54 λ	3 50	52 10	4–3
170	12. Quæ in extremitate pectinis alæ sinistræ	64 ζ	6 40	44 0	3
171	13. Quæ in pede sinistro	58 ν	10 0	55 10	4–3
172	14. Quæ in genu sinistro	62 ξ	14 30	57 0	4–3
173	15. Præcedens de duabus quæ sunt in pede dextro	{30 o¹ / 31}	1 10	64 0	4
174	16. Sequens ipsarum	32 ω²	2 40	64 30	4
175	17. Quæ in genu dextro nubi similis	{45 ω¹ / 46 ω²}	12 10	+*63 45	5
	INFORMATÆ.				
176	1. Australior duarum quæ sunt sub ala sinistra	{65 τ / 66 υ}	♒ 10 40	+49 40	4–3
177	2. Borealior ipsarum	67 σ	13 50	51 40	4–3
	CASSIOPEIA.				
178	1. Quæ in capite	17 ζ	♈ 7 50	+45 20	4–3
179	2. Quæ in pectore	18 α	10 50	46 45	3
180	3. Borealior ipsa et est in cingulo	24 η	13 0	47 50	4
181	4. Quæ supra sedem in cruribus est	27 γ	16 40	49 0	3–2
182	5. Quæ in genibus	37 δ	20 40	45 30	3
183	6. Quæ in tibia	45 ε	27 0	47 45	4
184	7. Quæ in extremitate pedis	35 Hev. ι	♉ 1 40	47 20	4
185	8. Quæ in sinistro brachio	33 θ	♈ 14 40	44 20	4
186	9. Quæ sub cubito sinistro	34 φ	17 40	45 0	5
187	10. Quæ in brachio dextro	8 σ	2 20	50 0	6
188	11. Quæ supra pedem sedis est	15 κ	15 0	52 40	4–5
189	12. Quæ in media sede seu cathedra	11 β	*7 50	51 40	3
190	13. Quæ in extremitate sedis	7 ρ	*3 40	+51 40	6
	PERSEUS.				
191	1. Quæ in dextræ manus extremitate et est nebulosa	7 χ (cum)	♈ 26 40	+40 30	Neb.
192	2. Quæ in dextro cubito	15 η	♉ 1 10	37 30	4
193	3. Quæ in humero dextro	23 γ	2 40	34 30	3–4
194	4. Quæ in humero sinistro	13 θ	♈ 27 30	32 20	4
195	5. Quæ in capite	18 τ	♉ 0 40	34 30	4
196	6. Quæ in occipite	18 Hev. ι	1 30	31 10	4
197	7. Fulgens quæ est in dextro latere Persei	33 α	4 50	30 0	2
198	8. Præcedens de tribus quæ sunt post illam quæ est in latere	35 σ	5 20	27 50	4
199	9. Media de tribus	37 ψ	7 0	27 40	4
200	10. Sequens ipsarum	39 δ	7 40	27 20	3
201	11. Quæ in cubito sinistro	27 κ	0 30	27 0	4
202	12. Fulgens quæ est in Gorgoneo	26 β	♈ 29 40	23 0	2
203	13. Quæ istam sequitur	28 ω	29 10	21 0	4
204	14. Quæ splendidam præcedit	25 ρ	27 40	21 0	4
205	15. Reliqua quæ istam adhuc præcedit	22 π	26 50	22 15	4
206	16. Quæ in genu dextro	72 b (21 Hev.)	♉ 14 50	*28 15	4
207	17. Præcedens ipsam et est supra genu	47 λ	13 0	28 10	4
208	18. Præcedens de duabus quæ supra poplitem	48 c	12 20	25 0	4
209	19. Sequens quæ in ipso poplite est	51 μ	14 0	26 15	4
210	20. Quæ in dextra sura	53 d	14 10	24 30	5
211	21. Quæ in talo dextro	58 e	16 20	18 45	5–4
212	22. Quæ in crure sinistro	41 ν	6 50	21 50	4–3
213	23. Quæ in genu sinistro	45 ε	8 40	+19 15	3

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	PERSEUS—continued.				
214	24. Quæ in tibia sinistra	46 ξ	♉ 8 20	+14 45	4
215	25. Quæ in sinistro calcaneo	38 o	4 10	12 0	3-4
216	26. Quæ istam sequitur et est in extremitate pedis sinistri	44 ς	6 20	+11 0	3-2
	INFORMATÆ.				
217	1. Quæ ad ortum respectu ejus quæ in genu sinistro est	52 f	♉ 11 50	+18 0	5
218	2. Quæ ad septentrionem respectu earum quæ in genu dextro est	14 Hev. Camel	15 0	31 0	5
219	3. Præcedens earum quæ in Gorgoneo sunt	16 p¹	♈ 24 40	+20 40	obs.
	AURIGA.				
220	1. Australior de tribus quæ sunt in capite	33 δ	♊ 2 30	+30 0	4
221	2. Borealior et est supra caput	30 ξ	2 20	31 50	4
222	3. Quæ in humero sinistro et vocatur Capella	13 a	♉ 25 0	22 30	1
223	4. Quæ in humero dextro	34 β	♊ 2 50	20 0	2
224	5. Quæ in cubito dextro	32 ν	1 10	15 15	4
225	6. Quæ in vola dextra	37 θ	2 50	13 20	4-3
226	7. Quæ in cubito sinistro	7 ε	♉ 22 0	20 40	4-3
227	8. Sequens de duabus quæ sunt in vola sinistra et vocantur hœdi	10 η	22 10	18 0	4-3
228	9. Præcedens ipsas	8 ζ	22 0	18 0	4
229	10. Quæ in talo sinistro	3 ι	19 50	10 10	3-4
230	11. Quæ in talo dextro communis cum Tauri cornu	23 γ=β Taur.	25 40	5 0	3-2
231	12. Quæ ad septentrionem respectu ejus est in extremitate pedis	25 χ	26 0	8 30	5
232	13. Adhuc borealior ista et est in vertebro	24 φ	26 20	12 10	5
233	14. Parva quæ est supra sinistrum pedem	14	*23 0	+ *10 20	6
	OPHIUCHUS.				
234	1. Quæ in capite	55 a	♏ 24 50	+36 0	3-2
235	2. Præcedens de duabus quæ sunt in humero dextro	60 β	28 0	27 15	4-3
236	3. Sequens ipsarum	62 γ	29 0	26 30	4
237	4. Præcedens de duabus quæ sunt in humero sinistro	25 ι	13 20	33 0	4
238	5. Sequens ipsarum	27 κ	14 40	31 50	4
239	6. Quæ in cubito sinistro	10 λ	8 20	*23 45	4
240	7. Præcedens de duabus quæ sunt in extremitate manus sinistræ	1 δ	5 0	17 0	3
241	8. Sequens ipsarum	2 ε	6 0	16 30	3
242	9. Quæ in cubito dextro	57 μ	26 40	15 0	4
243	10. Præcedens de duabus quæ sunt in extremitate manus dextræ	64 ν	♐ 2 20	13 40	4-5
244	11. Sequens ipsarum	69 τ	3 20	14 20	4
245	12. Quæ in genu dextro	35 η	♏ 21 10	7 30	3
246	13. Quæ in tibia dextra	40 ξ	*23 40	2 15	4-3
247	14. Præcedens de quatuor quæ sunt in pede dextro	36 A	23 0	— 2 15	4
248	15. Quæ istam sequitur	42 θ	24 20	1 30	4-3
249	16. Quæ adhuc istam sequitur	44 b	25 0	0 20	4
250	17. Reliqua de quatuor quæ omnes sequitur	51 c	25 50	*0 15	5
251	18. Quæ istas sequitur et tangit calcaneum	52 ? 2 Sagitt.	27 10	+ 1 0	5
252	19. Quæ in sinistro genu	13 ς	12 10	11 50	3
253	20. Borealior de tribus quæ sunt in sinistra tibia secundum rectam lineam	8 φ	11 40	5 20	5-4
254	21. Media ipsarum	7 χ	10 40	3 10	5
255	22. Australior de tribus	4 ψ	9 50	*1 40	5-4
256	23. Quæ in sinistro calcaneo	9 ω	12 20	0 40	5
257	24. Quæ tangit plantam sinistri pedis	5 ρ	10 40	— 0 45	4

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	INFORMATÆ.				
258	1. Borealior de tribus quæ sunt ad ortum humeri dextri	66 n	♐ 2 0	+28 10	4
259	2. Media de tribus	67	2 40	26 20	4
260	3. Australior ipsarum	68	3 0	25 0	4
261	4. Sequens de tribus quasi supra mediam	70	3 40	27 0	4
262	5. Borealior de quatuor et est solitaria	72	4 40	+33 0	4
	SERPENS.				
263	1. Quæ in extremitate maxillæ est de illis quæ in capite quadrilateræ sunt	21 ι	♎ 18 50	+38 0	4
264	2. Quæ nares tangit	38 ρ	21 40	40 0	4
265	3. Quæ in tempore	41 γ	24 20	36 0	3
266	4. Quæ in radice colli	28 β	22 0	34 15	3
267	5. Media quadrilateri et est in ore	35 κ	21 20	37 15	4
268	6. Exterior et ad septentrionem capitis	44 π	23 10	42 30	4
269	7. Quæ post primum colli flexum est	13 δ	21 40	29 15	3
270	8. Borealis de tribus deinceps sequentibus	27 λ	24 50	26 30	4
271	9. Media de tribus	24 α	24 20	25 20	3
272	10. Australis ipsarum	37 ε	26 20	24 0	3
273	11. Præcedens manum sinistram Ophiuchi post sequentem flexum	32 μ	28 50	16 30	4
274	12. Sequens eas quæ in manu sunt	3 υ Oph.	♏ 8 10	*13 15?	4
275	13. Quæ post posteriorem partem dextri cruris Ophiuchi	53 ν	23 40	10 30	4
276	14. Australior de duabus sequentibus istam	55 ξ	27 0	8 30	4-3
277	15. Borealior ipsarum	56 o	27 50	10 50	4
278	16. Quæ post manum dextram in flexu caudæ	57 ς	♐ 3 40	20 0	4
279	17. Quæ istam sequitur et est in cauda similiter	58 η	8 40	21 10	4-3
280	18. Quæ in extrema cauda est	63 θ	18 20	+27 0	4
	SAGITTA.				
281	1. Quæ in ferro sagittæ solitaria est	12 γ	♑ 10 10	+39 20	4
282	2. Sequens de tribus quæ in arundine sunt	8 ζ	6 40	39 10	6
283	3. Media ipsarum	7 δ	5 50	39 50	5
284	4. Præcedens de tribus	5 a	4 40	39 0	5
285	5. Quæ in extremitate γλυφίδου sagittæ	6 β	3 20	+ *38 40	5
	AQUILA.				
286	1. Quæ in medio capite	63 τ	♑ 7 10	+26 50	4
287	2. Quæ istam præcedit et est in collo	60 β	4 50	27 10	3
288	3. Fulgens quæ in occipite et vocatur Aquila	53 a	3 50	29 10	2-1
289	4. Quæ prope hanc ad septentrionem est	59 ξ	4 40	30 0	3-4
290	5. Præcedens de duabus quæ sunt in humero sinistro	50 γ	3 10	31 30	3
291	6. Quæ istam sequitur	61 φ	6 0	31 30	5
292	7. Præcedens de duabus quæ sunt in humero dextro	38 μ	♐ 29 40	28 40	5
293	8. Quæ hanc sequitur	44 σ	♑ 1 0	*26 40	5-4
294	9. Quæ sub Aquilæ cauda remotior est et lacteum circulum tangit	17 ς	♐ 22 10	+36 20	4
	INFORMATÆ.				
295	1. Præcedens de duabus quæ sunt ab australi capitis parte	55 η	♑ 3 40	+21 40	3
296	2. Quæ istam sequitur	65 θ	8 50	19 10	3
297	3. Quæ ab austro et africo dextri aquilæ humeri est	30 δ	♐ 26 0	25 0	4-3
298	4. Quæ a meridie hujus est	41 ι	28 10	20 0	3
299	5. Quæ australior hac adhuc est	39 κ	29 40	15 30	5
300	6. Quæ cunctas præcedit	16 λ	*20 10	+18 10	3

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	DELPHINUS.		° ′	° ′	
301	1. Præcedens de tribus quæ in cauda sunt	2 ε	♑ 17 40	+29 10	3-4
302	2. Borealior de duabus reliquis	5 ι	18 40	29 0	4-5
303	3. Australior ipsarum	7 κ	18 40	27 45	4
304	4. Australis earum quæ sunt in antecedente latere quadrilateri rhomboidis	6 β	18 30	32 0	3-4
305	5. Borealior antecedentis lateris	9 α	20 10	*33 20	3-4
306	6. Australis sequentis lateris rhombi	11 δ	21 20	32 0	3-4
307	7. Borealis sequentis lateris	12 γ	23 10	33 10	3-4
308	8. Australis de tribus quæ sunt inter caudam et rhombum.	3 η	17 30	30 15	6
309	9. Præcedens de duabus reliquis borealibus	4 ζ	*17 30	31 50	6
310	10. Reliqua de ipsis et sequens	8 θ	19 0	+31 30	6
	EQUULEUS.				
311	1. Præcedens duarum quæ sunt in capite	8 a	♑ 26 20	+20 30	obs.
312	2. Quæ ipsam sequitur	10 β	28 0	20 40	obs.
313	3. Præcedens duarum quæ in ore sunt	5 γ	26 20	25 30	obs.
314	4. Quæ ipsam sequitur	7 δ	27 40	+25 0	obs.
	PEGASUS.				
315	1. Quæ in umbilico est et communis cum capite Andromedæ.	δ=21 α And.	♓ 17 50	+26 0	2-3
316	2. Quæ in lumbis et extremitate pennæ.	88 γ	12 10	12 30	2-3
317	3. Quæ in humero dextro et in ipsa pedis radice	53 β	2 10	31 0	2-3
318	4. Quæ in occipite et humero alæ.	54 α	♒ 26 40	19 40	2-3
319	5. Borealior duarum quæ sunt in corpore sub ala.	62 τ	♓ 4 30	25 30	4
320	6. Australior ipsarum.	68 υ	5 0	25 0	4
321	7. Borealior duarum quæ in genu dextro sunt	44 η	♒ 29 0	35 0	3
322	8. Australior ipsarum.	43 o	28 30	34 30	5
323	9. Antecedens duarum propinquarum quæ in pectore sunt.	47 λ	26 10	29 0	4
324	10. Sequens ipsarum.	48 μ	27 0	29 30	4
325	11. Præcedens duarum propinquarum quæ in collo sunt.	42 ζ	18 50	18 0	3
326	12. Sequens ipsarum.	46 ξ	20 30	19 0	4
327	13. Australior duarum quæ in juba sunt.	50 ρ	21 20	15 0	5
328	14. Borealior ipsarum.	49 σ	20 30	16 0	5
329	15. Borealior duarum propinquarum quæ in capite sunt.	26 θ	*9 20	16 50	3
330	16. Australior ipsarum.	22 ν	8 0	16 0	4
331	17. Quæ in rictu est.	8 ε	5 20	22 30	3-2
332	18. Quæ in dextro talo.	29 π	23 40	41 10	4-3
333	19. Quæ in genu sinistro.	24 ι	17 40	34 15	4-3
334	20. Quæ in talo sinistro.	10 κ	12 20	+36 50	4-3
	ANDROMEDA.				
335	1. Quæ in occipite.	31 δ	♓ 25 20	+24 30	3
336	2. Quæ in humero dextro.	29 π	26 20	27 0	4
337	3. Quæ in humero sinistro.	30 ε	24 20	23 0	4
338	4. Australis de tribus quæ sunt in dextro brachio.	25 σ	23 40	32 0	4
339	5. Borealior ipsarum.	24 θ	24 40	33 30	4
340	6. Media de tribus.	27 ρ	25 0	32 20	5
341	7. Australis de tribus quæ sunt in extremitate manus dextræ.	17 ι	19 40	41 0	4
342	8. Media ipsarum.	19 κ	20 40	42 0	4
343	9. Borealis de tribus.	16 λ	22 10	44 0	4
344	10. Quæ in brachio sinistro.	34 ζ	24 10	17 30	4
345	11. Quæ in cubito sinistro.	38 η	25 40	15 50	4
346	12. Australior de tribus quæ sunt supra cingulum.	43 β	♈ 3 50	+*26 20	3

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	ANDROMEDA—continued.		° ′	° ′	
347	13. Media ipsarum	37 μ	♈ 1 50	+30 0	4
348	14. Borealis de tribus	35 ν	2 0	32 30	4
349	15. Quæ supra pedem sinistrum	57 γ	16 50	28 0	3
350	16. Quæ in pede dextro	54 = φ Pers.	17 10	37 20	4-3
351	17. Australior hac	51 = υ Pers.	15 10	35 40	4-3
352	18. Borealior duarum quæ sunt in poplite sinistro	50 υ	12 10	29 0	4-3
353	19. Australior ipsarum	53 τ	12 0	28 0	4
354	20. Quæ in genu dextro	42 φ	10 10	35 30	5
355	21. Borealior duarum quæ sunt in syrmate	49 A	12 40	34 30	5
356	22. Australior ipsarum	52 χ	14 10	32 30	5
357	23. Exterior præcedensque de tribus quæ sunt in extremitate manus dextræ.	1 o	♓ 11 40	+44 0	3
	TRIANGULUM.				
358	1. Quæ in vertice trianguli est.	2 α	♈ 11 0	+16 30	3
359	2. Præcedens de tribus quæ sunt in basi.	4 β	16 0	20 40	3
360	3. Media ipsarum.	8 δ	*16 20	19 40	4
361	4. Sequens de tribus.	9 γ	16 50	+19 0	3

Zodiacal Constellations.

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	ARIES.				
362	1. Præcedens duarum quæ sunt in cornu	5 γ	♈ 6 40	+ 7 20	3-4
363	2. Sequens ipsarum	6 β	7 40	8 20	3
364	3. Borealior duarum quæ in rictu sunt	17 η	11 0	7 40	5
365	4. Australior ipsarum	22 θ¹	11 30	6 0	5
366	5. Quæ in collo est	8 ι	6 30	5 30	5
367	6. Quæ in lumbo est	32 ν	17 40	6 0	6
368	7. Quæ in radice caudæ	48 ε	21 20	4 50	5
369	8. Præcedens de tribus quæ in cauda sunt	57 δ	23 50	1 40	4
370	9. Media de tribus	58 ζ	25 20	2 30	4
371	10. Sequens ipsarum	63 τ²	27 0	1 50	4
372	11. Quæ in posteriore parte cruris est	{45 ρ² / 46 ρ³}	19 40	*1 10	5
373	12. Quæ sub poplite	43 σ	18 0	− 1 30	5
374	13. Quæ in extremitate posterioris pedis	87 μ Ceti.	15 0	5 15	4-3
	INFORMATÆ.				
375	1. Quæ supra caput est quam Hipparchus in collo dicit.	13 α	♈ 10 40	+*10 0	3-2
376	2. Sequens fulgentiorque de quatuor quæ supra lumbos sunt.	41 c	21 40	10 10	4
377	3. Borealior reliquarum trium minusque splendidarum.	39	21 20	12 40	5
378	4. Media de tribus.	35	19 40	11 10	5
379	5. Australis ipsarum.	33	19 10	+10 40	5
	TAURUS.				
380	1. Borealis de quatuor quæ sunt in abscissione	5 f	♈ 26 20	− 6 0	4
381	2. Sequens ipsam	4 s	26 0	7 15	4
382	3. Quæ istam adhuc sequitur	2 ξ	*24 40	8 30	4
383	4. Australissima de quatuor	1 o	24 20	9 15	4
384	5. Quæ istas sequitur et est in dextra scapula	30 e	29 40	9 30	5
385	6. Quæ in pectore	35 λ	♉ 3 40	8 0	3
386	7. Quæ in genu dextro	49 μ	6 40	12 40	4
387	8. Quæ in talo dextro	38 ν	3 0	14 50	4
388	9. Quæ in genu sinistro	90 c¹	12 10	− 10 0	4

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	Zodiacal Constellations—continued.				
	TAURUS—continued.				
389	10. Quæ in cubito sinistro	88 d	♉ 13 0	−13 0	4
390	11. De Hyades, sic enim vocantur quæ in facie sunt, ea quæ in naribus	54 γ	9 0	5 45	3-4
391	12. Quæ inter hanc et borealem oculum est	61 δ¹	10 20	4 15	3-4
392	13. Quæ inter istam et australem oculum	{77 θ¹ 78 θ²}	10 50	5 50	3-4
393	14. Fulgens de Hyades, et est in oculo australi subrufa	87 α	12 40	5 10	1
394	15. Reliqua quæ est in oculo boreali	74 ε	*11 50	3 0	3-4
395	16. Quæ est in radice australis cornu et in aure	97 ι	*17 10	4 0	4
396	17. Australior duarum quæ sunt in cornu australi	104 m	20 20	5 0	5
397	18. Borealior ipsarum	106 l¹	20 0	3 30	5
398	19. Quæ est in extremitate cornu australis	123 ζ	27 40	2 30	3
399	20. Quæ est in radice cornu borealis	94 τ	15 40	*0 15	4
400	21. Quæ est in extremitate borealis cornu, eademque in dextro pede Aurigæ	112 β	25 40	+ 5 0	3
401	22. Borealior duarum propinquarum quæ sunt in aure boreali	69 υ¹	12 0	0 30	5
402	23. Australior ipsarum	65 κ	11 40	0 15	5
403	24. Præcedens duarum parvarum quæ in collo sunt	37 A¹	7 0	0 40	5
404	25. Quæ ipsam sequitur	50 ω²	9 0	−*1 0	6
405	26. Australior antecedentis lateris quadrilateræ figuræ quæ in collo est	44 p	8 0	+ 5 0	5
406	27. Borealior antecedentis lateris	42 ψ	8 30	*7 10	5
407	28. Australior sequentis lateris	59 χ	12 0	3 0	5
408	29. Borealior sequentis lateris	52 φ	11 40	5 0	5
409	30. Borealis terminus antecedentis Pleiadum lateris	19 Taygeta	2 10	4 30	5
410	31. Australis terminus antecedentis lateris	23 Merope.	*2 30	3 40	5
411	32. Sequens et angustissimus Pleiadum terminus	27 Atlas	3 40	3 40	5
412	33. Exterior et parva Pleiadum a septentrione	III 170	3 40	+ 5 0	4
	INFORMATÆ.				
413	1. Quæ sub pede dextro est et scapula	10	♈ 25 0	−17 30	4
414	2. Præcedens de tribus quæ supra cornu australe	102 ι	♉ 20 0	2 0	5
415	3. Media de tribus	109 n	*24 0	1 45	5
416	4. Sequens ipsarum	114 o	26 0	2 0	5
417	5. Borealior de duabus quæ sunt sub extremitate cornu australis	126	29 0	6 20	5
418	6. Australior ipsarum	129	29 0	7 40	5
419	7. Præcedens de quinque quæ sub cornu boreali sequuntur	121	27 0	+ 0 40	5
420	8. Quæ istam sequitur	125	29 0	1 0	5
421	9. Quæ istam adhuc sequitur	132	♊ 1 0	1 20	5
422	10. Borealior reliquarum duarum sequentium	136	2 20	3 20	5
423	11. Australior ipsarum	139	3 20	+ 1 15	5
	GEMINI.				
424	1. Quæ est in capite præcedentis Geminorum	66 α	♊ 23 20	+*9 40	2
425	2. Quæ est in capite sequentis Geminorum, subrufa	78 β	26 40	6 15	2
426	3. Quæ in sinistro præcedentis Geminorum cubito	34 θ	16 40	10 0	4
427	4. Quæ in eodem brachio	46 τ	18 40	7 20	4
428	5. Quæ ipsam sequitur et est in occipite	60 ι	22 0	5 30	4
429	6. Quæ istam sequitur et est in dextro humero ejusdem	69 υ	24 0	4 50	4
430	7. Quæ in humero sequenti sequentis Geminorum	77 κ	26 40	2 40	4
431	8. Quæ in dextro latere antecedentis Geminorum	57 A	21 40	2 40	5
432	9. Quæ in sinistro latere sequentis Geminorum	58	*23 10	*0 20	5
433	10. Quæ in sinistro genu præcedentis Geminorum	27 ε	13 0	+ 1 30	3

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	GEMINI—continued.				
434	11. Quæ sub sinistro genu sequentis Geminorum	43 ζ	♊ *18 10	− 2 30	3
435	12. Quæ in sinistra sequentis Geminorum axilla	55 δ	21 40	0 30	3
436	13. Quæ supra dextrum poplitem ejusdem Geminorum	54 λ	*21 40	*6 0	3
437	14. Quæ in extremo pede præcedentis Geminorum	7 η	6 30	1 30	4-3
438	15. Quæ hanc in eodem pede sequitur	13 μ	*8 10	1 15	4-3
439	16. Quæ in extremitate dextri pedis præcedentis Geminorum	18 ν	10 10	3 30	4-3
440	17. Quæ in extremitate sinistri pedis sequentis Geminorum	24 γ	12 0	7 30	3
441	18. Quæ in extremitate dextri pedis sequentis Geminorum	31 ξ	14 40	−10 30	4
	INFORMATÆ.				
442	1. Præcedens extremitatem pedum antecedentis Geminorum	1 H	♊ 4 10	− 0 40	4
443	2. Præcedens eam quæ est in genu antecedentis Geminorum et est splendida	44 κ Aurigæ.	6 30	+ 5 50	4-3
444	3. Quæ præcedit genu sinistrum sequentis Geminorum	36 d	15 10	− 2 15	5
445	4. Borealis trium sequentium dextram sequentis Geminorum per rectam lineam	85	28 20	1 20	5
446	5. Media de tribus	81 g	26 20	3 20	5
447	6. Australis ipsarum et ad cubitum manus	74 f	26 0	4 30	5
448	7. Quæ dictas tres sequitur et est splendida	16 ζ Cancri.	♋ 5 40	− 2 40	4
	CANCER.				
449	1. Media nubiformis convolutionis quæ in pectore dicta Præsepe	41 ε	♋ 10 20	+*0 40	Neb.
450	2. Borealior duarum præcedentium quadrilateræ figuræ, quæ est in nebula	33 η	7 40	1 15	4-5
451	3. Australior præcedentium duarum	31 θ	8 0	− 1 10	4-5
452	4. Borealis duarum sequentium quadrilateræ quæ vocantur Aselli	43 γ	10 20	+ 2 40	4-3
453	5. Australis ipsarum	47 δ	11 20	− 0 10	4-3
454	6. Quæ in australi forfice	65 α	16 30	5 30	4
455	7. Quæ in boreali forfice	48 ι	8 20	+11 50	4
456	8. Quæ in posteriore pede boreali	10 μ	2 40	1 0	5
457	9. Quæ in posteriore pede australi	17 β	7 10	−*10 30	4-3
	INFORMATÆ.				
458	1. Quæ super cubitum australis forficis est	{62 o¹ 63 o²}	♋ *15 40	− 2 20	4-5
459	2. Quæ sequitur extremitatem australis forficis	76 κ	21 10	5 40	4-5
460	3. Præcedens duarum sequentium quæ sunt super nebulam	69 ν	14 0	+*7 15	5
461	4. Sequens ipsarum	77 ξ	17 0	*4 50	5
	LEO.				
462	1. Quæ in extremitate naris	1 κ	♋ 18 20	+10 0	4
463	2. Quæ in apertione oris	4 λ	21 10	7 30	4
464	3. Borealior duarum quæ sunt in capite	24 μ	24 20	12 0	3
465	4. Australior ipsarum	17 ε	24 10	9 30	3-2
466	5. Borealis de tribus quæ in collo sunt	36 ζ	♌ 0 10	11 0	3
467	6. Sequens et media de tribus	41 γ	2 10	8 30	2
468	7. Australis ipsarum	30 η	0 40	4 30	3
469	8. Quæ est in corde et vocatur Regulus	32 α	2 30	0 10	1
470	9. Australior ipsa et est quasi in pectore	31 A	3 30	− 1 50	4
471	10. Parum antecedens illam quæ in corde est	27 ν	0 0	0 15	5

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	Zodiacal Constellations—continued.				
	LEO—continued.				
472	11. Quæ in genu dextro	16 ψ	⊗ 27 20	− 0 0	5
473	12. Quæ in anteriore dextræ vola	5 ξ	24 10	3 40	6
474	13. Quæ in anteriore sinistræ vola	14 o	27 20	4 10	4
475	14. Quæ in genu sinistro	29 π	♌ 2 30	4 15	4
476	15. Quæ in axilla sinistra	47 ρ	9 10	0 10	4
477	16. Præcedens de tribus quæ sunt in ventre	46 i	7 0	+ 4 0	6
478	17. Borealis reliquarum et sequentium duarum	52 k	10 20	5 20	6
479	18. Australior ipsarum	*12 l	10 20	2 20	6
480	19. Præcedens de duabus quæ sunt in lumbis	60 b	11 20	12 15	5
481	20. Sequens ipsarum	68 δ	14 10	13 40	2-3
482 / 483	21. Borealior duarum quæ sunt in vertebris	?	14 20	*11 {20 / 10}	5
484	22. Australior ipsarum	70 θ	16 20	9 40	3
485	23. Quæ in posterioribus cruribus	78 ι	20 20	5 50	3
486	24. Quæ in posterioribus poplitibus	77 σ	21 40	1 15	4
487	25. Australior hac et quasi in cubitis	84 τ	24 40	− 0 50	4
488	26. Quæ in posterioribus volis	91 υ	27 30	− *3 0	5
	27. Quæ in extremitate caudæ	94 β	24 30	+11 50	1-2
	INFORMATÆ.				
489	1. Præcedens de duabus quæ sunt super scapulam	41 Leo Min	♌ 6 0	+13 0	5
490	2. Sequens ipsarum	54	8 10	15 30	5
491	3. Borealis de tribus, quæ sunt sub latere	63 χ	17 30	1 10	4-5
492	4. Media ipsarum	59 c	17 10	− 0 30	5
493	5. Australis ipsarum	58 d	18 0	2 40	5
494	6. Borealissimum convolutionis nubilosæ quæ Coma Berenices vocatur, et est inter extrema Leonis et Ursæ	15 c Com. Ber	24 50	+30 0	obs.
495	7. Præcedens de australibus eminentibus Comæ Berenices	7 h Com. Ber	24 20	25 0	obs.
496	8. Sequens de ipsis in figura folii edere	23 k Com. Ber	28 30	+25 30	obs.
	VIRGO.				
497	1. Australis de duabus quæ sunt in extremo craneo Virginis	3 ν	♌ *27 0	+ 4 15	5
498	2. Borealior ipsarum	2 ξ	*26 20	5 40	5
499	3. Borealior de sequentibus ipsas in facie	9 o	♍ 0 40	8 0	5
500	4. Australior ipsarum	8 π	0 10	5 30	5
501	5. Quæ est in extremitate australis alæ atque sinistræ	5 β	♌ 29 0	0 10	3
502	6. Præcedens de quatuor, quæ sunt in ala sinistra	15 η	♍ 8 15	1 10	3
503	7. Quæ ipsam sequitur	29 γ	13 10	2 50	3
504	8. Quæ adhuc istam sequitur	46	17 10	2 50	3
505	9. Ultima et sequens de quatuor	51 θ	21 0	1 40	4
506	10. Quæ est sub cingulo in dextro latere	43 δ	14 20	8 30	3
507	11. Præcedens de tribus quæ in dextra borealique ala sunt	30 ρ	8 10	13 50	5
508	12. Australis reliquarum duarum	32 d²	10 10	11 40	6
509	13. Borealis ipsarum et vocatur Previndemiatrix	47 ε	12 10	16 0	3-2
510	14. Quæ in extremitate manus sinistræ et vocatur Spica	67 α	26 40	− 2 0	1
511	15. Quæ sub cingulo juxta dextrum vertebrum	79 ζ	24 50	+ 8 40	3
512	16. Borealis antecedentis lateris quadrilateræ figuræ quæ est in crure sinistro	74 l	26 20	3 20	5
513	17. Australis antecedentis lateris	76 h	27 15	0 10	6
514	18. Borealior de duabus, quæ in sequenti latere sunt	82 m	♎ 0 0	1 30	4-5
515	19. Australior lateris sequentis	68 i	♍ 28 0	− 3 0	5
516	20. Quæ in genu sinistro	86	♎ 1 40	1 30	5

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	VIRGO—continued.				
517	21. Quæ in dextro crure posteriore	90 p	♍ 28 0	+ 8 30	5
518	22. Media de tribus quæ sunt in syrmate	99 ι	♎ *6 40	7 30	4
519	23. Australis ipsarum	98 κ	7 20	2 40	4
520	24. Borealis ipsarum	105 φ	8 20	11 40	4
521	25. Quæ in extremitate sinistri pedis atque australis	100 λ	10 0	0 30	4
522	26. Quæ in extremitate dextri pedis atque borealis	107 μ	12 40	+ 9 50	3
	INFORMATÆ.				
523	1. Præcedens de tribus quæ ad rectam lineam sub sinistro cubito sunt	26 χ	♍ 14 40	− 3 30	5
524	2. Media ipsarum	40 ψ	19 0	3 30	5
525	3. Sequens ipsarum	49	22 15	3 20	5
526	4. Præcedens de tribus quæ quasi ad rectam lineam sub Spica sunt	53	27 10	*7 20	6
527	5. Media ipsarum et duplex	{61 / 63}	28 10	8 20	5
528	6. Sequens trium	89	♎ *5 0	− 7 50	6
	LIBRA.				
529	1. Fulgens earum quæ sunt in extremitate australis forficis	9 α	♎ 18 0	+ 0 40	2
530	2. Borealior ipsa et minus splendida	7 μ	17 0	2 30	5
531	3. Fulgens earum quæ sunt in extremitate borealis forficis	27 β	22 10	8 50	2
532	4. Præcedens ipsas et obscura	19 δ	*17 40	8 30	5
533	5. Quæ est in medio australis forficis	24 ι	24 0	− 1 40	4
534	6. Quæ istam præcedit in eadem forfice	21 ν	21 20	+ 1 15	4
535	7. Quæ est in medio borealis forficis	38 γ	27 50	4 45	4
536	8. Quæ istam in eadem forfice sequitur	46 θ	♏ 3 0	+ 3 30	4-5
	INFORMATÆ.				
537	1. Antecedens de tribus borealibus quæ sunt in forfice boreali	37	♎ 26 10	+ 9 0	5
538	2. Australis sequentium duarum	48 ψ	♏ 3 40	6 40	4-5
539	3. Borealis ipsarum	51 = ξ Scorp	4 20	9 15	4-5
540	4. Sequens de tribus intermediis	45 λ	3 30	0 30	6
541	5. Borealis reliquarum duarum præcedentium	43 κ	0 20	0 20	5
542	6. Australis ipsarum	0 Arg. 14782	1 10	− 1 30	4
543	7. Præcedens de tribus australioribus, quæ sunt in forfice australi	20 = γ Scorp	♎ 23 0	7 30	3
544	8. Borealior duarum reliquarum sequentium	39	♏ 1 0	*8 10	3
545	9. Australior ipsarum	40 τ	*2 0	− 9 40	3
	SCORPIUS.				
546	1. Borealis de tribus splendidis, quæ sunt in fronte	8 β	♏ 6 20	+ 1 20	3
547	2. Media ipsarum	7 δ	5 40	− 1 40	3
548	3. Australior de tribus	6 π	5 40	5 0	3
549	4. Australior adhuc ista in altero pedum	5 ρ	6 0	− 7 50	3
550	5. Borealior duarum, quæ borealissimæ splendidarum adhæret	14 ν	7 0	+ 1 40	4
551	6. Australis ipsarum	{9 ω¹ / 10 ω²}	6 20	0 30	4
552	7. Præcedens de tribus splendidis, quæ sunt in corpore	20 σ	10 40	− 3 45	3
553	8. Media ipsarum et subrufa quæ vocatur Antares	21 α	12 40	4 0	2
554	9. Sequens de tribus	23 τ	14 30	− 5 30	3

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	SCORPIUS—continued.				
555	10. Præcedens duarum quæ sub ipsis in extremo pede sunt.	13 c²	♏ 9 20	— *6 10	5
556	11. Sequens ipsarum............	XVI 31 d ..	10 40	6 40	5
557	12. Quæ in primo spondilo a corpore............	26 ε	18 30	11 0	3
558	13. Quæ post hanc in secundo spondilo............	{XVI 189 μ¹ / XVI 193 μ²}	18 50	15 0	3
559	14. Borealis de binis quæ in tertio spondilo sunt........	XVI 198 ζ¹ ..	20 0	18 40	4
560	15. Australior de binis............	XVI 206 ζ² ..	20 10	*19 0	4
561	16. Quæ deinceps in quarto spondilo est......	XVI 302 η ..	23 10	19 30	3
562	17. Quæ post ipsam in quinto spondilo est.....	XVII 138 θ ..	28 10	18 50	3
563	18. Quæ deinceps in sexto spondilo............	XVII 210 ι¹ ..	♐ 0 30	16 40	3
564	19. Quæ in septimo spondilo juxta aculeum......	XVII 174 κ ..	♏ 29 0	15 10	3
565	20. Sequens de duabus quæ in aculeo sunt......	35 λ	27 30	13 20	3
566	21. Præcedens ipsarum............	34 υ	27 0	— 13 30	4
	INFORMATÆ.				
567	1. Quæ aculeum sequitur et est nebulosa......	{γ Telescopii / XVII 229 ...}	♐ 1 10	— 13 15	Neb.
568	2. Præcedens duarum, quæ a septentrione aculei sunt..	45 d. Oph	♏ 25 30	6 10	5–4
569	3. Sequens ipsarum............	3 Sagittarii	*29 30	— *4 10	5
	SAGITTARIUS.				
570	1. Quæ in ferro sagittæ............	10 γ	♐ 4 30	— 6 20	3
571	2. Quæ in capulo sinistræ manus est......	19 δ	7 40	6 30	3
572	3. Quæ in australi parte Sagittarii est......	20 ε	8 0	10 50	3
573	4. Australior earum quæ sunt in boreali parte Sagittarii.	22 λ	9 0	1 30	3
574	5. Borealior ipsarum et in extremitate arcus......	{13 μ¹ .... / 15 μ²}	6 40	+ 2 50	4
575	6. Quæ in humero sinistro......	34 σ	15 20	— 3 10	3
576	7. Quæ hanc præcedit et est in sagitta..	27 φ	13 0	*3 50	4–3
577	8. Quæ in oculo est nebulosa et bina......	{32 ν¹ .... / 35 ν²}	15 10	+ 0 45	Neb.
578	9. Præcedens de tribus quæ sunt in capite......	37 ξ¹	15 40	2 10	4
579	10. Media ipsarum............	39 o	17 40	1 30	4
580	11. Sequens de tribus............	41 π	19 10	2 0	4
581	12. Australior de tribus, quæ in boreali interscapilio sunt.	43 d	21 20	2 50	5
582	13. Media ipsarum............	44 ρ	22 20	4 30	4
583	14. Borealis ipsarum............	46 υ	22 50	6 30	4
584	15. Obscura quæ tres istas sequitur......	{54 e¹ .... / 55 e²}	*25 40	5 30	6
585	16. Borealior de duabus quæ in australi interscapilio sunt.	61 g	29 30	5 50	5
586	17. Australior ipsarum............	56 f	27 40	2 0	6
587	18. Quæ in humero dextro......	{47 x¹ .... / 49 x³}	*22 20	— 1 50	5
588	19. Quæ in cubito dextro......	{51 h¹ .... / 52 h²}	24 50	2 50	4
589	20. De tribus quæ sunt in scapula, quæ prope occiput est.	42 ψ	20 0	2 30	5
590	21. Media ipsarum et in ipsa latitudine scapulæ..	40 τ	17 40	4 30	4–3
591	22. Reliqua et quasi sub axilla......	38 ζ	16 20	6 45	3
592	23. Quæ in anteriori sinistro talo......	{XIX 54 β¹ .. / XIX 62 β²}	17 40	23 0	2
593	24. Quæ in genu ejusdem pedis......	XIX 68 α ..	17 0	18 0	2–3
594	25. Quæ in anteriori dextro talo......	XVIII 17 η ..	6 40	13 0	3
595	26. Quæ in crure sinistro......	{XIX 330 κ¹ .. / XIX 333 κ²}	27 20	13 30	3
596	27. Quæ in posteriore dextro cubito......	XIX 297 ι ..	*26 50	— 20 10	3

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	SAGITTARIUS—continued.				
597	28. Præcedens borealis lateris de quatuor quæ sunt in radice caudæ......	58 ω ..	♐ *27 40	— 4 50	5
598	29. Sequens borealis lateris......	60 Λ ..	28 50	4 50	5
599	30. Antecedens australis lateris......	59 b ..	28 50	5 50	5
600	31. Sequens australis lateris......	62 c ..	29 40	— 6 30	5
	CAPRICORNUS.				
601	1. Borealis de tribus quæ sunt in sequenti cornu......	{5 α¹ / 6 α²}	♑ 7 20	+ 7 20	3
602	2. Media ipsarum............	8 ν ..	7 40	6 40	6
603	3. Australis de tribus............	9 β ..	7 20	5 0	3
604	4. Quæ in extremitate antecedentis cornu est......	{1 ξ¹ / 2 ξ²}	*6 0	8 0	6
605	5. Australis de tribus quæ sunt in rictu......	12 o ..	9 0	0 45	6
606	6. Præcedens reliquarum duarum......	10 π ..	8 40	1 45	6
607	7. Sequens ipsarum............	11 ρ ..	8 50	1 30	6
608	8. Præcedens de tribus quæ sunt sub oculo dextro..	7 σ ..	6 10	0 40	5
609	9. Borealior duarum quæ sunt in collo......	{13 τ¹ / 14 τ²}	11 40	0 50	6
610	10. Australior earum............	15 υ ..	11 50	*0 50	5
611	11. Quæ sub genu dextro......	16 ψ ..	10 50	— 6 30	4
612	12. Quæ est in genu sinistro atque flexo......	18 ω ..	11 40	8 40	4
613	13. Quæ in humero sinistro......	24 Λ ..	16 40	7 40	4
614	14. Præcedens duarum contiguarum quæ sunt sub ventre.	34 ζ ..	20 10	6 50	4
615	15. Sequens ipsarum............	36 b ..	20 20	6 0	5
616	16. Sequens de tribus quæ sunt in medio corpore......	28 φ ..	18 40	4 15	5
617	17. Australior reliquarum duarum antecedentium..	25 χ ..	16 40	4 0	5
618	18. Borealior ipsarum............	22 η ..	16 40	2 50	5
619	19. Antecedens duarum, quæ sunt in scapula......	23 θ ..	16 40	0 0	4
620	20. Sequens ipsarum............	32 ι ..	21 0	0 50	4
621	21. Antecedens duarum, quæ sunt in spina australi......	39 ε ..	23 20	4 45	4
622	22. Sequens ipsarum............	43 κ ..	25 0	4 30	4
623	23. Antecedens duarum, quæ sunt apud caudam......	40 γ ..	24 50	2 10	3
624	24. Sequens ipsarum............	49 δ ..	26 20	— 2 0	3
625	25. Antecedens de quatuor, quæ sunt in boreali caudæ parte......	42 d ..	26 50	+ 0 20	4
626	26. Australis reliquarum trium......	51 μ ..	28 40	0 0	5
627	27. Media ipsarum............	48 λ ..	27 40	2 50	5
628	28. Borealis ipsarum............	46 c¹ ..	28 40	+ 4 20	5
	AQUARIUS.				
629	1. Quæ est in capite Aquarii......	25 d ..	♒ 0 20	+15 45	5
630	2. Fulgentior duarum, quæ sunt in humero dextro......	34 a ..	6 20	11 0	3
631	3. Quæ sub ipsa obscurior......	31 o ..	5 10	9 40	5
632	4. Quæ in humero sinistro......	22 β ..	♑ 26 30	8 50	3
633	5. Quæ sub ipsa in scapula et quasi sub axilla......	23 ξ ..	27 20	6 15	4
634	6. Sequens de tribus, quæ sunt in vestimento manus sinistræ......	13 ν ..	17 40	5 30	3
635	7. Media ipsarum............	6 μ ..	16 10	8 0	4
636	8. Antecedens de tribus......	2 ε ..	14 40	8 40	3
637	9. Quæ in cubito dextro......	48 γ ..	♒ 9 30	8 45	3
638	10. Borealis de tribus, quæ sunt in extremitate manus dextræ......	52 π ..	11 40	10 45	3
639	11. Antecedens duarum reliquarum et borealium......	55 ζ dup ..	12 0	9 0	3
640	12. Sequens ipsarum............	62 η ..	13 20	+ 8 30	3

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	Zodiacal Constellations—continued.		° ′	° ′	
	AQUARIUS—continued.				
641	13. Præcedens duarum contiguarum, quæ sunt in dextro vertebro...	43 θ	♒ 6 10	+ 3 0	4
		46 ρ	7 0	*3 10	5
642	14. Sequens ipsarum...	57 σ	8 40	− 0 50	4
643	15. Quæ in dextro clune...	33 ι	1 40	1 40	4
644	16. Australis duarum quæ sunt in sinistro clune...	38 e	3 10	+ 0 15	6
645	17. Borealior ipsarum...	76 δ	11 40	− 7 30	3
646	18. Australior duarum quæ sunt in tibia dextra...	71 τ	11 20	5 0	4
647	19. Borealior ipsarum et est sub poplite...	53 f	4 40	− 5 40	5
648	20. Quæ in posteriori sinistri cruris parte...	68 g²	8 20	10 0	5
649	21. Australior duarum quæ sunt in tibia sinistra...	66 g¹	7 50	9 0	5
650	22. Borealior ipsarum et est sub genu...				
651	23. Antecedens duarum quæ sunt in ipso aquæ fluxu à manu...	63 κ?	15 0	+ 2 0	4
		73 λ	14 50	0 10	4
652	24. Quæ istam ex austro sequitur...	83 h	17 40	− 1 10	4
653	25. Adhuc quæ istam sequitur et est post flexum...	90 φ	20 0	0 30	4
654	26. Quæ istam adhuc sequitur...	92 χ	20 30	1 40	4
655	27. Quæ est in flexu à meridie istius...	91 ψ¹	19 0	3 30	4
656	28. Borealior duarum quæ adhuc à meridie istius sunt...	{93 ψ² .... 95 ψ³ ....}	19 50	4 10	4
657	29. Australior ipsarum...	94	*17 50	8 15	5
658	30. Solitaria ad meridiem istarum...	102 ω¹	*22 40	11 0	5
659	31. Antecedens duarum contiguarum post ipsam...	105 ω²	23 10	10 50	5
660	32. Sequens ipsarum...	{103 Λ¹ .... 104 Λ² ....}	21 40	14 0	5
661	33. Borealis de tribus quæ sunt in convolutione sequenti...	106 i¹	22 10	14 45	5
662	34. Media de tribus...	108 i³	23 10	15 40	5
663	35. Sequens ipsarum...	98 b¹	17 0	14 10	4
664	36. Borealis de tribus quæ deinceps similiter sunt...	99 b²	17 30	15 0	4
665	37. Media ipsarum...	101 b³	18 20	15 45	4
666	38. Australior ipsis de tribus...	86 c¹	11 50	*16 15	4
667	39. Præcedens de tribus, quæ sunt in reliqua convolutione...	89 c³	*12 40	15 20	4
668	40. Australior reliquarum duarum...	88 c²	13 10	14 0	4
669	41. Borealior ipsarum...	79=α Pis. Aust.	7 0	−20 20	1
670	42. Aquæ ipsius ultima et est in ore Piscis Austrinus...				
	INFORMATÆ.				
671	1. Præcedens de tribus, quæ flexum id est curvaturam aquæ sequuntur...	2 Ceti ..	♒ 26 40	−15 30	4-3
		6 Ceti ..	29 40	14 40	4-3
672	2. Borealior reliquarum duarum...	7 Ceti ..	29 0	−18 15	4-3
673	3. Australior ipsarum...				
	PISCES.				
674	1. Quæ in antecedentis Piscis ore...	4 β	♒ 21 40	+ 9 15	4-3
675	2. Australior duarum quæ sunt in cranio ejus...	6 γ ...	24 10	7 30	4
676	3. Borealior ipsarum...	7 b	26 0	9 20	4
677	4. Antecedens duarum quæ sunt in dorso...	10 θ	28 10	9 30	4
678	5. Sequens ipsarum...	17 ι	♓ 0 40	7 30	4
679	6. Antecedens duarum quæ sunt in ventre...	8 κ	♒ 26 0	4 30	4
680	7. Sequens ipsarum...	18 λ	29 40	3 30	4
681	8. Quæ est in cauda Piscis ejusdem...	28 ω	♓ 6 0	6 20	4
682	9. Prima post caudam in lino...	41 d	11 0	5 45	6
683	10. Sequens ipsarum...	51 dup.	13 0	3 45	6
684	11. Antecedens de tribus splendidis, quæ deinceps sunt...	63 δ	17 10	2 15	4
685	12. Media ipsarum...	71 ε	*20 30	1 10	4
686	13. Sequens de tribus...	86 ζ dup .	23 0	− 0 10	4

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	Zodiacal Constellations—continued.		° ′	° ′	
	PISCES—continued.				
687	14. Borealior duarum parvarum, quæ sub ipsis in flexu sunt...	80 e² ...	♓ *22 20	− 2 0	6
688	15. Australior ipsarum...	89 f ...	*23 0	5 0	6
689	16. Præcedens de tribus quæ sunt post flexum...	98 μ ...	26 30	2 20	4
690	17. Media ipsarum...	106 ν ...	*28 40	4 40	4
691	18. Sequens de tribus...	111 ξ ...	♈ 0 40	7 45	4
692	19. Quæ est in nodo linorum duorum...	113 α dup.	2 30	8 30	3
693	20. Antecedens earum quæ sunt à nodo in boreali lino...	110 o ...	0 30	1 40	4
694	21. Australis de tribus quæ deinceps post ipsam sunt...	102 π ...	0 10	+*1 50	5
695	22. Media ipsarum...	99 η ...	*0 20	5 20	3
696	23. Borealis de tribus et est in extremitate caudæ...	{93}ρ {94}	0 30	9 0	4
697	24. Borealior duarum quæ sunt in ore piscis sequentis...	82 g ...	2 0	21 45	5
698	25. Australior ipsarum...	83 τ ...	1 40	21 40	5
699	26. Sequens de tribus parvis quæ sunt in capite...	68 h ...	♓ 28 40	20 0	6
700	27. Media ipsarum...	67 k ...	27 40	19 50	6
701	28. Antecedens de tribus...	65 i dup.	27 0	20 20	6
702	29. Præcedens de tribus quæ in australi spina, post cubitum Andromedæ...	74 ψ¹ dup.	25 40	14 20	4
703	30. Media ipsarum...	79 ψ² ...	26 40	*13 0	4
704	31. Sequens ipsarum...	81 ψ³ ...	27 40	12 0	4
705	32. Borealior duarum quæ sunt in ventre...	90 υ ...	♈ 2 10	17 0	4
706	33. Australior ipsarum...	85 φ ...	♓ 29 50	15 20	4
707	34. Quæ est in spina sequenti juxta caudam...	84 χ ...	♈ 0 0	+1 45	4
	INFORMATÆ.				
708	1. Præcedens de duabus borealibus quadrilateræ figuræ quæ est sub Pisce antecedente...	27 ...	♓ 1 10	− 2 40	4
709	2. Sequens earum...	29 ...	2 15	2 30	4
710	3. Præcedens australis lateris...	30 ...	0 40	5 30	4
711	4. Sequens australis lateris...	33 ...	2 20	− 5 30	4
	Southern Constellations.				
	CETUS.				
712	1. Quæ in extremitate naris...	91 λ	♈ 17 40	− 7 45	4
713	2. Sequens de tribus quæ sunt in rictu, et est in extrema maxilla...	92 α ...	17 40	12 20	3
714	3. Media ipsarum et est in ore medio...	86 γ ...	12 40	11 30	3
715	4. Præcedens de tribus et est in mento...	82 δ ...	10 30	14 0	3
716	5. Quæ est in supercilio et in oculo...	? ...	*10 10	8 10	4
717	6. Borealior hac et est quasi in capillis...	? ...	12 40	6 20	4
718	7. Præcedens hanc, et est quasi in juba...	65 ξ¹ ...	7 20	4 10	4
719	8. Borealis antecedentis lateris quadrilateræ figuræ quæ est in pectore...	72 ρ ...	3 0	24 30	4
720	9. Australis antecedentis lateris...	76 σ ...	3 20	28 0	4
721	10. Borealis sequentis lateris...	83 ε ...	6 40	25 10	4
722	11. Australis sequentis lateris...	89 π ...	7 0	27 30	3
723	12. Media de tribus quæ sunt in corpore...	52 τ ...	♓ 22 0	25 20	3
724	13. Australis ipsarum...	59 υ ...	23 0	30 50	4
725	14. Borealis de tribus...	55 ζ ...	25 0	20 0	3
726	15. Sequens duarum quæ sunt juxta caudam...	45 θ ...	19 40	*15 20	3
727	16. Antecedens ipsarum...	31 η ...	15 0	15 40	3
728	17. Borealis sequentis lateris figuræ quadrilateræ, quæ est in cauda...	19 φ² ...	11 0	−13 40	5

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	CETUS—continued.				
729	18. Australis sequentis lateris	O. 198	♓ 10 40	−14 40	5
730	19. Borealis præcedentis lateris	17 φ¹	9 20	13 0	5-4
731	20. Australis præcedentis lateris	O. 161	9 0	14 0	5-4
732	21. De duabus quæ sunt in extremis caudæ, quæ in boreali est	8 ι	4 40	9 40	3-4
733	22. Quæ in extremitate australi caudæ	16 β	5 40	−20 20	3
	ORION.				
734	1. Nebulosa quæ in capite Orionis est	39 λ dup	♉ 27 0	−*13 50	Neb.
735	2. Splendida quæ in humero dextro et est subrufa	58 α	♊ 2 0	17 0	1-2
736	3. Quæ in humero sinistro	24 γ	♉ 24 0	17 30	2-1
737	4. Quæ sub ista sequitur	32 λ	25 0	18 0	4-5
738	5. Quæ est in cubito dextro	61 μ	♊ 4 20	14 30	4
739	6. Quæ in brachio dextro	74 k	6 20	11 50	6
740	7. Sequens et bina australis lateris figuræ quadrilateræ quæ est in extremitate manus dextræ	70 ξ	6 30	10 0	4
741	8. Antecedens australis lateris	67 ν	6 0	9 45	4
742	9. Sequens borealis lateris	72 f²	7 20	8 15	6
743	10. Præcedens borealis lateris	69 f¹	6 40	8 15	6
744	11. Præcedens de duabus quæ sunt in collorobo	54 χ¹	1 40	3 45	5
745	12. Sequens ipsarum	62 χ²	*4 20	4 15	5
746	13. Sequens de quatuor quæ sunt in scapula quasi ad rectam lineam	47 ω	♉ 27 50	19 40	4
747	14. Præcedens istam	38 n²	26 20	20 0	6
748	15. Quæ adhuc hanc præcedit	33 n¹	25 20	*20 20	6
749	16. Reliqua et antecedens de quatuor	30 ψ²	24 10	20 40	5
750	17. Borealissima earum quæ sunt in pelle manus sinistræ	15 y²	20 30	8 0	4
751	18. Secunda a borealissima	11 y¹	19 20	8 10	4
752	19. Tertia a borealissima	9 o²	18 0	10 15	4
753	20. Quarta a borealissima	7 π¹	16 20	12 50	4
754	21. Quinta a borealissima	2 π²	15 10	14 15	4
755	22. Sexta a borealissima	1 π³	14 50	15 50	3
756	23. Septima a borealissima	3 π⁴	14 50	17 10	3
757	24. Octava a borealissima	8 π⁵	15 20	20 20	3
758	25. Reliqua et australissima earum quæ sunt in pelle	10 π⁶	16 20	21 30	3
759	26. Antecedens de tribus quæ sunt in cingulo	34 δ	25 20	24 10	2
760	27. Media ipsarum	46 ε	27 20	24 50	2
761	28. Sequens de tribus	50 ζ dup	28 10	25 40	2
762	29. Quæ in ensis capulo	28 η	23 50	25 50	3
763	30. Borealis de tribus conjunctis quæ sunt in ensis extremitate	{42}{45} c	26 30	*28 40	4
764	31. Media ipsarum	{41 θ¹}{43 θ²}	26 40	29 10	3-4
765	32. Australis de tribus	44 ι	27 0	29 50	3
766	33. Sequens de duabus quæ sunt sub ensis extremitate	49 d	27 40	30 40	4
767	34. Præcedens ipsarum	36 υ	*26 10	30 50	4
768	35. Splendida quæ est in extremitate pedis sinistri communis cum aqua	19 β	19 50	31 30	1
769	36. Borealior ipsarum supra talum in tibia	20 τ	21 0	30 15	4-3
770	37. Exterior sub sinistro calcaneo	29 e	23 20	31 10	4
771	38. Quæ sub dextro et sequenti genu	53 κ	♊ 0 10	−33 30	3-2
	ERIDANUS.				
772	1. Quæ post illam quæ est in extremo pede Orionis in principio fluvii	69 λ	♉ 18 20	−31 50	4-3
773	2. Borealior hac in flexu juxta suram Orionis	67 β	18 50	−28 15	4

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	Southern Constellations—continued.				
	ERIDANUS—continued.				
774	3. Sequens de duabus quæ post istam deinceps sunt	65 ψ	♉ 18 0	−29 50	4
775	4. Præcedens ipsarum	61 ω	14 40	28 15	4
776	5. Sequens duarum quæ rursus deinceps sunt	57 μ	13 10	25 50	4
777	6. Præcedens ipsarum	48 ν	*10 10	25 20	4
778	7. Sequens de tribus quæ post ipsam sunt	42 ξ	6 20	26 0	5
779	8. Media ipsarum	40 o²	*5 30	*27 0	4
780	9. Præcedens de tribus	38 o¹	2 50	27 50	4
781	10. Sequens de quatuor quæ parum deinceps distant	34 γ	♈ 27 0	32 50	3
782	11. Præcedens istam	26 π	24 20	31 0	4
783	12. Præcedens adhuc istam	23 δ	24 10	28 50	4
784	13. Præcedens de quatuor	18 ε	22 0	28 0	3
785	14. Sequens de quatuor quæ parum deinceps distantia distant	13 ζ	17 10	25 30	3
786	15. Præcedens istam	{9 ρ²}{10 ρ³}	14 50	23 50	4
787	16. Præcedens adhuc istam	3 η	12 10	*23 50	3
788	17. Præcedens de quatuor		10 30	23 15	4
789	18. Quæ in flexu fluvii est, primumque tangit pectus Ceti	1	5 10	32 10	4
790	19. Sequens istam	2	5 50	34 50	4
791	20. Præcedens de tribus quæ deinceps sunt	11 τ¹	8 50	38 30	4
792	21. Media ipsarum	16 τ⁴	13 50	38 10	4
793	22. Sequens de tribus	19 τ⁵	17 30	39 0	4
794	23. Borealis antecedentis lateris de quatuor quæ deinceps quasi quadrangulum faciunt	27 τ⁶	21 20	41 20	4
795	24. Australior antecedentis lateris	28 τ⁷	21 30	42 30	5
796	25. Antecedens sequentis lateris	33 τ⁸	22 10	43 15	4
797	26. Sequens hujus lateris et reliqua de quatuor	36 τ⁹	24 40	43 20	4
798	27. Boreali sede duabus contiguis quæ ab istis ad ortum distant	50 υ⁶	♈ 4 10	50 20	4
799	28. Australior ipsarum	52 υ⁷	5 0	51 45	4
800	29. Sequens duarum quæ deinceps post flexum sunt	43 υ⁵	♈ 28 10	53 50	4
801	30. Præcedens ipsarum	41 υ⁴	25 50	53 10	4
802	31. Sequens de tribus quæ deinceps in nonnulla distantia sunt	III 202 υ³	17 50	53 0	4
803	32. Media ipsarum	III 189 υ²	14 50	53 30	4
804	33. Præcedens de tribus	III 149 υ¹	11 50	52 0	4
805	34. Ultima fluvii et est splendida	{II 238}{II 239} dup θ Eridani	0 10	−53 30	1
	LEPUS.				
806	1. Borealis antecedentis lateris quadrangulæ figuræ quæ in auribus	3 ι	♉ *19 40	−35 0	5
807	2. Australis antecedentis lateris	4 κ	19 50	36 30	5
808	3. Borealis sequentis lateris	7 ν	21 20	35 40	5
809	4. Australis sequentis lateris	6 λ	21 20	36 40	5
810	5. Quæ in mento est	5 μ	19 10	39 15	4-3
811	6. Quæ in extremitate anterioris sinistri pedis	2 ε	16 10	45 15	4-3
812	7. Quæ in medio corpore	11 α	25 50	41 30	3
813	8. Quæ sub ventre	9 β	*24 20	44 20	3
814	9. Borealior duarum, quæ sunt in posterioribus pedibus	15 δ	♊ 1 0	44 0	4-3
815	10. Australior ipsarum	13 γ	♉ 29 0	45 50	4-3
816	11. Quæ in lumbis	14 ζ	♊ 0 30	38 20	4-3
817	12. Quæ in extremitate caudæ	16 η	2 40	−38 10	4-3

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	CANIS MAJOR.				
818	1. Quæ in ore fulgentissima est, et vocatur Sirius, et est subrufa	9 α	♓ 17 40	−39 10	1
819	2. Quæ in auribus	14 θ	19 40	35 0	4
820	3. Quæ in capite	18 μ	21 20	36 30	5
821	4. Borealis duarum quæ sunt in collo	23 γ	23 20	37 45	4
822	5. Australis ipsarum	20 ι	23 20	37 45	4
823	6. Quæ in pectore	15 π¹	20 20	40 0	4
824	7. Borealis duarum quæ sunt in genu dextro	8 ν³	16 10	41 15	5
825	8. Australior ipsarum	7 ν²	16 0	42 30	5
826	9. Quæ in extremitate anterioris pedis	2 β	11 0	41 20	3
827	10. Antecedens duarum quæ sunt in genu sinistro	4 ξ¹	14 40	46 30	5
828	11. Sequens ipsarum	5 ξ²	16 10	45 50	5
829	12. Sequens duarum quæ sunt in humero sinistro	24 o²	24 40	46 10	4
830	13. Præcedens ipsarum	16 o¹	21 40	47 0	5
831	14. Quæ est in cruris sinistri radice	25 δ	26 40	48 45	3-4
832	15. Quæ sub ventre inter crura	21 ε	23 40	51 30	3
833	16. Quæ in poplite pedis dextri	13 κ	*21 0	55 10	4
834	17. Quæ in extremitate pedis dextri	1 ζ	9 40	53 45	3
835	18. Quæ in cauda	31 η	⊗ 2 10	−50 40	3-4
	INFORMATÆ.				
836	1. Quæ a septentrione capite canis	22 Monoc	♓ 19 30	−25 15	4
837	2. Australissima de quatuor quæ sunt sub posterioribus pedibus quasi ad rectam lineam	θ Columbæ	*7 0	61 30	4
838	3. Borealior hac	κ Col.	11 20	58 45	4
839	4. Borealior adhuc ista	{δ Col. = 3 Can. Maj.}	13 0	57 0	4
840	5. Reliqua et borealior de quatuor	λ	14 10	56 0	4
841	6. Præcedens de tribus quæ sunt ad occasum rerum istarum quatuor quasi ad rectam lineam	μ Col.	♉ 28 0	55 30	4
842	7. Media ipsarum	λ Col.	♊ 0 20	57 40	4
843	8. Sequens de tribus	γ Col.	2 20	*59 30	4
844	9. Sequens de duabus splendidis quæ sunt sub istis	β Col.	♉ 29 0	59 40	2
845	10. Præcedens ipsarum	α Col.	26 0	57 40	2
846	11. Reliqua et australior supradictis	ε Col.	22 10	−59 30	4
	CANIS MINOR.				
847	1. Quæ in collo	3 β	♊ 25 0	−14 0	4
848	2. Fulgens quæ est in posterioribus et vocatur Procyon	10 α	*29 10	16 10	1
	ARGO NAVIS.				
849	1. Præcedens duarum quæ sunt in extremitate navis	11 ε	⊗ 10 20	−42 30	5
850	2. Sequens earum	15 ρ Pup	14 20	43 20	3
851	3. Borealior duarum contiguarum quæ sunt supra scutulum in puppi	7 ξ Pup	8 50	45 0	4
852	4. Australior ipsarum	VII 220	8 40	46 0	4
853	5. Præcedens istarum	VII 173	5 20	45 30	4
854	6. Splendida quæ est in medio scutulo	VII 175 dup	6 20	47 15	3
855	7. Præcedens de tribus quæ sunt sub scutulo	VII 163	5 20	*49 30	4
856	8. Sequens ipsarum	3 Pup	9 20	*49 30	4
857	9. Media de tribus	VII 200 I Pup.	8 30	49 15	4
858	10. Quæ in χηνίσκου sive anserculo est	VII 277	14 0	49 50	4
859	11. Borealior duarum quæ sunt in carina puppis	{VII 99 / VII 108} group	4 0	53 0	4
860	12. Australior ipsarum	VII 68 π Pup.	4 0	−58 40	3

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	ARGO NAVIS—continued.				
861	13. Borealior earum quæ sunt in foris puppis	VII 172 f Pup.	⊗ 10 10	−*55 30	5
862	14. Præcedens de tribus quæ deinceps sunt	VIII 186 {d¹ / d² Pup / d³}	12 10	58 40	5
863	15. Media ipsarum	VII 214 c Pup.	13 40	57 15	4
864	16. Sequens de tribus	VII 254 b Pup.	16 30	57 45	4
865	17. Splendida quæ istas in foris sequitur	VII 306 ζ Pup.	21 0	*58 20	2
866	18. Præcedens de duabus obscuris, quæ sunt sub splendida	VII 253 a Pup.	18 10	60 0	5
867	19. Sequens ipsarum	Lac. 3128	21 0	59 20	5
868	20. Præcedens de duabus quæ sunt supra splendidam dictam	VIII 21 h¹ Pup.	*23 0	56 40	5
869	21. Sequens ipsarum	VIII 35 h² Pup.	24 20	57 40	5
870	22. Borealis de tribus quæ sunt in scutulis et est quasi in malo	Lac. 3580	♌ 5 40	51 30	4-3
871	23. Media ipsarum	VIII 168 d Vel.	6 10	55 40	4-3
872	24. Australis de tribus	VIII 139 c Vel.	4 0	57 0	4-3
873	25. Borealis de duabus contiguis quæ sunt sub istis	VIII 176 a Vel.	9 10	60 0	4-3
874	26. Australior ipsarum	VIII 155 b Vel.	9 0	61 15	4-3
875	27. Australis de duabus, quæ sunt in medio malo	VIII 145 β Pyx	0 0	*51 30	3
876	28. Borealior ipsarum	VIII 162 a Pyx	⊗ 29 20	49 0	3
877	29. Præcedens de duabus quæ sunt in extremitate mali	VIII 193 γ Pyx	28 0	43 20	4
878	30. Sequens ipsarum	VIII 220 δ Pyx	29 0	43 30	4
879	31. Quæ est sub tertia in sequento scutulo	IX 1 λ Vel.	♌ *14 0	54 30	2
880	32. Quæ in abscissione fororum est	IX 116 ψ Vel.	17 30	51 15	2-3
881	33. Quæ inter gubernacula in carina	VII 135 σ Pup.	⊗ 11 10	63 0	4
882	34. Sequens istam obscura	VII 235 P. Pup.	19 0	64 30	6
883	35. Splendida sequens istam sub foris	γ Vel.	♌ 0 0	63 50	2
884	36. Splendida quæ ad meridiem istius est in inferiore carina	χ Car.	8 30	69 40	2
885	37. Antecedens de tribus, quæ istam sequuntur	o Pup.	15 0	65 40	3
886	38. Media ipsarum	δ Vel.	21 20	65 50	3
887	39. Sequens de tribus	f Car.	26 0	67 20	2
888	40. Præcedens de duabus sequentibus has juxta abscisionem	κ Vel.	♍ 1 0	62 50	3
889	41. Sequens ipsarum	N. Vel.	8 0	*62 15	3
890	42. Antecedens de duabus quæ sunt in boreali et præcedenti gubernaculo	V 315 = η Col.	♓ 4 0	65 50	4-3
891	43. Sequens ipsarum	VI 205 ν Pup.	20 10	65 40	3-2
892	44. Præcedens duarum reliquarum in gubernaculo et vocatur Canopus	α Argus	17 0	75 0	1
893	45. Reliqua et sequens ipsarum	τ Pup.	29 0	−71 45	3-2
	HYDRA.				
894	1. Australis duarum præcedentium de quinque quæ sunt in capite et est in naribus	5 σ	⊗ 14 0	−15 0	4
895	2. Borealior ipsarum et est supra oculum	4 δ	13 20	*13 10	4
896	3. Borealis de duabus sequentibus et est quasi in cranio	11 ε	15 20	11 30	4
897	4. Australior ipsarum et est in oris hiatu	7 η	15 30	*14 45	4
898	5. Quæ omnes istas sequitur et est quasi in mento	16 ζ	17 50	*12 0	4
899	6. Præcedens duarum quæ sunt in radice colli	18 ω	20 20	11 50	4
900	7. Sequens ipsarum	22 θ	23 20	13 40	4
901	8. Media de tribus quæ deinceps in flexu colli sunt	32 τ²	28 50	15 20	4
902	9. Sequens de tribus	35 ι	♌ 0 40	14 50	4
903	10. Australissima ipsarum	31 τ¹	⊗ 28 30	17 10	4
904	11. Borealis et obscura de duabus contiguis quæ sunt ab austro	{LL. 18657 / W. 9h 439}	29 10	−19 45	6

No. in Baily.	Ptolemy.	Modern name.	Long.	Lat.	Mag.
	Southern Constellations—continued.		° ′	° ′	
	HYDRA—continued.				
905	12. Splendida de duabus contiguis	30 a	♌ 0 0	—*23 0	2
906	13. Præcedens de tribus sequentibus post flexum	38 κ	6 0	26 30	4
907	14. Media ipsarum	39 υ¹	8 40	26 0	4
908	15. Sequens de tribus	40 υ²	11 10	*23 15	4
909	16. Præcedens de tribus quæ deinceps quasi ad rectam lineam sunt	42 μ	18 0	24 40	3
910	17. Media ipsarum	φ (2 Crat.)	20 0	23 0	4
911	18. Sequens de tribus	ν (4 Crat.)	23 0	22 10	3
912	19. Borealis de duabus quæ sunt post basim Crateræ	(11 β Crat.)	♍ 1 30	25 45	4-3
913	20. Australior ipsarum	χ¹ (9 Crat.)	2 20	30 10	4
914	21. Præcedens de tribus post istas quæ sunt quasi in triangulo	ξ (19 Crat.)	12 10	31 20	4
915	22. Media et australior ipsarum	o (25 Crat.)	14 30	33 10	4
916	23. Sequens de tribus	β (28 Crat.)	16 10	31 20	3
917	24. Quæ post corvum est prope caudam	46 γ	♎ 0 0	13 40	4-3
918	25. Quæ in extremitate caudæ	49 π	13 30	— 17 40	4-3
	INFORMATÆ.				
919	1. Quæ a meridie capitis	30 Mon	♋ 12 30	— 23 15	3
920	2. Sequens eas quæ in collo sunt non multum ab illis distans	{24 Sextan / 15 a Sextan}	♌ 11 0	*10 10	3
	CRATER.				
921	1. Quæ in basi Crateræ est communis cum Hydro	7 a	♌ 26 20	23 0	4
922	2. Australior de duabus quæ sunt in medio Crateræ	15 γ	♍ 2 30	19 30	4
923	3. Borealior ipsarum	12 δ	0 0	18 0	4
924	4. Quæ est in australi arcu oris	27 ζ	7 0	18 30	4-3
925	5. Quæ est in boreali arcu oris	14 ε	♌ 29 20	13 40	4
926	6. Quæ est in ansa australi	30 η	♍ 9 10	16 10	4-5
927	7. Quæ est in ansa boreali	21 θ	*1 40	— 11 50	4
	CORVUS.				
928	1. Quæ in rostro communis cum Hydro	1 a	♍ 15 20	— 21 40	3
929	2. Quæ est in collo juxta caput	2 ε	14 20	19 40	3
930	3. Quæ in pectore	5 ζ	16 40	18 10	5
931	4. Quæ in antecedente dextraque ala	4 γ	13 30	14 50	3
932	5. Præcedens de duabus quæ sunt in ala sequenti	7 δ	16 40	12 30	3
933	6. Sequens ipsarum	8 η	17 0	11 45	4
934	7. Quæ in extremo pede communis cum Hydro	9 β	20 30	— 18 10	3
	CENTAURUS.				
935	1. Australissima de quatuor quæ sunt in capite	2 g	♎ 10 30	— 21 40	5-4
936	2. Borealior ipsarum	4 h	10 0	18 50	4
937	3. Antecedens de duabus reliquis et mediis	1 i	9 10	20 30	4-3
938	4. Sequens ipsarum et reliqua de quatuor	3 k	10 0	20 0	5-4
939	5. Quæ in sinistro antecedentique humero	XIII 53 ι	6 10	25 40	3
940	6. Quæ in humero dextro	5 θ	15 40	22 30	3
941	7. Quæ in sinistra scapula	XIII 99 d	9 10	27 30	4
942	8. Borealior de duabus præcedentibus quæ sunt in Thyrso	XIV 40 ψ	18 0	22 20	4
943	9. Australior ipsarum	XIV 55 a	19 10	23 45	4
944	10. De reliquis duabus quæ est in extremo Thyrsi	XIV 150 c¹	22 0	18 15	4
945	11. Reliqua et australior hac	XIV 141 b	22 30	20 50	4
946	12. Præcedens de tribus quæ sunt in dextro latere	XIII 197 v	13 20	28 20	4-3
947	13. Media ipsarum	XIII 198 μ	14 0	29 20	4-3
948	14. Sequens de tribus	XIII 246 φ	15 10	— 28 0	4-3

No. in Baily.	Ptolemy.	Modern name.	Longitude.	Lat.	Mag.
	Southern Constellations—continued.		° ′	° ′	
	CENTAURUS—continued.				
949	15. Quæ est in dextro brachio	XIII 288 χ	♎ 16 20	— 26 30	4-3
950	16. Quæ in dextro cubito	XIV 109 η	22 50	25 15	3
951	17. Quæ in extremitate manus dextræ	XIV 216 κ	27 30	24 0	4
952	18. Splendida quæ est in conjunctione humani corporis	XIII 231 ζ	18 0	33 30	3-2
953	19. Sequens de duabus obscuris, quæ sunt borealiores hac	XIII 267 v²	17 40	31 0	5
954	20. Præcedens ipsarum	XIII 249 v¹	16 50	30 20	5
955	21. Quæ est in principio scapulæ	ω cum	12 10	34 50	5
956	22. Antecedens hanc in dorso equi	f	9 0	37 40	5
957	23. Sequens de tribus quæ sunt in lumbis	γ	5 50	40 0	3
958	24. Media ipsarum	τ	5 0	40 20	4
959	25. Antecedens de tribus	σ	2 40	41 0	5
960	26. Præcedens de duabus contiguis quæ sunt in crure dextro	δ	2 40	46 10	3
961	27. Sequens ipsarum	ρ	3 30	46 45	4
962	28. Quæ in pectore sub axilla equi	M	18 20	40 45	4
963	29. Præcedens de duabus quæ sunt sub ventre	ε	16 20	43 0	2
964	30. Sequens ipsarum	Q	17 40	43 45	3
965	31. Quæ est in poplite pedis dextri	γ Crucis	10 0	51 10	2
966	32. Quæ est in talo ejusdem pedis	β Crucis	15 20	51 40	2
967	33. Quæ sub poplite sinistri pedis	δ Crucis	6 20	55 10	4
968	34. Quæ in sura ejusdem pedis	α Crucis	11 10	55 20	2
969	35. Quæ in extremo anterioris dextri pedis	α Centauri	♍ 8 20	*44 10	1
970	36. Quæ in genu sinistri pedis	β Centauri	♎ 24 40	45 20	2
971	37. Quæ est extra sub dextro posteriore pede	μ Crucis	14 40	—49 10	4
	LUPUS.				
972	1. Quæ in extremo posteriore pede apud manum Centauri	XIV 211 β	♎ 28 0	— 24 50	3
973	2. Quæ in poplite ejusdem pedis	a	25 50	29 10	3
974	3. Præcedens de duabus quæ sunt in scapula	XV 31 δ	♍ 1 0	21 15	4
975	4. Sequens earum	XV 98 γ	4 10	21 0	4
976	5. Quæ in medio feræ corpore	XV 35 ε	3 0	25 10	4
977	6. Quæ in ventre sub latere	λ	0 10	27 0	5
978	7. Quæ in crure	XV 242 π	0 40	29 0	5
979	8. Borealior de duabus quæ sunt juxta radicem cruris	μ	4 40	28 30	5
980	9. Australior ipsarum	κ	3 40	30 10	5
981	10. Quæ in extremis lumbis	ζ	5 40	33 10	5
982	11. Australis de tribus quæ sunt in extrema cauda	ρ?	♍ {20 20 / *26 0 / 22 0}	31 20	4
983	12. Media de tribus	ι	*21 50	30 30	4
984	13. Borealior ipsarum	{XIV 66 τ¹ / XIV 67 τ²}	23 0	29 20	4-3
985	14. Australior de duabus quæ sunt in collo	XV 217 η	♍ 8 50	17 0	4
986	15. Borealior ipsarum	XV 248 θ	9 20	15 20	4-3
987	16. Præcedens de duabus quæ sunt in rictu	XV 174 Fl.5 χ	5 40	13 20	4
988	17. Sequens ipsarum	XV 204 ξ	6 40	11 50	4
989	18. Australior de duabus quæ sunt in anteriore pede	XV 10 Fl.1 i	♎ 27 20	*11 30	4-3
990	19. Borealior ipsarum	XV 22 Fl.2 f	*27 30?	—10 0	4-3
	ARA.				
991	1. Borealior de duabus quæ sunt in basi	σ	♍ 27 40	— 22 40	5
992	2. Australior ipsarum	θ	♐* 3 0	25 45	4
993	3. Quæ est in media aræ	α	♍*26 10	26 30	4-3
994	4. Borealis de tribus quæ sunt in foco	ε¹	20 40	—30 20	5

Catalogue I—continued.

No. in Baily.	Ptolemy.	Modern name.	Long.	Lat.	Mag.
	Southern Constellations—continued.				
	ARA—continued.		° ′	° ′	
995	5. Australior reliquarum et contiguarum duarum....	γ	♏25 10	− 34 10	4–3
996	6. Borealior ipsarum........	β	25 0	− 33 20	4
997	7. Quæ est in extremitate.........	ζ	20 50	−*34 0	4
	CORONA AUSTRALIS.				
998	1. Antecedens extra australem arcum........	{XVIII 73 δ¹ {XVIII 76 δ²} Tel.	♐ 9 10	− 21 30	4
999	2. Quæ ipsam sequitur et est in corona........	{XVIII 166 η¹ {XVIII 169 η²}	11 40	21 0	5
1000	3. Quæ istam sequitur........	Lac. 7909	13 10	20 20	5
1001	4. Sequens adhuc istam.........	XVIII 250 ζ..	14 50	20 0	4
1002	5. Quæ post istam est ante Sagittarii genu.....	XVIII 291 δ..	16 10	18 30	5
1003	6. Quæ post istam est borealior quam fulgens quæ est in genu......				
1004	7. Borealior hac........	XVIII 305 β...	17 0	17 10	4
1005	8. Adhuc borealior ista......	XVIII 300 α..	*16 50	16 0	4
1006	9. Sequens de duabus præcedentibus istam in boreali arcu......	XVIII 280 γ...	16 30	15 10	4
1007	10. Præcedens de duabus obscuris.........	XVIII 230 ε..	15 10	15 20	6
1008	11. Hanc etiam satis præcedens.........	XVIII 222 ν..	14 40	14 50	6
1009	12. Adhuc istam præcedens..........	XVIII 142 λ..	11 50	*14 40	5
1010	13. Reliqua et australior quam supradicta......	Lac. 7748	9 40	15 50	5
		XVIII 85 θ....	9 10	− 18 30	5
	PISCIS AUSTRINUS.				
1011	1. Quæ est in ore, est eadem cum principio aquæ...				
1012	2. Præcedens de tribus quæ sunt in australi capitis circumferentia.....	24 α	♒ 7 0	−*20 20	1
1013	3. Media ipsarum.........	17 β	0 40	20 20	4
1014	4. Sequens de tribus.........	22 γ	4 10	22 15	4
1015	5. Quæ est ad branchias.........	23 δ	5 20	22 30	4
1016	6. Quæ est in dorsali australique spina........	18 ε	4 20	16 15	4–3
1017	7. Sequens de duabus quæ sunt in ventre......	14 μ	♓ 25 10	19 30	5
1018	8. Antecedens ipsarum.........	ζ	♒ 1 10	15 10	5
1019	9. Sequens de tribus quæ sunt in boreali spina.....	16 λ	♓ 28 50	14 40	5
1020	10. Media ipsarum.........	12 η	25 10	15 0	4
1021	11. Præcedens de tribus.........	10 θ	21 50	16 30	4
1022	12. Quæ in extrema cauda.........	9 ι	21 0	18 10	4
		γ Gruis	20 10	− 22 15	4
	INFORMATÆ.				
1023	1. Præcedens de tribus splendidis antecedentibus Piscem....				
1024	2. Media ipsarum.........	α Micros	♓ 8 0	− 22 20	3–4
1025	3. Sequens de tribus.........	γ Micros.	11 10	22 10	3–4
1026	4. Præcedens hanc et est obscura.........	ε Micros.	14 0	21 10	3–4
1027	5. Australior de duabus reliquis quæ sunt in septentrione........	XX 445	12 0	20 50	5
1028	6. Borealis ipsarum........	XXI 12	13 50	17 0	4
		24 A Capric...	13 50	− 14 50	4

CATALOGUE II.

Ptolemy's Catalogue Compared with Modern Observations Reduced to Epoch A. D. 100.

The first column gives the number of the star in Baily's edition; the second, Ptolemy's number; the third, Ptolemy's longitude in degrees and minutes with some alternative readings; the fourth, Ptolemy's latitude with some alternative readings; the fifth column gives Ptolemy's magnitude; the sixth column gives the modern name; the seventh and eighth columns give the longitude and latitude of the identified stars for the epoch A. D. 100, reduced from Piazzi's Catalogue, with the exception of the stars in Danckwortt's Catalogue (*Vierteljahrsschrift der Astronomische Gesellschaft, 1881*); and those in the catalogue of Neugebauer (*Sterntafeln von 4000 vor Chr. bis zur Gegenwart nebst Hilfsmitteln zur berechnung von Sternpositionen zwischen 4000 vor Chr. und 3000 nach Chr., 1912*) which have been reduced from those catalogues respectively. The ninth column gives the magnitudes in the Harvard Revised Photometry, the combined magnitude being given for double stars; and the tenth and eleventh columns give the differences of the computed positions of longitude and latitude.

No. in Baily.	Ptolemy's Catalogue.				Modern name.	Computed for A.D. 100.		Magnitude in Harvard Revised Photometry.	C—Pt.	
	No.	Long.	Lat.	Mag.		Long.	Lat.		Δ Long.	Δ Lat.
		° ′	° ′			° ′	° ′		′	′
			URSA MINOR.							
1	1	60 10	+66 0	3	1 α...	62 8	+65 52	2.1	+118	− 8
2	2	62 30	70 0	4	23 δ...	64 42	69 46	4.4	+132	− 14
3	3	70 10	74 20	4	22 ε....	72 36	73 39	4.4	+146	− 41
4	4	89 40	75 40	4	16 ζ...	90 32	74 53	4.3	+ 52	− 47
5	5	93 40	77 40	4	21 η...	93 39	77 43	5.0	− 1	+ 3
6	6	107 10	72 50	5	7 β...	106 21	72 49	2.2	− 49	− 1
7	Inf. 1	116 10	74 50	2	13 γ...	114 25	75 5	3.1	−105	+ 15
8	Inf. 1	103 0	+71 10	4	5 A...	101 27	+71 14	4.4	− 93	+ 4
			URSA MAJOR.							
9	1	85 20	+39 50	4	1 o....	86 33	+40 7	3.5	+ 73	+ 17
10	2	85 50	43 0	5	2 A...	85 7	44 23	5.4	− 43	+ 83
11	3	86 20	43 0	5	4 π²...	86 17	43 46	4.8	− 3	+ 46
12	4	86 10	47 10	5	8 ρ...	87 26	47 43	5.0	+ 76	+ 33
13	5	87 40	47 0	5	13 σ²...	88 45	47 39	4.9	+ 65	+ 39
14	6	88 50	50 30	5	24 d...	89 47	51 1	4.6	+ 97	+ 31
15	7	90 30	43 50	4	14 τ...	90 58	44 23	4.7	+ 28	+ 33
16	8	92 30	44 20	4	23 h...	94 20	44 55	3.7	+110	+ 35
17	9	99 0	42 0	4	29 υ...	99 51	42 38	3.9	+ 51	+ 38
18	10	101 0	37 15?	4–5	30 φ...	102 48	38 4	4.5	+108	+ 49
19	11	100 40	35 0	3	25 θ...	101 10	35 9	3.3	+ 30	+ 9
20	12	95 30	29 20	3	9 ι...	96 32	29 35	3.1	+ 62	+ 15
21	13	96 20	28 20	3	12 κ...	97 27	28 50	3.7	+ 67	+ 30
22	14	95 40	36 0	4	18 e...	96 47	35 53	4.9	+ 67	− 7
23	15	95 50	33 0	4	15 f...	96 41	33 17	4.5	+ 51	+ 17
24	16	107 10	49 0	2	50 α...	108 36	49 34	1.9	+ 56	+ 34
25	17	112 10	44 30	2	48 β...	112 47	44 55	2.4	+ 37	+ 25
26	18	123 10	51 0	3	69 δ...	124 17	51 29	3.4	+ 67	+ 29
27	19	123 0	+46 30	2	64 γ...	123 44	+46 59	2.5	+ 44	+ 29