THE GEM

OF THE

ASTRAL SCIENCES,

OR

MATHEMATICS OF CELESTIAL PHILOSOPHY;

WITH

IMPROVED FORMULÆ,

AND ALL THE RULES OF CALCULATIONS USED THEREIN;

NEW AND EXPEDITIOUS

TABLES OF RIGHT ASCENSIONS & DECLINATIONS OF THE PLANETS,

AND

FOUR LARGE COPPER-PLATES,

WITH AMPLE INSTRUCTIONS, ILLUSTRATING THE USE AND CONSTRUCTION OF THE CELESTIAL PLANISPHERES;

ALSO,

AN ORIGINAL TREATISE

ON

PERFORMING THESE CALCULATIONS FOR AUSTRALIA, NEW ZEALAND, VAN DIEMAN'S LAND, AND ALL OTHER PLACES IN THE SOUTHERN HEMISPHERE;

WITH MUCH USEFUL INFORMATION, NOT TO BE FOUND IN ANY OTHER BOOK YET EXTANT.

DEDICATED TO THE RIGHT HON. SIR ROBERT PEEL, BARONET.

BY

THOMAS OXLEY, Esq.

CIVIL ENGINEER, LONDON.

LONDON:

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DEDICATION.

To the Right Honourable Sir ROBERT PEEL, Baronet,

In admiration of his great acquired and natural talents,—for his strong attachment to and promotion of the arts and sciences, of commerce and manufactures,—as a testimony of his moral virtues both as a private citizen and the most eminent of statesmen,—and in approbation of his magnanimity and unparalleled patriotism in sacrificing his own inclinations and private interests for the advancement of his country's welfare, this Work is most humbly and respectfully dedicated by

His obedient humble servant and well-wisher,

THOMAS OXLEY,
Civil Engineer.

London, September 20th, 1848.

PREFACE

TO THE FIRST EDITION

OF

THE CELESTIAL PLANISPHERES,

OR

ASTRONOMICAL CHARTS.

We are informed by the Sacred Writings, that in the primitive ages of the world men lived to the very protracted ages of several hundred years; but with very few exceptions their lives appear to have been so uniform and monotonous, their achievements so few, and the works they performed were accomplished in so tedious a manner, that we can have no doubt that we moderns pass through as great vicissitudes, and even accomplish more, in the space of forty or fifty years, than the ancients did in the whole course of their lives. For my own part, I am strongly persuaded, although our lives are so much shorter than those of the ancients, that our faculties for the enjoyments of life are greatly increased, and very far superior to theirs; that our means of accomplishing whatever we desire, whether for expediting the works of labour, the enterprises of merchandise, or for the acquisition of knowledge, are so multiplied and improved, that we can do more in a few months than the ancients could in the space of several years. Were it necessary to enumerate examples, I should only have to mention the wonders performed by the printing press and the steam engine. With these reflections in my mind, and in this age of improvement, I should have been surprised that the work which I now first offer to the notice of the scientific world had not been brought forward some years ago by some ingenious person and friend of science; but

knowing, as I do by experience, that although it is so easy and pleasant to use the Planispheres which I now offer for your service, to construct them was a work of considerable labour and difficulty, which, no doubt, is the reason the work was never before made public: for it appears, that about thirty-six years ago a learned and ingenious gentleman, Mr. Ranger, of London, invented a Planisphere*; but what it was I know not, having never seen it; neither could I obtain the least information of its construction, as I shall plainly shew in the first Chapter of this Treatise; I therefore claim the honou of the invention of what I now publish, with as much right and reason as Lord Napier claimed the invention of his Logarithms (Σ†); and I may fairly add, that these Planispheres will be found as

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* Mr. Ranger never published any account of his discovery, but turned it to his pecuniary advantage by calculating the Nativities of the nobility and wealthy gentry, by whom he was well remunerated; and he only taught a few such persons the use of his Planispheres, receiving a very large recompense from each person. This information I received from Mrs. Ranger, the widow of the late Mr. Ranger aforesaid, whom I have met several times since the year 1840.

(Σ †) About sixteen years before I published the first Edition of the Celestial Planispheres I could only hear of three or four persons in London who knew any thing of the use and construction of Ranger's Genethliacal Planispheres. I applied to them, but they would not even let me see what sort of things they were unless I first paid down five guineas, and then they would have taught me the construction and method of using them. As I found that I should have to pay another five guineas for the Zodiac, or else have the trouble of constructing it and any other Instruments that might be required, this determined me to decline taking instruction, and made me resolve to proceed with and complete the experiments on the Planispheres, which I had long before begun: success crowned my endeavours, and the result was the Book and the Celestial Charts, which I first published in the year 1830. This affair has a great similitude to Lord Napier's discovery of his Logarithms; for his Lordship had heard that a new invention had then lately been made in Denmark by the Mathematician and Astronomer Longomontanus, to save the tedious multiplications and divisions then made use of in

useful for the purposes to which they are applied as the logarithms are in their way: and, moreover, I have taken great pains to render them generally useful both to those who study Modern Astronomy, and to those who study the Elementary Philosophy of the ancients, commonly called Astrology. The first-mentioned will have a work well worth their purchase money; and in regard to the latter, they will find the work of inestimable value. The author of the Planispheres well knows that the publication of this work will expose him to the sneers of the ignorant and envy of the malevolent; *they will call him an Astrologer, &c., but he regards them not;* and it will be the signal for those who are troubled with the *Cacoëthes Scribendi* to pour forth the torrents of their venom through the channels of various periodicals; they will glory in the opportunity, or the pretext it may afford them, to display their rhetorical flourishes in declaiming against the Science of Planetary Influences; but as I do not publish this work with the design of offending any person, therefore I intend not to suffer myself to be offended by any one. I do not wish to induce any one to believe any thing against his own opinion, for, as the poet says,

"A man convinced against his will
Retains the same opinion still."

And I have often observed that those persons are always the loudest in their abuse of Astrology who know nothing at all of the Science but the name only, however learned they may be in other arts and sciences. I will just ask such persons, would they not think the conduct of any person extremely ridiculous in setting himself up for a judge in the operations of surgery and of the practice of medicine, when he was entirely ignorant of both? Neither must he imagine, however clever he may be in other matters, that he can become a

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performing Astronomical Calculations. Lord Napier could learn no more from his informant, Dr. Craig, than that it was done by some sort of proportional numbers. After a few weeks had passed Dr. Craig called again, and his Lordship shewed him a draft of his Canon Mirabilis Logarithmorum, which, with some alterations, he printed in 1614. Thus we see that a man of studious mind and industrious habits, from a very slender hint, will proceed to the discovery and perfecting of Inventions of the most useful and curious nature.

competent judge of the Science by perusing Sibly's Astrology once over,—let all such persons know this truth; and although a single perusal may enable an orator to praise or to condemn, to tear in tatters or to adorn with the flowers of rhetoric, it nevertheless requires some years of study, of practice, and of attentive observation, to make a man a competent judge of the merits of any particular art or science.

I have further to observe, that on one subject it is highly proper that both the friends and enemies of Astrology should be set right. I allude to what are commonly called *Astrological Calculations*, when, in fact, there are no Astrological Calculations; for the calculations erroneously so called are most evidently as purely Astronomical as the taking the altitude of the Sun, or of clearing the observed distance of the Moon from the effects of Parallax and Refraction.

And as regards the predicting of Events by the configurations of the heavenly bodies, whatever opinions I myself entertain on these subjects are founded on facts, and upon many years' study, calculation, and observation; and, if I thought it proper or convenient, I could produce many well-authenticated instances of various accidents having been predicted for many years beforehand by Planetary Configurations; but the one which I have recorded in the ninth Chapter of the Second Part of this Work (§ 3) would weigh more in my mind in favour of the Predictive Science than all the bigotted and flimsy arguments that the Anti-Astrologic Orators could bring against it. But notwithstanding what I have just advanced, agreeably to my New Theory, which is contained in the concluding Chapter (§ 4) of this Book, predictions derived from the positions and configurations of the Planets may really come to pass, and that entirely independent of any planetary influence whatever, being founded on principles strictly mathematical.

(§ 3) and (§ 4). The two Chapters here referred to are by far too long to insert in this Book: but, if the Reader wishes for proofs of the verity of the Astral Sciences, he will find some of very modern date, as remarkable and as powerful as could well be desired, recorded in the 25th Chapter of this "Gem of the Astral Sciences," particularly Section § 611 A.

The Author is too well acquainted with the ways of the world, and the failings of mankind, not to know well that whoever publishes any thing curious or useful may certainly calculate upon having a host of enemies and detractors: the ignorant will be so through bigotry and lack of knowledge, and the envious through want of candour to acknowledge merit; he, therefore, does not expect to fare better than other authors. He now reiterates what he has before remarked,—that he does not publish this work with the wish to offend any one, and therefore if after this avowal should any one traduce and disparage this performance, he will venture to predict that his publication will become a standard work, and that these Planispheres will be had in request many ages after the memory of his traducers shall have been buried in oblivion.

(The Manuscript of the Original Book was finished, and the foregoing Preface written, in the Summer of 1829.) It may be proper here to remark, that when the Author of this Book was fourteen or fifteen years old he could calculate Nativities by all usual methods, and also by the Rules of Spherical Trigonometry; but as he grew towards the years of maturity his employment as a mathematical teacher, and his experiments and inventions in Steam Navigation, made him first think of performing the aforesaid calculations in a more expeditious manner, as he could not well spare time for them; and this caused him to turn his attention to the invention of Celestial Planispheres.

T. O.

PREFACE

TO

THE GEM OF THE ASTRAL SCIENCES.

As the present book contains all the mathematical and astronomical information comprised in my first work on the Celestial Planispheres, and in the True Key, or Supplement to that Book, besides much original matter not to be found in the two books before named, nor in any other books but my own manuscripts only, it now becomes a duty both to myself and my readers to give them some information of the additions and improvements in this present Work. If I had only been desirous of saving myself trouble, I could have done so to a very great extent by causing the printers to set up chapter after chapter of and from my first two books. But being most ardently solicitous to make every improvement that time, labour, patience, and practical experience could possibly achieve, I have taken great pains, in borrowing from my former productions, not only to write every line and word over again, but in every chapter to add improvements where it was possible to do so, and by the addition of new sentences, and even entire new sections, as far as practicable to render the whole book intelligible to every capacity; for I would much rather be a plain and intelligible Author than be considered eloquent and learned, but almost incomprehensible to my readers. The first part of this Book, from Section No. 1 to Section 59, contains Instruction on the Principal Divisions of the Heavens and of the Elements of Directional Motion, agreeable to the doctrine of Ptolemy and Placidus, but expressed in my own peculiar language and according to my own knowledge and experience of these subjects, without the least reference to or imitation of what had previously been done by other authors in this department of the Astral Sciences. In regard to my new and improved Formulæ in Spherical Trigonometry also, in the first part of this Book, they cannot fail of proving of vast utility to the practical calculator who wishes to obtain very correct results by Spherics in the most expeditious manner; and as for those persons who wish to become proficients in the theory of such matters, I have mentioned the books whereby they may accomplish that desire. In reference to the Formulæ in my first published book on the Celestial Planispheres, I had not given examples of the use of some few of them; but in the present work I have given exemplifications of the

use of every one of the aforesaid Formulæ, besides adding several more new and improved Formulæ with their proper exemplifications; and moreover have preceded them by a new chapter of my own composing on the use of the Logarithms and of the Sines and Tangents, &c. And the practical application of Spherical Trigonometry and of the Logarithms is largely exemplified in various Directions and other calculations in the Geniture of the Emperor Napoleon, from Section 95 to Section 183 inclusively. The second part of my present book, namely, from Section 186 to Section 212, is not to be found in my former publications, nor in any other book that I know of: the only thing that could be considered in any way of a similar nature, are some tables for finding the Right Ascensions and Declinations of the Planets, contained in Mr. Ewing's Astronomy, printed in the year 1797; but Mr. Ewing's Tables are not at all suitable for the use of the astral student, as they only extend to six degrees of north and south latitude; and moreover, in using them, so many proportions are to be found by so many separate operations of the Rule of Three, that in practice they are extremely slow and tedious; and I have proved by experiment, that, by using suitable tables of Sines and Tangents with my new and improved Formulæ, the student can obtain the results of the calculations to the nearest second of a degree in less than half the time required by Ewing's Tables. Indeed, if Ewing's Tables would have answered our purpose, I should have gladly recommended them for the use of the student, as I have done in regard to some other tables. I should have been happy in saving myself the labour of many hundreds of calculations carried out to seconds, required in the computation of the tables now first offered by myself to the scientific public. These new abridged tables will enable the student to find the Right Ascension and Declination of a Star or Planet to nine degrees of north and south latitude, true to the nearest minute of a degree, in less than half the time and with less than half the trouble required by any other tables: they are all comprised in the short compass of seven pages; so that we have only to turn over a very few leaves in using them, which is of itself a great advantage; and they will answer the purpose far better than the tables of Right Ascensions and Declinations that have hitherto been published in thirty-six to forty large pages. In fact, these new and abridged tables to the genuine astral student are worth of themselves alone, more, and much more, than he pays for the whole of "The Gem of the Astral Sciences."

The Third Part of this Book has been very greatly improved, and the number of Examples of working Directions by the Celestial Planispheres is much greater than in my former publications, besides an entire new chapter on the mathematical construction of the Planisphere of the Zodiac and the Curves of the Polar Elevations, not given in my works beforementioned. The instruction contained in the tenth and eleventh chapters of this book will be found of very great utility for many other purposes besides the mounting and preparing of the Celestial Planispheres for use; and, being the result of much practical experience, will be equally useful to engineers, architects, and to all other persons laying down plans and projections requiring to correspond correctly to a given scale of measurement. I believe no other author has ever published any thing of this nature.

Indeed, the whole of the Third Part of this Book, or Treatise on the Use and Construction of the Celestial Planispheres, and the important Rule for the Rectification of Nativities, are perfectly original, as I never saw any treatise on the subject previous to my own book and manuscripts. I never received the least instruction from any person in this department of the mathematical sciences; but by and through my own diligence discovered the methods of constructing the Planisphere of the Zodiac and the Curve Patterns, and in the same manner perfected the system of calculation both for Zodiacal and Mundane Directions, by these elongated representations of the Sphere upon a plane surface: I accomplished all this without aid or instruction from any person. I will here observe, that Circular Planispheres have been known for many ages; but the Circular Planispheres are by no means well adapted to the purposes of Genethliacal Astronomy. And although Placidus, and after him Mr. Ashmand in his translation of Ptolemy's Tetrabiblos, or Quadripartite, has mentioned a Ptolemaic Planisphere which would be of great service in foreseeing the aspects, &c.; yet neither Mr. Ashmand nor any other author has ever been able to shew us in which of Ptolemy's books we can find any account of such a planisphere. As Ptolemy himself has nowhere mentioned in his Almagest, nor in his Tetrabiblos, any such invention, to give him the honour of such a discovery is much upon a parallel with the conduct of some of our modern writers in asserting that the ancient Greeks had railways and steam ships: there are many men learned in words and in languages who are totally destitute of the inventive faculty themselves, and who seem to feel pleasure in imputing the inventions and discoveries of their contemporaries to the ancients, as

they think this procedure gives them opportunities of displaying their superior classical erudition.

Mr. Ashmand further states in the book beforementioned, that Mr. Ranger died without making his invention public. I will further remark, that in this book I have again given my Original Rule much improved for the Rectification of the *given Times* of Nativities, with a splendid Practical Illustration of the same Rule. Though many years ago—I well remember the time—I would gladly have given ten pounds or more for so useful and important a Rule as this.

In regard to the Fourth and last part of this Book, I believe, and so do a number of my talented friends who have seen the proof sheets and copper-plates, that it cannot fail of meeting a hearty welcome from every Student of the Celestial Philosophy, as it will enable him to perform the required calculations for Australia, Van Dieman's Land, and for all places in the Southern Hemisphere, with the same facility and correctness he has been accustomed to attain in his calculations done for the Northern parts of our Globe.

I have mentioned, in the foregoing Preface to the first edition of my Astronomical Charts, that the manuscript of that very comprehensive work was written and finished in the year 1829. But I ought also to have stated that, years before that time, I had written a short Treatise of twenty-three pages, containing the chief principles of the use and construction of the said Charts, and six Examples of Directional Motion: it was not written for publication, but only by way of memorandum for my future use and guidance therein. I have it still in my possession, and it concludes with the following words:—"Finished this tract on the Celestial Planisphere on Tuesday 2d of February 1819; done at the City of Saint Marc, Kingdom of Hayti, West Indies, by T. Oxley." That little Treatise was, I may say, the parent of the great and useful work which I now present with my best wishes to the scientific public.

I will here observe that in this Book, as was quite natural to me, having been many years a mathematical teacher, &c., I have frequently used the first person singular: this is not for the love of egotism, but far from it; though I am thoroughly convinced that the class of persons most given to complain of egotism in others, is that of persons who possess very little or no abilities or talents, either natural or acquired. This Book is an Original Work in the sciences, and, as such, is as much an original invention as are my Patent American Land Clearing Machines, and Land Clearing Engines for cutting down standing

Timber level with the Ground, and which have been used in the Western World for more than a quarter of a century; or as my lately patented Self-reefing and Unreefing Paddle Wheels, the Submarine Feathering Propeller Wheels, and my Expanding and Contracting Screw Propellers, &c., for which I have obtained Patents in different kingdoms and countries. And shall I from pretended modesty not mention or claim the invention of these things*, for fear the mentioning thereof may offend some Wealthy Engineer, who has not one atom of Inventive Genius, though styled a Celebrated Engineer; and who has nothing to constitute celebrity and greatness but the great wealth and large manufactory bequeathed to him by his late talented Father! And, for similar reasons, shall I not claim my Discoveries and Inventions contained in this Book, lest I should give offence to some person who hitherto did not know a Sine from a Tangent, &c.?—or shall I be so regardless of what is due to my own honour as an Author, as to leave it in the power of any one piratically inclined to publish as his own discoveries that which alone belongs to me? Should any such person happen to become a reader of this Book, he will be immediately convinced of the great utility of dividing this Work into Sections; as he may save himself from an expensive legal process from my Solicitor, by only keeping in mind the injunction implied in the very short Section No. 551 of this volume, and which Section is to be understood as being applicable to the whole of this Original Work, entitled the "Gem of the Astral Sciences."

As what is here written is not meant to offend, I trust that no offence will be taken by any person of good intentions; but hope that the contents of this Book will prove useful to all admirers of the Astronomical Sciences.

THOMAS OXLEY, Civil Engineer, and
Patentee of the Self-Reefing and Unreefing Paddle Wheels, &c.

No. 3, Elizabeth-place, Westminster-road,
London, 21st of September, 1848.

* See Section 185 A.—For the account of Mr. Oxley's Invention and Construction of the Working Model of a Steam Boat, some nine or ten years before one was seen on the River Thames, see his correspondence with the President of the Royal Society, as given, with the full description, in No. 937 of the London Mechanic's Magazine.

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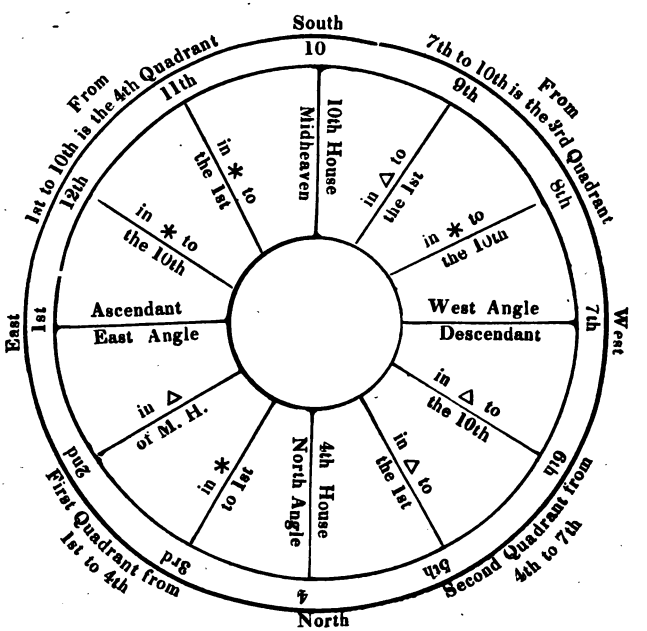
THE GEM
OF THE
ASTRAL SCIENCES.

CHAPTER I.
INTRODUCTORY OBSERVATIONS AND ELEMENTARY INSTRUCTIONS.

SECTION I.—I believe it has often been remarked, that, to do any thing well, we must not only do it carefully, but "begin at the beginning." If this observation holds true in common affairs, it applies with still greater force to books and treatises on the sciences, otherwise I would have omitted this introductory chapter, as the design of this work is not to teach the marks and characters for the signs and planets to beginners, but to furnish those students that have made some progress in the Astral Sciences with new, easy, and correct tables, instruments, and instructions for performing their calculations of Nativities, by the best and most expeditious methods yet discovered; and as the proper commencement of this part of our science is a clear knowledge of the twelve divisions of the celestial figure, I shall begin with some remarks on the following explanatory

FIGURE OF THE HEAVENS.



S. 2.—In the foregoing figure, let the circle and space in the middle represent the globe of the earth; then may the outer circle serve to represent both the zodiac, and also that circle or sphere in which the planets appear to perform one revolution round the globe in the course of twenty-four hours; and the straight lines tending towards the centre will serve to intersect or mark the degrees of the zodiac, which occupy the cusps or beginnings of each of the twelve divisions or houses of the celestial figure; and may be accepted instead of curve lines, as the representatives of the poles of the houses, which polar elevations do each correspond to a certain number of degrees of latitude on the globe of the earth; and therefore, as the numbers 1, 2, 3, 4, &c. shew the cusps or beginnings of each house, it is clear that each house comprehends all the space between the beginning of that same house and the beginning of the next following house or division of heaven: thus, all the space between No. 1 and No. 2 is the first house, and a planet situated any where between these two lines would be in the first house; the same must be understood of all the rest of the houses. But when we speak of the distance of any planet from a house or angle, that distance must be understood as being always reckoned from the cusp of the house named.

S. 3.—In this figure the signs of the zodiac are purposely omitted, because sometimes one sign and sometimes another sign of the zodiac, all of them in succession, occupy respectively each and all of the houses of the figure; but, to explain this more fully, we will suppose for a moment that we were living under the equator; then, if we suppose the beginning of the sign ♈ to be placed upon the first house or ascendant, then will the sign ♉ occupy the cusp of the second, and the sign ♊ will be upon the third house, and the sign ♋ will occupy the cusp of the fourth house, &c.; so that the first sign of the zodiac would occupy the first house of the figure, and the second sign would be upon the second house of the figure, and so in succession unto the twelfth sign of the zodiac and the twelfth house of the celestial figure: this would be the position of the heavens to those persons who inhabit the countries situated under the equator, or very near it, and are said to live in a right sphere, or in a sphere of right ascension.

S. 4.—But to those persons who live in places far removed from the equator of the world, as under fifteen, twenty, thirty, forty, fifty, or sixty degrees of latitude, the signs of the zodiac will appear to move obliquely, and they will not be equally divided by the lines called the poles of elevation of the celestial houses; for then it will sometimes happen that one sign of the zodiac will occupy the cusps of two houses; and again, two signs of the zodiac will be found included in one house of the figure: all this can be clearly shewn by the celestial globe, or by my Planispheres; but it is impossible to give a proper idea of this matter by the absurd square figure in common use, from which cause this circumstance of intercepted signs has generally been found very perplexing to beginners in this science.

Motion of the Planets.

S. 5.—All the planets move in their orbits according to the succession of the signs of the zodiac, from ♈ to ♉, and from ♉ to ♊, &c.; and this motion of the planets in their orbits is performed in a direction from the west towards the east, being the very reverse of what is called mundane motion. As to the planets being retrograde, it is only an apparent motion, occasioned by the planets being seen under a certain angle from the earth; for although it appears sometimes retrograde to us on the earth, the planet is all the while moving in its proper orbit, according to the regular succession of the signs of the zodiac.

S. 6.—But there is another motion, which, though it is apparent only as respects the planets themselves, yet to us inhabitants of the earth it is to be considered as a real motion; and this motion, which is of the utmost importance to be well understood by the student in the science of directional motion, is called the mundane motion of the planets; and it is by this motion the planets ascend in the east angle, and move on through the twelfth and the eleventh to the cusp of the tenth house, or meridian (and their being upon the cusp of the tenth house is commonly called the southing or culmination of the planets), and from the tenth house they move by the same motion to the seventh house, or west angle; and from the west angle unto the fourth house, or lower meridian, and from the fourth house, the planets move onward to the horizon, or east angle; all the varieties of mundane motion being performed in the space of one natural day, or twenty-four hours.

S. 7.—It may here be proper to observe, that the first, second, third, fourth, fifth, and sixth houses are all below the horizon, and are called nocturnal houses, because during the night, that is, after sunset and before sunrise, the sun is always posited in some of these houses; and the seventh, eighth, ninth, tenth, eleventh, and twelfth houses are above the horizon, and are called diurnal houses, because it is always day when the sun is posited in any of these six houses. It may be further well to remark, that the lengths of the diurnal and nocturnal arcs of the planets depend upon their own declinations, and the latitude of the town, city, or place.

S. 8.—The student would do well to remember all the divisions of the explanatory figure at the beginning of this chapter, as this will render easy every thing relating to the methods of calculating directions which will be found in the following chapters: it may be well to add, that the whole diurnal arc or space above the horizon is called the upper hemisphere, and the whole space below the horizon is called the lower hemisphere.

CHAPTER II.

OF ASPECTS AND DISTANCES, &c.

Of Aspects in the Zodiac.

Section 9.—An aspect is a certain distance of two planets; the sextile ⚹ in the zodiac is 60°, or two signs distant; the quintile ⚺ is 72°, or two signs and one-fifth part of two signs; the quartile □ is 90°, or three signs: the trine △ is 120°, or four signs distant; the sesqui-quadrate ⚼ is 135°, or four signs and half a sign more; the bi-quintile ⚻ is 144°, or the bi-quintile is four signs and one-fifth part of four signs. The opposition ☍ is 180°, or six signs distant: there are also two minor aspects, namely, the semi-sextile ⚺, when two planets are 30°, or one sign distant from each other; and the semi-quartile ∠ is 45°, or one sign and half a sign distant. The conjunction ☌ is when two planets are in the same sign and degree. Some authors do not call this last an aspect, but a position only.

S. 10—I have given the marks or abbreviations for the aspects here, because some of them are new characters, and are, for the sake of both neatness and brevity, engraved on the Celestial Planispheres which will accompany the third part of this book, which third part will be devoted entirely to the construction and use of the Planispheres, and the neat and expeditious mode of calculating Nativities thereby.

Of the Mundane Aspects.

S. 11.—The mundane aspects are computed by the distance of the houses from each other; thus, in mundo, the space of two houses is the mundane sextile; the space of two houses and of one-fifth part of two houses is the quintile in mundo; the space of three houses is the mundane quartile; the space of four houses is the mundane trine; the space of four houses and half a house more is the sesqui-quadrate in mundo; and one-fifth part of four houses added to the space of four houses constitute the bi-quintile in mundo. And the distance of six complete houses is the mundane opposition.

S. 12.—The same proportions hold good in respect to the mundane motions of the planets, and the aspects they form thereby; for when a certain planet is two-thirds of his semi-diurnal or two-thirds of his semi-nocturnal arc distant from the sun, moon, or any other planet, they are then in mundane sextile to each other. Two-thirds of the planet's semi-arc, added to one-fifth part of the said two-thirds, constitute the mundane quintile. The whole semi-arc is the mundane quartile of a planet. The space of the semi-arc and one-third of the next semi-arc is the mundane trine. The sesqui-

quadrate in mundo is equal to the semi-arc and half the semi-arc added to it; or, which is the same, three parts in four of the whole arc, diurnal or nocturnal, of any planet, constitute its mundane sesqui-quadrate. The space of the mundane trine, with one-fifth part of the trine added, is the bi-quintile in mundo; or, which amounts to the same thing, the bi-quintile is equal to four parts in five of a planet's whole diurnal or nocturnal arc.

S. 13.—The whole diurnal arc, or the whole nocturnal arc of a planet, is the mundane opposition of that planet; this may be easily understood, by supposing one planet posited exactly on the cusp of the first, and another posited exactly on the cusp of the seventh house: or if one planet be elevated above the horizon exactly as much as another planet is depressed below the horizon, in proportion to their semi-arcs, one being on the eastern and the other on the western side of the meridian, they are then in mundane opposition. Observe, that one-third part of a planet's semi-diurnal arc is the space of one house of that planet, and so also is one-third of the semi-nocturnal arc of the planet; and in speaking of the mundane aspects or mundane motions of the planets, the word house is to be understood not as referring to any particular sign of the zodiac, but only to one-third of the planet's semi-arc, whether reckoned in hours and minutes of time, or in degrees and minutes of the equator. Thus, when it is said that a planet is three parts in five of one house above the ascendant, in this case one-third part of the semi-arc is taken and divided by five, whereby we find out what is one-fifth part; and the fifth part, multiplied by three, gives three-fifths, or three parts in five of the semi-arc.—N.B. These remarks are not intended for the learned in the Astral Sciences, but for the benefit of those who wish to learn.

S. 14.—The explanations of the aspects here given, being so very explicit, might by some persons be thought quite sufficient for every purpose; but to prevent the possibility of mistake, in directing the Medium Cœli and the ascendant to the different mundane aspects of the planets, (for, according to the very learned Placidus, the 10th and 1st should never be directed to aspects in the zodiac, though some astrologers still continue to do so), it may be of service to shew how the same is applied to practice, by pointing out the places of the celestial figure where the aforesaid distances of the aspects fall, both from the ascendant and Medium Cœli. But we will begin with the aspects to the Medium Cœli.

S. 15.—*Sextile.* A planet on the cusp of the eighth or twelfth house, or at the distance of two-thirds of his semi-diurnal arc, will be in sextile to the midheaven. *Quintile.* A planet, when he is four parts in five of his semi-diurnal arc distant from the midheaven; or, when three parts in five of one house, either above the ascendant or above the west angle.

S. 16.—*Quartile.* When at the distance of the whole semi-diurnal arc; or, which is the same, when on the cusp of the first or the cusp of the seventh house.

S. 17.—*Trine.* When on the cusp either of the second or of the sixth house; or, which is the same, when the planet is one-third part of his semi-nocturnal arc below the east or below the west angle.

S. 18.—*Sesqui-quadrate.* When a planet is one house and half a house more below the horizon; or, which is the same, when the planet is half of his semi-nocturnal arc below the east or west angle.

S. 19.—*Bi-quintile.* When a planet is two parts in five of his semi-nocturnal arc from the Imum Cœli, or fourth house; or, when he is three parts in five of his semi-nocturnal arc below the horizon.

S. 20.—*Opposition.* A planet having the same right ascension as the fourth house, or being on the cusp of the fourth house, is in opposition to the midheaven.

Ascendant. The aspects to the ascendant fall in the following places:—

S. 21.—*Sextile.* A planet on the cusp of the eleventh, or on the cusp of the third house; or, when a planet is two-thirds of his semi-diurnal arc above, or when two-thirds of his semi-nocturnal below the horizon, he is then in sextile aspect to the ascendant.

S. 22.—*Quintile.* The quintile to the ascendant is when two houses and one-fifth part of two houses, either above or below the horizon; or when a planet is four parts in five of his semi-diurnal arc above the horizon; or when four parts in five of his semi-nocturnal arc below the horizon; or, which is the same, when a planet is one fifth part of his semi-diurnal arc from the Medium Cœli on the east side thereof; or when one-fifth part of his semi-nocturnal arc distant from the cusp of the fourth house on the east side thereof; at any of these places on the eastern side of the figure (of heavens) will a planet be in quintile aspect to the ascendant.

S. 23.—*Quartile.* A planet, when on the cusp of the tenth or fourth house, or when a planet is at the distance of his semi-diurnal arc above, or when at the distance of his semi-nocturnal arc below, the horizon, he is then in mundane quartile to the ascendant.

S. 24.—*Trine.* When on the cusp of the ninth or fifth house; or when at the distance of two-thirds of his semi-diurnal arc above, or when at the distance of two-thirds of his semi-nocturnal arc below the cusp of the seventh house, a planet will then be in trine to the ascendant.

S. 25.—*Sesqui-quadrate.* Is found at the distance of three-fourths of a planet's diurnal arc from the ascendant above the horizon, or when distant from the ascendant three-fourths of the planet's nocturnal arc below the horizon; or, which is equal to the same, when a planet is at an equal distance between the midheaven and west angle; or when equally distant between the fourth and seventh houses; or when a planet is half his semi-diurnal arc distant from the west angle above the horizon; or when he is half his semi-nocturnal arc below the west angle, he will then be in sesqui-quadrate to the ascendant.

S. 26.—*Bi-quintile.* When a planet is two parts in five of his

semi-diurnal arc above the west angle, or when he is two parts in five of his semi-nocturnal arc below the west angle; or when a planet is three parts in five of his semi-diurnal arc from the tenth house towards the west; or when a planet is three parts in five of his semi-nocturnal arc from the cusp of the fourth house towards the west; he is then in bi-quintile to the ascendant.

S. 27.—*Opposition.* A planet on the cusp of the west angle is in opposition to the ascendant. Remember that all these aforesaid proportions hold good in directing the planets to all the different directions of each other, both in zodiac and in mundo.

S. 28.—This explicit recapitulation of the places of the aspects will be of great service to enable the student, without hesitation, to compute the aspects, or, as they are commonly called, directions in mundo, in the most easy and convenient manner; for in the practice of calculating the Directions of a nativity, it will be sometimes most convenient to take the distances of the planets from one angle and sometimes from another angle of the figure.

S. 29.—It will be an excellent exercise for the student, if he will describe a circle four or five inches in diameter, then divide it into twelve equal parts, and number them 1, 2, 3, 4, 5, &c., for the twelve houses of the celestial figure; then take the semicircle, or circumferenter, and thereby mark off, from the cusps of the first and tenth houses, the distances of the aspects beforementioned; he will then understand in the clearest manner the places and positions of the different aspects, and the process of doing this will immediately imprint the whole very strongly upon the memory. Note.—The brass semicircle, or the circumferenter, is always found in a good case of pocket drawing instruments, and has the integral degrees of the circle engraved upon it.

S. 30.—Observe also, that the midheaven, or tenth house, the eleventh, twelfth, first, second, and third houses of the figure, are called the eastern or ascending part of the heaven; and the ninth, eighth, seventh, sixth, fifth, and fourth houses constitute the descending or western part of heaven. Further observe, that the distances of planets from the tenth and fourth houses are taken in degrees and minutes, &c., of right ascension. The distances of planets from the ascendant are taken in degrees, &c., of oblique ascension; and the distances from the seventh house are taken in degrees, &c. of oblique descension. Or,

S. 31.—If a planet be posited between the cusps of the first and fourth houses, its distance of right ascension from the fourth, taken from its semi-nocturnal arc, will be its oblique distance from the first house.

S. 32.—Or if the planet be situated any where between the first and tenth houses, its right distance from the tenth, subtracted from the semi-diurnal arc of the planet, will be its oblique distance above the first.

S. 33.—Or if a planet be posited between the tenth and seventh houses, its distance in right ascension from the cusp of the tenth,

subtracted from its semi-diurnal arc, will be its distance in oblique descension above the cusp of the seventh.

S. 34.—Or if a planet be situated any where between the cusps of the fourth and seventh houses, the planet's distance in right ascension from the fourth, subtracted from the planet's semi-nocturnal arc, will be its distance in oblique descension below the cusp of the seventh house.

S. 35.—If a planet is in the eastern houses above the horizon, subtract the right ascension of the midheaven from the right ascension of the planet, the remainder will be the planet's distance from the midheaven.

S. 36.—But if a planet be in the western part of heaven above the horizon, subtract the right ascension of the planet from the right ascension of the midheaven; the remainder will be the planet's distance from the tenth.

S. 37.—Or briefly thus, the difference of the right ascensions of the planet and midheaven will be the distance of the planet from the midheaven.

This last rule (S. 38) holds good equally with respect to finding the distances of planets from the fourth house; but to make every thing clear and easy for the student, observe, if a planet be in the ascendant, or in the second or third house, subtract the right ascension of the planet from the right ascension of the fourth house; the remainder will be the distance of the planet from the fourth house.

S. 39.—But if the planet be in the fourth, fifth, or sixth house, then subtract the right ascension of the fourth house from the right ascension of the planet; the remainder will be the distance of the planet from the fourth house.

S. 40.—The distances from the ascendant may be taken in degrees of oblique ascension, by subtracting the lesser oblique ascension from the greater, be that whichever it may, and the difference will be the planet's distance from the ascendant. Here let us note that, if the oblique ascension of the planet be the least number, then is the planet above the horizon; but if the planet's oblique ascension be greater than that of the ascendant, then is the planet below the horizon.

S. 41.—The distances from the west or seventh house may be taken in degrees of oblique descension, by subtracting the least from the greatest oblique descension; the remainder will be the planet's distance from the seventh house. It may here be well to observe, that if the oblique descension of the seventh be less than the oblique descension of the planet, then will the planet be above the horizon; but if the oblique descension of the planet be less than the oblique descension of the seventh, by being in the preceding degrees of the same sign, &c., then will the planet be below the horizon. Note.—A planet being in the sign ♈ at the time that the sign ♓ was descending on the west angle, is not an exception to this rule: for example, suppose the oblique descension of the seventh house to be 350°, and that a planet was in ♈ with 10° of oblique descension,

here we add the circle, or 360°, to the planet's oblique descension, 10°, and the sum is then 370° for the oblique descension of the planet; from which, subtracting the oblique descension of the seventh = 350°, there will remain 20°, the planet's distance in oblique descension above the seventh house.

S. 42.—Remember always to add 360° when subtraction cannot be made without it: this holds equally good both in finding the right and oblique distances of the planets from the angles and from one another. The manner of finding oblique ascensions and oblique descensions is shewn in SS. 118, 122, and 349, of this work.

It remains for us to speak of two other kinds of aspects or distances, called Parallels.

Parallels in the Zodiac.

S. 43.—The ancient authors called these Antiscions of the Planets, &c., but most modern authors call them, with much propriety, Parallels of Declination; because, when any planet arrives at a point of the zodiac where he has the same quantity of declination that some other planet has, he is then in the parallel of declination of the other planet, and is considered as deriving some influence from that planet. It matters not whether both planets have north declination or both south declination, or whether one planet be in the north declination and the other in the south declination, provided that both planets have the same number of degrees and minutes, &c. of declination; because the parallels of declination in the heavens are the lesser circles of the sphere, equally distant from the equator, just in the same manner as are the parallels of geographical latitude on the globe of the earth. For example, in the nativity of the Emperor Napoleon, the planet Venus has 20° 9′ of north declination; therefore the sun or any other planet, when arrived in 20° 9′ of declination, either north or south, will then be in the parallel of declination of Venus. Or, in the examplary nativity of T. F. Y——, Esq. (see chapter xxv), the planet Saturn is in ☊ 21° 59′, with 15° 25′ north declination; so when the sun or any other planet shall have 15° 25′ of declination, either north or south, that planet will be in the parallel of declination of Saturn, no matter where his zodiacal longitude may be. But when a planet falls in the same declination as another planet has, but of a contrary name, I distinguish this latter by the name of contra-parallel; thus, I should call 15° 25′ of south declination the contra-parallel of Saturn in that nativity. These contra-parallels are of great use in the projection of the Celestial Planispheres, as I shall clearly shew in the third part of this Treatise. Astrologers generally consider the contra-parallels of the planets to be of an evil and unfriendly nature, like that of the oppositions, particularly the contra-parallels of Saturn and Mars.

S. 44.—Observe, when the declination of any planet is less than 23° 28′ (the greatest obliquity of the ecliptic), then there will be four different places of the zodiac, where the parallels of declination will fall from that planet: two of these places will be in the northern

signs, ♈ ♉ ♊ ♋ ♌ ♍; and two in the southern signs of the zodiac, ♎ ♏ ♐ ♑ ♒ ♓; which places may be easily found, either by the common tables of declinations or by the Planisphere.

Of Mundane Parallels.

S. 45.—Mundane Parallels are proportional distances of the planets from the cusps of the four cardinal houses (the first, seventh, tenth, and fourth), according to the semi-diurnal or semi-nocturnal arcs of the planets. Thus, when one planet is the distance of one-third of his semi-diurnal arc from the midheaven, and upon the cusp of the ninth house, he would be in mundane parallel to another planet which was one-third of his semi-diurnal arc distant from the midheaven, and upon the cusp of the eleventh house; and being also two houses distant, they would be likewise in mundane sextile to each other; and in like manner planets have their mundane parallels to each other at every variety of distances, which distances are thus found by the rule of proportion :—

S. 46.—*Analogy* (exemplified in SS. 178, 419, and 420.)
As the semi-diurnal or semi-nocturnal arc of one planet
Is to its distance from a given angle or house
So is the semi-diurnal or semi-nocturnal arc of another planet
To its required distance from the same given angle or house.

Note.—The distances by right ascension from the tenth and fourth, are taken in oblique ascension from the first, and in oblique descension if from the seventh house, according to S. 30.

S. 47.—Observe, that one-third of the semi-arc, of even one-sixth of the semi-arc of each planet, may be used in working the above proportion; but I prefer using the whole semi-arc, as less liable to error in the results.

S. 48.—Note. One-sixth part of a planet's semi-diurnal arc is called its horary time diurnal, and one-third part of a planet's semi-diurnal arc is called its double horary times diurnal; and one-sixth part of a planet's semi-nocturnal arc is called its horary time nocturnal, and one-third of the semi-nocturnal arc is termed the double horary times nocturnal in the writings of Placidus de Titus and other modern authors on directional motion.

CHAPTER III.

OF PROMITTORS, SIGNIFICATORS, AND DIRECTIONS, &c. &c.

Promittors.

S. 49.—The Promittors are Saturn, Jupiter, Mars, Venus, and Mercury; these are always Promittors, or planets promising the accomplishment of some event. Sol and Luna have sometimes the name or quality of Promittors.

Significators.

S. 50.—Are Sol, Luna, ⊕, Ascendant, and Medium Cœli. Sol and Luna have, as before said, sometimes the appellation of promittors, and as such are reciprocally directed to each other, or to their own aspects (or rays). The Promittors are the planets to which other planets or significators are directed, and the significator is the planet or aspect to be directed.

Of a Direction.

S. 51.—As an aspect is a certain distance (as explained in the preceding chapter), so a direction is the space that a planet has to move onward, in order to complete the aspect. It is the calculation of these spaces which is the tedious and most laborious part of the art or science of directional motion.

Poles of the Planets.

S. 52.—When a planet is upon the cusp of the midheaven, or when upon the cusp of the fourth house, it has no polar elevation, and would be directed to any aspect in the zodiac by right ascension; but if it was upon either the cusp of the ascendant, or on the cusp of the seventh house, then it would have the same polar elevation as the place for which the figure is erected, and would be directed to directions in the zodiac by tables of oblique ascensions, &c., calculated for the latitude of the same place. But when a planet is located any where between the midheaven and the east or west angle, or when situated any where between the cusp of the fourth and east or west angle, the planet will have a polar elevation less than that of the latitude of the place for which the figure is erected. Thus, for example, the latitude of London is 51° 31′, and the pole of the eleventh and third, ninth and fifth houses, is 23° 47′; and the pole of the twelfth and second, sixth and eighth houses is 40° 52′: therefore if a planet was either upon the eleventh or third, fifth or ninth house, his polar elevation would be 23° 47′; and if a planet was upon either the cusp of the twelfth or second, or the sixth or eighth house, his pole would be 40° 52′; and if in any intermediate situation, then would the planet have an intermediate polar elevation, though not exactly in arithmetical proportion. These remarks are explanatory and introductory to this subject, as I have given very exact rules, with some suitable examples, for finding the poles of the houses and the true polar elevation of the planets, in the fifth chapter of this work.

S. 53.—Placidus and some other authors say, that, when a planet is within 3° of right ascension from the cusp of the tenth or fourth house, we should direct that planet to the aspects by right ascensions. But I do not approve of what Placidus says in this respect; because, supposing the polar elevation of a planet was only 1° of latitude, the ascensional difference for the 30th degree of ♈ would be 12′, and for the beginning of Cancer 26′ of a degree; and should

we direct, as Placidus would have us do, by right ascensions, the error in the arcs of direction would be 12′ in one instance, and 26′ in the other, even under the pole of 1°; but under the pole of 2° the error would be double. It is full as well to be more exact, particularly when we have all the instruments or means requisite, and moreover when it takes us no more trouble.

Circles of Position.

S. 54.—Some authors have, in some instances, confounded polar elevations and circles of position with each other, as though they were one and the same thing; but there is, or ought to be, a great distinction between them. The circle of position of any planet is not the pole of that planet, but it is a certain point of distance upon the equator, where the pole of the planet intersects the equator, and may always be found by the following

Analogy (exemplified in SS. 131, 331, 334, 375, 381, and 385).

As the semi-arc of a planet, diurnal or nocturnal,
Is to 90 degrees of the equator
So is the distance of the planet in right ascension from the tenth or fourth house
To the distance in right ascension of the planet's circle of position from the tenth or fourth house upon the equator.

S. 55.—Now observe, that the difference between the planet's circle of position's distance from either meridian, and the distance of the planet itself from that meridian, will be the ascensional difference of that planet, under the planet's own true pole of elevation. (See chapter xii, and S. 284, and in several other Sections.)

Of Direct and of Converse Directions.

S. 56.—Much has been said by some authors which involves this part of the science of directional motion in needless difficulty and mystery: the principle is clear enough if properly explained. Suppose in any geniture that the sun was posited on the cusp of the twelfth house (see the figure, S. 1), and that ♃ was posited in the first, second, or third house; when ♃ should have arrived by his converse mundane motion till on the cusp of the twelfth, or when ♃ would be two-thirds of his semi-diurnal arc from the tenth (or the eastern side thereof), the sun would then be said to be directed to the conjunction of ♃ in mundo by direct direction. But if the planet ♃ had been posited on the cusp of the twelfth house, and the sun had been in the first, second, or third house, and had ascended to the cusp of the twelfth, or when the sun would be two-thirds of his semi-diurnal arc from the tenth, the sun would then be in conjunction of ♃ by converse direction in mundo. (This is exemplified by a similar direction in S. 393.) These observations about the conjunction are equally applicable to the ☌ ☍ □ ☌, and to all other directions whatever.

S. 57.—The ☉ and ☽ directed to the aspects in the zodiac conversely. This is said to be done by some authors and professors;

but it is evidently absurd, and even impossible. The ☉ and ☽ are never retrograde. Then let us ask, if the ☉ were in 10° ♉ and ♂ 5° ♈, how could they make the ☉ go backward, contrary to the order of the signs, to form the conjunction with ♂? In the nativity of the Emperor Napoleon (see SS. 131 to 134), the ☉ is in 22° 43′ ♌, and ♄ in 25° 46′ ♎: the ☉ cannot go back to meet the body of ♄, or to form the conjunction in the zodiac; but ♄ can go forward, according to his proper motion in the zodiac, and come to the conjunction of the ☉ in 22° 43′ ♌. Both students and professors would do well to avoid all such errors; and remember, that the more clear and correct they are in making their calculations, to so much greater advantage will the beauties of the celestial sciences appear to all judicious and candid persons.

S. 58.—The general principles of the science of directional motion, according to Ptolemy, Placidus, Partridge, and all the best authors, both ancient and modern, are explained in the different sections of the first, second, and third chapters preceding; and are exemplified by suitable examples in the plainest manner in the following pages of this work, and, I believe, far more intelligibly than has been done by the aforesaid authors themselves. Let the student make himself proficient in the instructions herein contained, and then he will be perfectly competent to perform correctly all the calculations required in the celestial sciences, as done by the most talented students and professors of the present time.

S. 59.—Previous to giving examples of calculating the different kinds of directions in a nativity, I will give a chapter on the use of the tables of logarithmic sines and tangents, &c., and then another chapter on the most useful formulæ for obtaining the right ascensions, declinations, ascensional differences, &c., by spherical trigonometry, for the use and benefit of those students who may wish to attain the greatest possible exactness in their calculations.

CHAPTER IV.

ON THE USE OF THE TABLES OF LOGARITHMIC SINES AND TANGENTS, &c.

S. 60.—I SHALL not here attempt to shew all the uses to which these truly wonderful tables, called the logarithms of numbers, and the logarithmic sines and tangents, are applicable; this being, perhaps, much better done than I should do it, by the eminent authors who have published such tables, in the very learned essays they have prefixed to the tables. Suffice it for me here to observe, that logarithms are representative or artificial, standing for or representing the natural numbers in common use; and so contrived and constructed, that, by adding the logarithms of any two numbers together, it will answer the purpose of multiplying the same two

numbers together; for if the sum of the logarithms of any two numbers be looked for in a table of logarithms, it will be found to answer to the natural number that would have been produced by multiplying the same two numbers together by common arithmetic. And also, if we subtract the logarithm of a less number from the logarithm of a greater number, the remainder logarithm, sought in the tables, will be found to answer to the number produced by dividing the greater by the less number: this is sufficient to shew the ingenious student that a vast saving of time and trouble must result from the said tables in all sorts of astronomical calculations, where great exactness is required.

The use of the tables of logarithmic sines and tangents will be quite easy to the student if he will be pleased carefully to observe the following simple rules.

S. 61.—In all modern tables the degrees are numbered at the top of the table, in direct order, and the minutes, from 1′ to 60′, in that outside column towards your left hand, from 0° to the 44th degree complete at the top of the table; and the remainder of minutes, from from 1′ to 60′ is, as aforesaid, marked in the left side of the table, so that the 45th complete degree is found at the bottom of that page which is marked 44 degrees at the top. But from 45 degrees to the 90th degree, the degrees are numbered at the bottom of the table, and the minutes belonging thereunto are contained in the outer column on the right side of the tables.

S. 62.—Therefore, if you have got to take out from the tables the sine, cosine, tangent, or co-tangent of any arc that is less than 45 degrees, look at the top of the table for your given number of degrees, and for your given number of minutes look in the left-hand column under minutes, and opposite to the given minute, in the column marked sine, cosine, tangent, and co-tangent, will be found the sine, cosine, tangent, and co-tangent of the given degree and minute that was required to be found. *Example*:—Let it be required by the tables to find the logarithmic sine, cosine, tangent, and co-tangent of 23° 28′? Thus; we find 23 degrees at the top of the table, and in the left-hand column of minutes, opposite to 28, under sine we find 9·6001181, and under cosine 9·9625076, and under tangent 9·6376106, and under co-tangent 10·3623894: and these numbers are respectively the logarithmic sine, cosine, tangent, and co-tangent of the arc of 23° 28′, as was required.

The Emperor Napoleon was born at Ajaccio, in Corsica, the latitude of which is 41° 40′ N. Let it be required to find the sine, cosine, tangent, and co-tangent of 41° 40′; this is done by looking at the top of the table for 41 degrees, and on the left side for 40 minutes, and under sine we find 9·8226883, and under cosine 9·8733352, and under tangent 9·9493531, and under co-tangent 10·0506469, and these are in like manner the sine, cosine, tangent, and co-tangent of 41° 40′, as was required to be found.

S. 63.—But when the given arc exceeds 45°, then look for the

given number of degrees at the bottom of the table, and for the minutes in the column of minutes on the right-hand side of the table. *Example.*—Thus; the latitude of London is usually taken as 51° 31′ N. We wish to find the sine, cosine, tangent, and co-tangent for 51° 31′. We find find 51 degrees at the bottom of the table, and we next look for 31′ in the right-hand column of minutes; opposite to the said 31′, and *above* the word *sine*, in the column marked *Sine* at the bottom of the table, will be found 9·8936448; and above *cosine*, and opposite to the said 31′, will be found 9·7939907; and above *tangent* and opposite the aforesaid 31′, will be found 10·0996541; and above the word *co-tangent* and opposite the right-hand 31′, we find 9·9003459; these numbers are respectively the sine, cosine, tangent, and co-tangent of 51° 31′, which were required to be found.

To find the Arc, or Number of Degrees, &c., corresponding to a given Logarithmic Sine and Tangent, &c.

S. 64.—When two or more sines and tangents, and sines and cosines, &c., are added together, the sum, or resulting number, is the tangent, or the co-tangent, or the sine, or the cosine, as the case may be, of another arc or angle, the amount of which in degrees and minutes, &c., is required to be found in these tables of sines and tangents. To those persons who have carefully attended to the foregoing instruction this will be perfectly easy. *Example.*—If the resulting number be 9·8936448, and is by the formula to be taken as the cosine of an arc, we search for it and find it in the column of cosines, at the top of the table. It is 38 degrees, and because it is less than 45 degrees, (by SS. 61 and 62,) we look in the left-hand column for the minutes, and we find that it stands opposite 29′, therefore this number is the cosine of an arc of 38° 29′. But if the same number had been to be sought for as a sine, we should find it above the word *Sine*, for in this case the word *Sine* stands at the bottom of the same column; and also at the bottom of the table stands 51°, and therefore, (by SS. 61 and 63,) we know the minutes must be looked for in the right-hand side of the table, and thus we find the said number stands opposite to 31′: and therefore we find when this number is thus taken it answers to the sine of 51° 31′. Again, if the resulting number was 9·9003459, and was to be taken as a tangent, we should find that the word *Tangent* stands at the top of the table, under 38 degrees; and by looking in the left-hand column of minutes, as before taught, we find this number is the tangent of 31° 29′.

S. 65.—For the purposes of directional motion the nearest minute of a degree found in a table of sines and tangents is generally sufficiently exact: but if the student wish so be more exact, he has only to observe the logarithmic difference between any two given numbers for one minute of a degree, and by adding the part proportional of the logarithmic difference for the fraction of a minute to the sine or tangent of the exact degree and minute, he will have the sine

or tangent for the degrees, minutes, and seconds. But from the cosine and co-tangent of a given degree and minute he must subtract the part proportional (of the logarithmic difference), and the remainder will be the cosine or co-tangent for the required number of degrees, minutes, and seconds. The reason you subtract in the case of cosines and co-tangents is, that as the arc of a cosine or co-tangent increases, its logarithmic representative or number in the table *decreases*.

Thus, the cosine of 23° 28′ is . . . . . 9·9625076
And the cosine of 23° 29′ is a smaller number = 9·9624527

The logarithmic difference for 1 minute is . . . 549
And the part proportional for $\frac{1}{6}$ of a minute, or 10 secs., is . . . . . 92 nearly

Now if we wanted the cosine of 23° 28′ 10″ we should proceed thus:—

From the cosine of 23° 28′ . . . . . 9·9625076
Subtract the part proportional for 10 secs. 92

There remains the cosine of 23° 28′ 10″ . . . . . 9·9624984

S. 66.—But suppose we wanted the cosine or co-tangent with any number of seconds greater than 10″, as 16″, 18″, 25″, 36″, &c., then multiply the logarithmic difference of 10 seconds by the number required, cutting off the right-hand figure of the product, you will have the logarithmic difference to be subtracted.—*Example.* It is required to have the logarithmic cosine of 23° 28′ 16″? In the foregoing Example we see the proportional part for 10 seconds was 92; now 92 × 16 = 1472, and omitting the right-hand figure, we have 147, the part proportional for 16 seconds: then,

From the cosine of 23° 28′ . . . . . 9·9625076
Subtract the part proportional 147

There remains the cosine of 23° 28′ 16″ . . . . . 9·9624929

If, in using the following formulæ, the ingenious student wishes to find the degrees, minutes, and seconds corresponding to any resulting sine, cosine, tangent, or co-tangent, he has only to find the proportion for how much the sine or tangent exceeds the logarithmic number belonging to the next smaller arc in the tables. But for the cosine and co-tangent, see how much it falls short of the logarithmic number answering to the next smaller given arc in the table, and by allowing for the part proportional, he will easily find the degrees, minutes, and seconds answering to any resulting cosine or co-tangent. This supposes him to be using Tables containing these numbers to degrees and minutes only; but tables of sines and tangents have been published, such as Callet's French Tables for every degree, minute, and ten seconds, and Mr. Michael Taylor's Tables for every degree, minute, and second throughout the Quadrant; but these tables are not only too ponderous and too

voluminous, but also too expensive for the generality of astral students. Callet's Tables cost from 18*s*. to a guinea (they formerly cost double that sum), and Taylor's Tables from four to five guineas the book. In both the aforesaid books, the sines and tangents are given to seven places of figures, besides the indices or index figures. For the purposes of the Astral Sciences six figures, or even if the tables contain only five figures besides the index figures, will generally be found sufficiently exact, and can be used with much greater facility and despatch of business than can the larger tables beforementioned, except when we wish to find the results to seconds of a degree. I will in the course of this work give the student a list of the best and cheapest Tables that have been published. Note.—The index of the sine and tangent is the figure or two figures which stand on the left side, and is separated by a point from the remaining five, six, or seven figures which complete each logarithmic sine and tangent, &c.

Of Complements Arithmetical, or Co-arcs.

S. 67.—The Complement Arithmetical, or Co-arc, as it is called by way of brevity in the formulæ, being of great use in shortening the various calculations in Spherical Trigonometry, &c., for the sake of the student not conversant in this branch of the mathematics, it will be well to shew how these co-arcs are found.

If the logarithm of any number, or of any sine or tangent, &c., be less than 10·00000, or 10·000000, or than 10·0000000, &c. always adding at least as many zeros to the right of the 10· as there are decimals in the logarithm of the number, or sine, or tangent to be subtracted; but if the logarithm of the number, or of the sine or tangent, &c., be greater than 10·, subtract it from 20· with the zeros as aforesaid, in the same way as you would subtract a less from a greater number in common arithmetic, and the remainder is the co-arc required.

S. 68.—But the most expeditious way is, by beginning at the left or first figure, and subtracting each figure in succession from 9, and the last or right-hand figure from 10, except the last figure be 0, in which case subtract the last significant figure from 10, and what remains is the co-arc desired. An example or two will render this quite easy, even to those who were before unacquainted with the use of logarithms. *Example.*—Required to find the co-arc of the sine of 23° 28′.

The sine of 23° 28′ is	9·6001181
The co-arc is	0·3998819

Thus, beginning at the left, say, 9 from 9 there remains 0, and 6 from 9 there remains 3; next 0 from 9 there rests 9; and again 0 from 9 there remains 9, and 1 from 9 and there remains 8; and again 1 from 9, again we have 8 left, next 8 from 9 there remains 1, and last 1 from 10 there remains 9; and these figures placed in order make 0·3998819, the co-arc of 23° 28′, as desired. In

the next example it is required to find the co-arc for the tangent of 66° 32′, and, being greater than 10, it is therefore by the rule (see S. 67) subtracted from 20. We find that

The tangent of 66° 32′ is , ...	10·3623894
The co-arc is	9·6376106

Beginning at the left, we say, 0 from 9 and there remains 9, next 3 from 9 and there remains 6, then 6 from 9 there remains 3, and next 2 from 9 and 7 is the remainder; then 3 from 9, and 6 remains; and then 8 from 9 there remains 1, and next 9 from 9 and there remains 0; and lastly, say 4 from 10 there remains 6, which make the co-arc to be 9·6376106, just the same as if we had subtracted the tangent 10·3623894 from 20·0000000. With a little practice a person may find the co-arcs by this method with as much dispatch as they can write down the figures.

There are some tables of sines and tangents that have another column containing secants and co-secants. If your tables contain the secants, then in these formulæ, where you are directed that you may, instead of using the cosine, make use of its co-arc, or complement arithmetical, if you take the secant of the given arc less by 10, or less by radius in the index figure, it will be the same as the complement arithmetical of the cosine, and may be instantly written down instead of it, and save you the trouble of finding the co-arc of the cosine.

By the co-arcs, and the aid of the logarithms of numbers and of the sines and tangents, the rules of multiplication and division, &c., are all performed by addition and subtraction; and many very useful and important problems in Astronomy and various other branches of the mathematics resolved, with a facility and expedition far surpassing the operations of common arithmetic.

CHAPTER V.

NEW AND IMPROVED FORMULÆ,

With Precepts for the Use of those Persons who are desirous of very great Exactness in their Calculations.

S. 68.—In this chapter I will give the whole of those rules and precepts required, when the calculations for Nativities are performed by the aid of Spherical Trigonometry. Rules for the same purpose have been given in several different books which have been published; but they are generally so encumbered with a magnificent display of mathematical erudition, and continual references to the different relations, extreme and mean, of base and hypothenuse, &c., and to the Orthographic and Stereographic Projections of the Sphere, &c., as to be fit only for those persons who have gone

through a complete course of instruction in Spherics; so that they prove of little service to the practical calculators, whose only object is to obtain the correct results or answers in as little time as possible. Any thing beyond this is to them mere waste of both time and labour. I would ask, what matters it to the practical navigator, who has to work a lunar observation, to talk to him about the fluxions of spherical triangles, or of their *minute* increments and decrements? All that he wants is a correct and expeditious mode of performing his calculations.

S. 69, A.—If the student would wish to gain all the advantages of correctness and expedition which will result from the use of these Improved Formulæ, he will engrave them, which he may easily do with a steel pointrel, or graver, upon such slates as are used in schools, or, what is still better, such as are used on board a ship, called log-slates, with covers or hinges to prevent the calculations being rubbed off. The Formulæ best to be thus put upon slates are those most frequently wanted, namely, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10. When this has been done, the student may perform his calculations in less than half the time that he could do them without the Formulæ-slates. It may be proper here to remark, that rules for calculating the right ascensions and declinations of the planets, &c., have been given in books of Astronomy for ages past, but none of them had the same form and arrangement as my improved Formulæ have. The Formulæ according to my arrangement are, No. 1, 2, 3, 4, 5, 7, 8, and 9. The merit of being the author of an Improved Formula is the same as being the inventor of a new instrument or machine to be used in making things long in use; it affords more and improved facilities for doing the thing desired, and which is often a matter of much importance. Let all my readers remember these New Formulæ are my copyright, and are entered at Stationers' Hall.

S. 70.—Note. R. or Rad. signifies Radius; T. or Tan., Tangent, and C-Tan. stands for Co-tangent; Si. or Sin. for Sine, and C-Sin. for Cosine; Sec. signifies Secant, C-Sec. Co-secant: ∠ stands for Arc. or Angle, Dec. for Declination, N. North, S. South, R. A. for Right Ascension, Ob. A. or O. A. Oblique Ascension, O. D. Oblique Descension; A. X. signifies Ascensional Difference, S.D. A. Semi-diurnal Arc, and S.N. A. Semi-nocturnal Arc; Lon. or Ln. Longitude, and Lat. or Lt. Latitude; à stands for *from*, and — less, or subtract. Observe, that, in calculating by the following Formulæ, all your computations are reckoned straightforward, according to the regular succession of the signs of the zodiac, and according to the regular increase of the degrees of right ascension. This is the grand object of my improvement, and not reckoned sometimes backward and sometimes forward, as taught in other books.

S. 71.—For example, if any star or planet, &c., be in ♈ ♉ ♊, his longitude and R. A. are reckoned from 0° 0′ 0″, or from the beginning of ♈; and if a planet be in ♎ ♏ ♐, his longitude and

R. A. are reckoned from the beginning of ♋, or from 90°; and if the sun, moon, or planet be in ♎ ♏ ♐, then the longitude and R. A. are taken from the beginning, or 0° 0′ 0″, of ♎ = 180°; and lastly, if the sun, moon, or planet be in ♑ ♒ or ♓, then the longitude and R. A. are reckoned from the beginning of ♑ = 270°; therefore the result of R. A. for a planet in ♑ ♒ or ♓ added to 270°, would be the R. A. required for a planet in ♑ ♒ and ♓, and so of the rest. This mode of procedure not only renders the work of calculation much more expeditious, but will be found to prevent many mistakes that would be made in using the old formulæ.

S. 72.—Formula No 1.

Sun's Lon. given to find his R. A. (See S. 116.)

As Radius, or Sine of 90°	1	0·							
Is to C-Sin. ⊙'s greatest Decl... 23° 28′		9·	9	6	2	5	0	7	6
So is { Tan. Lon. à ♈ or ♎									
{ C-Tan. Lon. à ♋ or ♑									
To { Tan. R. A. à ♈ or ♎									
{ C-Tan. R. A. à ♋ or ♑									

S. 73.—Formula No. 2.

Sun's R. A. given to find his longitude. (See S. 125.)

As Rad.	1	0·							
To C-Sin. ..... 23° 28′..		9·	9	6	2	5	0	7	6
So is { C-Tan. R. A. à ♈ or ♎									
{ Tan. R. A. à ♋ or ♑									
To { C-Tan. Lon. à ♈ or ♎									
{ Tan. Lon. à ♋ or ♑									

S. 74.—Wishing to give the student every facility in the practical application of the instruction here given, I take the opportunity to advise, that in using the longer Formulæ (Nos. 4, 5 and 10), when you enter the tables of sines and tangents to take out the sine of longitude, take out also the cosine of longitude, &c., at the same time of opening the book, and place each in its proper place in the Formula on your slate. And when you take out the tangent of the fourth arc, then take out also the cosine of the fourth arc, or its secant less 10, that is, the secant less the radius, which write down in its proper place. And when you find the sine of declination, take out the cosine of declination, and write it down in its proper place in the Formula; and also at the same opening of your book of tables take out the tangent of declination, and write it down in its proper place in Formula No. 10, or Table of Results, to be ready for further use in finding the ascensional difference and pole of the planet, &c. Observe the same method in using the other Formulæ, as it will greatly economise both time and labour.

S. 75.—FORMULA No. 3.

Sun's Lon. given to find his Decl. (See S. 117.)

As Rad.		1	0·						
To Sin.	23° 28′		9·	6	0	0	1	1	8	1
So is Sin. Lon. à ♈ or ♎									
C-Sin. Lon. à ♋ or ♑									
To Sin. Decl.									

S. 76.—FORMULA No. 4.

Lon. and Lat. of a Planet being known, to find the R. A and Declination. (See S. 146.)

Observe { Lon. and Lat. of the same names: 90 — Lat. = first ∠
Observe { if of different names: 90 + Lat. = 1st ∠

As Rad.		1	0·						
To Sin. Lon. à ♈ or ♎									
C-Sin. Lon. à ♋ or ♑									
So is Tan.	23° 28′		9·	6	3	7	6	1	0	6
To Tan. of a 1st ∠ / 4th ∠									

which taken from the 1st ∠ leaves for 5th ∠.

For the Declination.

As C-Sin. 4 ∠ (co-arc)									
or Sec. less 10.									
To C-Sin. 5 ∠									
So is C-Sin.	23° 28′		9·	9	6	2	5	0	7	6
To Sin. of Dec.									

For the R. A.

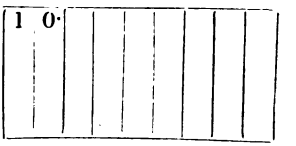
As C-Sin. Dec.									
or Sec. less 10.									
Is to C-Sin. of Lon. à ♈ or ♎									
Sin. of Lon. à ♋ or ♑									
So is C-Sin. of Lat.									
To C-Sin. of R. A. à ♈ or ♎									
Sin. of R. A. à ♋ or ♑									

The same names mean, both North or both South, and different names imply that one is North and the other South; and ♈ ♉ ♊ ♋ ♌ ♍ are north longitude, but ♎ ♏ ♐ ♑ ♒ ♓ are south longitude.

S. 77.—Formula No. 5.

Lon. and Lat. of a Planet, &c., being known, to find the R. A. and Dec.

As Rad. .....
Is to { Sin. Lon. à ♈ or ♎ .....
C-Sin. Lon. à ♋ or ♑ .....
So is C-Tan. Lat. .....
To Tan. of a 4th ∠ .....

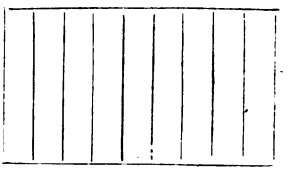


If Lat. and { both N. or both S. } { diff. } of the 4th ∠
Lon. be. { one N. and one S. } { sum }

and 23° 28′ will be the 5th ∠.

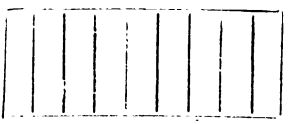
Next for the R. A.

As Sin. 4th ∠ (co-arc) .....
To Sin. 5th ∠ .....
So is { Tan. Lon. à ♈ or ♎ .....
C-Tan. Lon. à ♋ or ♑ .....
To { Tan. R. A. à ♈ or ♎ .....
C-Tan. R. A. à ♋ or ♑ .....



For the Dec.

As C-Sin. 4th ∠ (co-arc) .....
Is to C-Sin. 5th ∠ .....
So is Sin. Lat. .....
To Sin. Dec. .....



This is called the Tangent Formula for Right Ascension, because the answer is found in the table of tangents. This Formula is of excellent use in finding the R. A. of a planet with latitude, which may happen to be within only 3 or 4 degrees of 0° ♈ 0′ or 0° ♎ 0′. Even with no more than five figures besides the index, the logarithmic difference is so large, that you might, with the tangents, always find the R. A. within the second of a degree, by taking the parts proportional, as taught in SS. 65 and 66. But the R. A. comes out a sine or a cosine by Formula No. 4; you will see that the numbers in such tables will be for 2 or 3, or 4 or 5, even to 16 or 17 minutes without any logarithmic difference; and therefore you could not be certain that you were not so much wrong in writing down the arc for the R. A. required. It is seldom that any author gives more than one Rule, or Formula, for finding a planet's R. A. and Dec. with latitude, but I hope my readers will see the great utility of having the two Formulæ for their use.

S. 78.—FORMULA No. 6.

To find the Ascensional Difference of a Star or Planet, &c.

As Rad.	1	0·
Is to Tan. of the Planet's Decl.		
So is Tang. of Pole, or of Lat. of Place.		
To Sine of Asc. Diff.		

I shall here remark, for the information of such of my readers as are not conversant with the use of Mathematical Tables, that each of the Formulæ which consists of four lines only is the obtaining of an answer according to the Rule of Three logarithmetically; in which operations we add the logarithms of the second and third terms together, and from their sum we subtract the logarithm of the first term, and the remainder is the logarithmic sine or tangent, &c., of the answer required: and (Note) whenever radius or the sine of 90° is the first term, we have only to add the logarithmic expression of the second and third terms, and to reject 10 from the index of the sum. And also observe, that when radius is not the first term, but a sine or a cosine, &c., happens to be the first in the proportion, the co-arithmetical of the said first term, being added to the logarithm, &c., of the second and third terms, and rejecting Radius, or 10, from the index of their sum, gives the answer, precisely the same as if we had added the logarithms, &c. of the second and third terms, and from their sum had subtracted the logarithm, &c., of the first term, and saves us nearly half the time. Formulæ such as Nos. 4 and 5, which have each of them three different parts, are equal to three different questions in the Rule of Three.

S. 79.—FORMULA No. 7. (See SS. 104, 105.)

The Oblique Ascension given, to find the Ecliptic Longitude.

As Rad.	1	0·
Is to { C-Sin. of O. A. à ♈ or ♎		
Is to { Sin. of O. A. à ♋ or ♑		
So is C-Tan. of Lat., or Pole of House.		
To C-Tan. of a 4th ∠		

Observe, if O. A. be less than 90°, or above 270°, add 23° 28′ to 4th ∠ for a 5th ∠. But if O. A. be above 90° and less than 270°, then the difference of 4th ∠ and 23° 28′ = 5th ∠. Note:—When the 5th ∠ exceeds 90°, take the sine of its excess above 90° for the cosine of 5th ∠.

As C-Sin. 5 ∠ (co-arc)	
Is to C-Sin. 4 ∠	
So is { Tan. O. A. à ♈ or ♎	
So is { C-Tan. O. A. à ♋ or ♑	
To { Tan. Lon. à ♈ or ♎	
To { C-Tan. Lon. à ♋ or ♑	

N.B.—1st. If the 5th ∠ be above 90°, when the given O. A. is less than 180°, then take the C-Tan. from 0° 0′ of ♋ towards ♎ for the Lon. sought.—Secondly. But if the O. A. be more than 270°, and 5 ∠ be more than 90°, take the result as the Tan. of Lon. à ♎ towards ♑.—Thirdly. If the O. A. be more than 270°, and the 5 ∠ be less than 90°, then the C-Tan. is the Lon. from 0° ♑ 0′ towards ♈.

S. 80.—Formula No. 8. (Exemplified in S. 184.)

To find what Degree of the Ecliptic ascends, when the O. A. is exactly 90°, either from 0° ♈ 0′ or 0° ♎ 0′.

As Rad.	1	0·
To Sine of ..... 23° 28′		
So is Tan. of Lat.		
To Tan. of Lon. from 0° ♋ 0′ (if there was 0° ♈ 0′ on the Meridian, and the O. A. was exactly 90°: but		
To the C-Tan. of Lon. from 0° ♎, if there was 0° ♎ 0′ on the Meridian, and the O. A., therefore, exactly 270°).		

The Formulæ Nos. 7 and 8 are of great use to the Astral Student, particularly No. 7, for by it may the cusps of the eleventh, the twelfth, the first, second, and third houses, be calculated to a much greater degree of truth and exactness than by any other method. The Zodiacal or Ecliptic Longitude, to the degree, minute, and second, may be readily found by Formula No. 2 of the meridian or tenth house of the Celestial Figure. These six houses being found, the other six are then known, because each opposite house has upon its cusp the same degrees and minutes of the opposite sign of the zodiac.

S. 81.—Formula No. 9.

Given the R. A. and Decl. of ⊕, or of a Planet, to find its Zodiacal Longitude and Latitude.

Observe, if R. A. be less than 180°, it is North; but if more than 180°, it is South.

Then, if R. A. and Dec. be both N. or both S. } the sum of 4 ∠ and 23° 28′ } = 5 ∠

If R. A. and Dec. be one N. and the other S. } Diff. of 4 ∠ and 23° 28′ } is the 5 ∠

Then,

As Radius Sin. 90°	1	0·
To { Sin. R. A. à ♈ or ♎ ..... C-Sin. R. A. à ♋ or ♑		
So is C-Tan. Dec.		
To Tan. of 4th ∠		

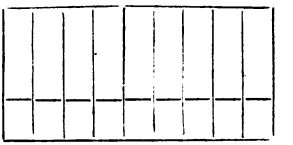
Add, or subtract, 23° 28′, as taught above, and the sum, or difference, is the 5th ∠.

Note.—If 5 ∠ exceed 90°, the Lat. is of a contrary name to Dec.; but if 5 ∠ be less than 90°, the Lat. is of the same name as the Decl.

Secondly. For the Latitude.

As C-Sin. 4th ∠.....
To C-Sin. 5th ∠.....
So is Sin. Decl.....

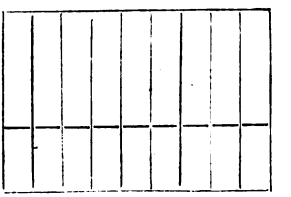
To Sin. of Lat.....



Thirdly. For the Longitude.

As Sin. 4th ∠.....
To Sin. 5th ∠.....
So is { Tan. R. A. à ♈ or ♎ .....
C-Tan. R. A. à ♋ or ♑ .....

To { Tan. Lon. à ♈ or ♎.....
C-Tan. Lon. à ♋ or ♑.....



S. 82.—I scarcely need inform the students of the Astral Sciences, the admirers of the great Ptolemy, that this illustrious mathematician and astronomer has shewn in his Tetrabiblos, Book 3d, and chapter xiii, that the place of the Part of Fortune, ⊕, is to be carefully found, &c., and that it is of the utmost importance to do so when ⊕ falls in a Hylegiacal part of the Celestial Figure. Its mundane position is found from the oblique ascensions of the sun and moon under the latitude of birth; and, these particulars being known, from them we find the right ascension and declination of ⊕ (see S. 142). Then, by Formula No. 9, we can easily find the longitude and latitude of ⊕ in the zodiac, which will enable us to direct the ☉, ☽, and other planets to the zodiacal aspects of the ⊕: and this is considered to be a great improvement in the science of directional motion by some of the most talented professors and learned students of the present age. This ninth Formula will also be very useful to the practical or observing astronomer, who, having by his astronomical clock found the R. A., and by his meridional instrument the declination of any comet, star, or planet, wishes to find its zodiacal longitude and latitude, both correctly and expeditiously, without perplexity, and without the least fear of mistake. I can assure my readers that they may search in vain all through the works of Dr. Maskelyne, and of all the others of great astronomers and mathematicians, for any thing for the same purpose, that is equally clear and easy as my ninth Formula. Not one person in a thousand would understand theirs and Dr. Maskelyne's methods; as may be seen by referring to the 14th Problem of Whiting's Practical Astronomy, pp. 204 and 205; or to the 13th Problem of Dr. Maskelyne, in page 59 of his Introduction to Mr. Michael Taylor's Book of Logarithms and Sines and Tangents.

S. 83.—Formula No. 10.

The Table of Results.

	R.A.	Decl.	Tan. Dec.	A.X.	S. D. A.	⅓	S. N. A.	⅓
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
☉								
☽								
☿								
♄								
♃								
♂								
♀								
☿								
⊕								

In the other Formulæ, as well as in this, the lines should be drawn across the whole breadth of the slate.

S. 84.—Formula No. 11.

The Declination and Ascensional Difference being given, to find the Pole.

As Rad.	1	0·						
To C-Tan. of Decl.								
So is Sin. Asc. Diff.								
To Tan. of the Pole								

Or the same may be done by

S. 85.—Formula No. 12.

As Tan. Decl. (co-arc)								
Is to Rad.								
So is Sin. of Asc. Diff.								
To Tan. of the Pole								

When we desire to find the true polar elevations of the different houses of the Celestial Figure (see SS. 96, 97, and 99), and the true poles of the planets (see S. 112), agreeably to the true and rational principles of the illustrious Ptolemy, then the 11th and 12th Formulæ will be found very useful, being the most accurate and most expeditious.

S. 86.—Formula No. 13.

Given the Pole and Ascensional Difference to find the Declination. (See S. 539.)

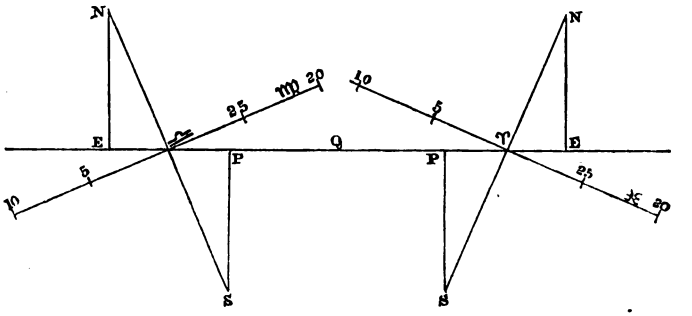
As Tan. of the Pole (co-arc)									
Is to Rad.	1	0·	0	0	0	0	0	0	0
So is Sin. of Asc. Diff.									
To Tan. of Decl.									

This 13th Formula may be usefully applied by a skilful student to certain cases that may occur in the Rectification of Nativities, where it would be required to know what the declination must be that will give a certain required Arc of Direction: to such a student it will prove of great service. The author of this work invented it some years ago, and believes it is not to be found in any other book; and therefore it is quite new to the public. It is also of great use in constructing the curve Patterns.

S. 87.—Formula No. 14,

To find the Right Ascension of a Star or Planet when in 0° 0′ 0″ of ♈, or in 0° 0′ 0″ of ♎.

That nothing might be wanting to give the student a clear understanding of this curious and useful Problem, the author has prefixed an explanatory Diagram, and given a practical example of resolving the same by calculation.



As Rad.				1	0·					
Is to Sin. of ∠ at N	23°	28′	0″		9	6	0	0	1	1	8	1
So is Tan. of Star's Lat. ♈ N.	9	0	0		9	1	9	9	7	1	2	5
To Tan. of its R. A. ♈ E.	3	36	32		8	7	9	9	8	3	0	6

Or the same may be done by

S. 88.—Formula No. 15.

As Rad. Sin. 90° = ∠ at E.				1	0·					
To Sin. of oppos. side ♈ N. lat.	9°	0′	0″		9·	1	9	4	3	3	2	4
So is Sin. of ∠ at N.	23	28	0		9	6	0	0	1	1	8	1
To sin. of its opposite side ♈ E.	3	34	18		8	7	9	4	4	5	0	5

S. 89.—We see clearly by the diagram or plan affixed, that a star or planet in 0° 0′ 0″ ♈, with north latitude, that the right ascension would fall backward into ♓ at E, its R. A. being equal to ♈ E; but if the latitude was south, the R. A. would fall forward as at P, according to the order and succession of the signs of the zodiac. A

star or planet in 0° 0′ 0″ ♎ with north latitude, the R. A. falls forward in the order of the signs; but in 0° 0′ 0″ ♎ with south latitude, the R. A. would fall backward into ♍, as at P. In the diagram, E Q E represents the equator, and ♈ N and ♈ S the latitude north and south. There is a small difference between the results given by the 14th and 15th Formulæ. The 14th is considered as the most correct; and by it we find ♈ E the R. A. backwards into ♓, 3° 36′ 32″; and 3° 36′ 32″ from 360°, leaves 356° 23′ 28″ as the R. A. of a planet in 0° 0′ 0″ ♈, with 9° north latitude: but the arc ♈ P = 3° 36′ 32″ is the true R. A. with 9° south latitude.

S. 90.—Formula No. 16.

To find the Declination of a Planet, &c. having latitude in 0° 0′ 0″ ♈, or in 0° 0′ 0″ ♎.

Example, with 9° North, or 9° South Latitude.

(See the Diagram in Formula No. 14.)

As Rad. Sin. of	90°	0′	0″	1	0·							
Is to Sin. of Hypothen. ♈ N. lat.	9	0	0		9·	1	9	4	3	3	2	4
So is Sin. of ∠ at Base E. ♈ N.	66	32	0	}	9·	9	6	2	5	0	7	6
or C-Sin. of	23	28	0	}								
To Sin. of Perpendicular or Declination { E. N. or P. S. }	8	15	1		9·	1	5	6	8	4	0	0

The student may gain a very clear understanding of the doctrine of Right Ascensions and Declinations if he carefully considers the Diagram and these calculations. Although the various authors who have written treatises on Spherics and Astronomy must have been as familiar with the principles illustrated by these three last problems, as they were with their right and left hands, yet they have given no Formulæ similar to Nos. 14, 15, and 16; and therefore the author of this book believes he is entitled to be considered as the inventor of these three Formulæ. He has had them upwards of thirty years upon one of his Formula-slates, and has lately carefully examined the works of all the authors in his possession, but cannot find any similar Formulæ in any of them.

S. 91.—Formula No. 17.

By knowing the Right Ascension and Ascensional Difference of a given Degree in the Ecliptic, or of a Planet, to find the Oblique Ascension thereof.

Having found the R. A. by Formula No. 1, 4, 5, 14, or 15, and the Ascensional Difference by Formula No. 6,

Then, if the Decl. be North, from the R. A. take the Ascensional Difference, and there remains the Oblique Ascension.

S. 92.—FORMULA No. 18.

To find the Oblique Descension of any Degree of the Zodiac, or of a Star or Planet, by knowing, as before, the Right Ascension and Ascensional Difference.

Then, if the Decl. be North, to the R. A. add the A. X., and the sum is the Oblique Descension.

But if the Decl. be South, then from the R. A. subtract the A. X., and the remainder will be the Oblique Descension.

S. 93.—FORMULA No. 19.

By knowing the Declination and Ascensional Difference, To find the Semi-diurnal Arc of a Planet, &c.

When the Declination is North, add the Ascensional Difference to 90°, and the sum is the Semi-diurnal Arc;

But, when the Declination is South, subtract the Ascensional Difference from 90°, and the remainder is the Semi-diurnal Arc.

S. 94.—FORMULA No. 20.

Having the Declination and Ascensional Difference given of any Star or Planet, to find the Semi-nocturnal Arc.

1st When the Declination is North, subtract the Ascensional Difference from 90°, and the remainder is the Semi-nocturnal Arc;

2d But when the Declination is South, add the Ascensional Difference to 90°, and the sum is the Semi-nocturnal Arc.

THE PRACTICAL APPLICATION OF THE PRECEDING RULES AND FORMULÆ.

S. 95.—For the purpose of exemplifying the Rules and Formulæ aforesaid, and the precepts which follow, I have selected the Nativity of that celebrated character, the Emperor Napoleon. As many persons may be desirous to know my reasons for this selection, I will now observe, that my first reason is, the great eminence of the man; the second is, that the dates, &c., of the chief events or accidents of his life are so well known; and, thirdly, that his Nativity was first published as a book (I believe at least fourteen or fifteen years before the date of Napoleon's abdication of the Imperial Throne of France) by the late Mr. John Worsdale, a talented astronomer and student of the Celestial Philosophy. In that work Mr. Worsdale predicted the times of the successes and reverses in the fate and fortunes of the French Emperor, as he most clearly did of his downfall as a monarch, and also foretold the approximate time of his death; and my fourth and last reason for selecting this geniture as a praxis for the student in preference to any other, is, that it is in the hands of many thousands of persons, and that almost

every student and admirer of the Celestial Sciences is familiar with it.

I scarcely need to inform my reader, if he is even but little conversant with celestial lore, that the first, and I may say, principal process to be performed, before we can speculate upon individual destiny, is to set, or erect, a Figure of the Twelve Houses of Heaven to the moment the person was born at, to the longitude and latitude of the place of birth. Napoleon was born at Ajaccio, in Corsica, in Latitude 41° 40′ North, and Longitude 9° East from London: and Mr. Worsdale states, that the Emperor himself gave the time of his birth to an astronomer in Corsica, as having taken place on the 15th of August, 1769, at a quarter before ten o'clock in the forenoon (solar time); or, as is most usual in this sort of computations, to express the time according to astronomical reckoning, the estimate time of birth was on the 14th of August, at 21 h. 45 min. post meridian; the R. A. of the midheaven would then be 111° 19′. Mr. Worsdale rectified this estimate time by adding 1° 40′, which answers to 6 minutes and 40 seconds of time; which gives 21h. 51 min. 40 sec. for the rectified time of birth, and the R. A. of the midheaven would then be 112° 59′. This gives the Arc of Direction of the midheaven to the ☉, or body of the Sun, 32° 5′, which, according to solar measure, answers exactly to 35 years and 3 months, the time he was crowned Emperor of the French. As the other directions given in Mr. Worsdale's calculations agree so very well with the times of the other events of the Emperor's life, this must have either been the very instant of his birth, or within a few seconds of it. The next thing to be done, according to the plan and arrangement of this my present Treatise, is to shew the manner of finding the Poles, or Polar Elevation of the Houses of the Celestial Figure, and then exemplify their use in erecting the Figure of Napoleon's Nativity.

S. 96.—There were, I believe, two editions of the Nativity of Napoleon published by the late Mr. Worsdale; the first in 1799 or 1800, the second edition in 1804 or 1805. A scientific friend lent me a copy of each edition. It was undoubtedly from the Second Edition that the above time of the Emperor's birth was copied by me. It is now so many years ago since I saw either of them, that I cannot state more exactly the dates of their publication; but between 1800 and 1815 several other gentlemen besides Mr. W. published Treatises on Napoleon's Nativity.—T. O.

To find the true Poles of the Houses.

S. 97.—By Formula No. 6, find the ascensional difference of the sun's greatest declination, 23° 28′, corresponding to the Parallels of Cancer and Capricorn, for any latitude you desire. Having found the ascensional difference, divide it into three equal parts. One-third of the ascensional difference will give the poles of the eleventh and third, ninth and fifth houses; and two-thirds of the ascensional

difference will give the poles of the twelfth and second, and of the eighth and sixth houses, by applying the said ascensional difference, or portions of it, according to Formulæ Nos. 11 or 12.

Example.

S. 98.—Required the Ascensional Difference of 23° 28′ for Ajaccio, in Corsica, Latitude 41° 40′ North.

As Radius		10·0000000
To Tangent of Latitude	41° 40′	9·9493531
So is Tangent of ⊙'s greatest declination	23 28	9·6376106
To sine of Ascensional Difference . . .	22° 43′ 36″	= 9·5869637
which call	22 44	

One-third of this ascensional difference is 7° 34′ 32″ and ⅔ = 15° 9′ 4″.

But we need not work to seconds in these calculations, the nearest minute of a degree being sufficiently exact (unless we desire great exactness, and have tables of sines and tangents, as I have, for each second of the Quadrant). Now, by Formula No. 12, we shall proceed,

S. 99.—To find the Poles of the eleventh and third, and of the fifth and ninth houses.

As Tangent of Declination (co-arc)	23° 28′	0·3623894
Is to Radius		10·0000000
So is Sine of Ascensional Difference	7° 34′ 32″	9·1200257
To Tangent of	16° 53′ 33″	9·4824151

or 16° 54′, which is the Polar Elevation of the eleventh and third, of the fifth and ninth houses in the Nativity of Napoleon.

We find the Poles of the twelfth and second, of the sixth and eighth houses next,

As Tangent of Declination (co-arc)	23° 28′	0·3623894
Is to Radius		10·0000000
So is Sine of Ascensional Difference	15° 9′ 4″	9·4172485
To Tangent of	31° 3′ 1″	9·7796379

or 31° 3′ is the Pole of Elevation of the twelfth and second, and of the sixth and eighth houses required; and the student will please to remember, that the Pole of the first house, or Ascendant, is always that of the latitude of the place where the person is born.

We shall next proceed to erect the Celestial Figure of the Emperor's Birth. Here follows the

PRECEPTS TO ERECT, OR CALCULATE, A FIGURE OF THE HEAVENS BY SPHERICAL TRIGONOMETRY.

The Examples are here combined with the Precepts.

S. 100.—To the R. A. of the solar time of birth (for solar time see S. 289), reckoned from the preceding noon-day, add the R. A.

of the sun, calculated to the same time. The sum, if under 360°, is the R. A. of the Meridian; but if the sum exceed 360°, then reject 360° from the sum, and the remainder will be the R. A. of the Meridian or tenth house required. Then, by the continued adding of 30 degrees to the R. A. of the tenth, we obtain the oblique ascensions of the eleventh, twelfth, first, second, and third houses, as in the following

S. 101.—*Example.* As before stated, at rectified time of Napoleon's birth, the R. A. of the tenth house was ..... 112° 59′
Add 30 0

The sum is the O. A. of the eleventh (under the Pole of 16° 54′) ..... 142° 59′
Add 30 0

The sum is the O. A. of the twelfth (under the Pole of 31° 3′) ..... 172° 59′
Add 30 0

The sum is the O. A. of the first (under the Pole of 41° 40′) ..... 202° 59′
Add 30 0

The sum is the O. A. of the second (under the Pole of 31° 3′) ..... 232° 59′
Add 30 0

The sum is the O. A. of the third (under the Pole of 16° 54′) ..... 262° 59′

S. 102.—The degree and minute of the Ecliptic on the tenth is found from its R. A. Now as the R. A. exceeds 90°, and is less than 180°, we use the excess above 90°, as being the R. A. from 0° ♋ 0′. In this case the R. A. of the tenth, 112° 59′ less 90°, leaves 22° 59′ distance from 0° ♋ 0′. We then say, by Formula No. 2,

S. 103.—As Radius Sine of	90°	10·00000
To Cosine	23° 28′	9·96251
So is Tangent of R. A. à ♋	22 59	9·62750
To Tangent of Longitude à ♋	21 16	9·59001

So we see that 21° 16′ ♋ is upon the cusp of the tenth house.

S. 104.—To find the Cusp of the Eleventh House, we must operate by Formula No. 7.

We have given in this case the Pole of the eleventh house 16° 54′, and the O. A. 142° 59′, to find the Ecliptic longitude. Here the O. A. exceeds 90° by 52° 59′; this 52° 59′ is to be used as the argument of O. A. from 0° ♋ 0′. Then say,

As Radius			10·00000
Is to Sine of O. A. from ♋	52°	59′	9·90225
So is Co-tangent of Pole of the eleventh	16	54	10·51738
To Co-tangent of the 4th ∠	20	50	10·41963
Here we take the difference the 4th ∠, and	23	28	
For the 5th ∠ =	2	38	

Because the O. A. 142° 59′ is more than 90°, and less than 270°.

Then say,

As Cosine of 5th ∠ (co-arc)	2°	38′	0·00046
Is to Cosine of 4th ∠	20	50	9.97063
So is Co-tangent of O. A. à ♋	52	59	9·87738
To Co-tangent of longitude à ♋	54	48	9·84847
This 54° 48′ à 0° ♋ 0′ answers	♌ 24	48	which is

the cusp of the eleventh house.

S. 105.—To find the Cusp of the Twelfth House.

The O. A. is 172° 59′ = 82° 59′ from 0° ♋ 0′. We use 82° 59′ as the argument of O. A. in finding the longitude from 0° ♋ 0′.

By Formula No. 7, say,

As Radius			10·00000
Is to Sine of O. A. from 0° ♋ 0′	82°	59′	9·99674
So is Co-tangent of Pole of the twelfth	31	3	10·22037
To Co-tangent of the 4th ∠	31	14	10·21711
Here again we take the difference of the 4th ∠, and of	23	28	
For the 5th ∠ =	7	46	

Then say,

As Cosine 5th ∠ (co-arc)	7°	46′	0·00400
Is to Cosine 4th ∠	31	14	9.93200
So is Co-tangent of O. A. à ♋	82	59	9·09019
To Co-tangent of longitude à ♋	83	56	9·02619

Which gives for the cusp of the twelfth house.... 23° 56′ ♍

S. 106.—To find the Cusp of the Ascendant, or First House.

The O. A. of the first, as before found, is 202° 59′. This exceeds 180°, and is less than 270°; we therefore, by Formula No. 7, use the excess above 180°, viz., 22° 59′, for the argument of O. A. from 0° ♎ 0′.

As Radius			10·00000
Is to Cosine O. A. from ♎	22°	59′	9·96408
So is Co-tangent of the latitude of birth	41	40	10·05065
To the Tangent of a 4th ∠	44	2	10·01473

We again take the difference between the 4th ∠ and ☽ 23 28,
For the 5th ∠ . . . . . 20 34 because the O. A. 202° 59′ is above 90° and less than 270°; then by the second analogy of the 7th Formula we say,

As Cosine of the 5th ∠ (co-arc)	20°	34′	0·02860
Is to Cosine of the 4th ∠	44	2	9·85669
So is Tangent of O. A. from ♎	22	59	9·62750
To Tangent of Longitude from 0° ♎ 0′	18	2	9·51279

Therefore the Cusp of the Ascendant is . . . . 18 2 ♎

S. 107.—To find the Cusp of the Second House.

The O. A. of the 2d is 232° 59′, or 52° 59′ from 0° ♎ 0′, to be used as the argument of O. A. from ♎ by the 7th Formula.

As Radius			10·00000
Is to Cosine O. A. from ♎	52°	59′	9·77963
So is Co-Tangent of Pole of 2d House	31	3	10·22037
To Co-Tangent of a 4th ∠	45	0	10·00000
The difference between the 4th ∠ and	23	28	
is the 5th ∠	21	32	

By the second Analogy, say,

As Cosine of 5th ∠ (co-arc)	21°	32′	0·03142
Is to Cosine of 4th ∠	45	0	9·84949
So is Tangent O. A. from ♎	52	59	10·12262
To Tangent of Longitude from 0° ♎	45	14	10·00353

This Arc 45° 14′ answers to 15·14 ♏ for the Cusp of the 2d House.

S. 108.—To find the Cusp of the Third House.

The O. A. of the Third House is 262° 59′, which is 82° 59′ more than 180°, but less than 270°: we use 82° 59′ as the Argument of O. A. from 0° ♎ 0′. By the 7th Formula, say,

As Radius			10·00000
Is to Cosine of O. A. à ♎	82°	59′	9·08692
So is Co-Tangent of Pole of 11th House	16	54	10·51738
To Co-Tangent of a 4th ∠	68	6	9·60430
The difference between the 4th ∠ and	23	28	
is the 5th ∠	44	38	

By the second Analogy, say

As Cosine of 5th ∠ (co-arc)	44° 38′	0·14775
Is to Cosine of 4th ∠	68 6	9·57169
So is Tangent of O. A. à ♎	82 59	10·90981
To Tangent of Longitude from 0° ♎ 0′	76 47	10·62925

This Arc 76° 47′ gives 16° 47′ ♐ for the Cusp of the 3d House.

Having found the Cusps of the six Eastern Houses, whereby the rest of the twelve become known, I next present my readers with

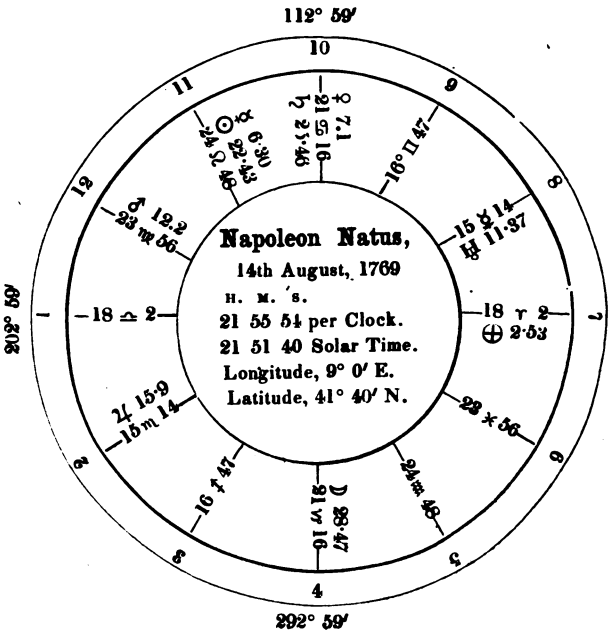
S. 109.—A Table

Of Astronomical Requisites in the Nativity of the Emperor Napoleon, which I have calculated by Spherics, to the same time as given by Mr. Worsdale.

	Long.	Lat.	Decl.	Tan. Dec.	R. A.	A. X.	Semi-Arcs.	½
☉	22 Ω 43		13 57 31	9·395433	145 4 15	12 46 50	102 46 50 D	34 15 36
☽	28 ♈ 47	2 N 59	17 30½ S	9·498943	300 16 50	16 18 14	106 18 14 N	35 26 5
♅	11 ♉ 37	0 S 26	14 55 20 N	9·425688	39 19 0	13 43 10	103 43 10 D	34 34 23
♄	25 ♋ 46	0 N 3	21 3 42 N	9·585573	117 45 51	20 2 30	110 2 30 D	36 40 50
♃	15 ♏ 9	0 N 53	15 33 10 S	9·444539	222 57 58	14 20 25	104 20 25 N	34 46 28
♂	12 ♍ 2	0 N 58	7 57 N	9·145044	163 48 26	7 8 20	97 8 20 D	32 22 46
♀	7 ♋ 1	3 S 10	20 7 N	9·563811	97 27 49	19 1 25	109 1 25 D	36 20 28
☿	6 Ω 30	0 N 30	19 9 7 N	9·540701	129 1 27	18 0 10	108 0 10 N	36 0 3

Though it is by no means necessary to go to the nicety of calculating the Right Ascensions and Declinations, &c. to seconds, I did so to shew that they were not copied from any other author's work. The planet Uranus ♅ is not given in the Geniture done by Mr. Worsdale; but I have given its requisites for the gratification of those students who may wish to trace out and see what influence this planet had over the destinies of Napoleon: many students have assured me it is chiefly of a Saturnine character, mixed with an influence of a Mercurial kind.

S. 110.



CHAPTER VI.

DIRECTIONS IN THE ZODIAC.

S. 111.—HAVING submitted to my readers the positions of the planets for the moment the celebrated Emperor of the French first became an inhabitant of this sublunary globe, and also having given the exact calculations of the aforesaid Celestial Figure according to the Formulæ of Spherical Trigonometry, together with the Table of Astronomical Requisites for the same Geniture, I shall now proceed still further to exemplify the use of the preceding Formulæ and Precepts, first in the calculation of Directions in the Zodiac, and afterwards in Mundo, as this appears to me to be the best mode of giving the student a clear understanding of these matters, and advancing his progress in this department of the Astral Sciences.

S. 112.—Formula No. 21.

Example

Of finding the True and Rational Pole of the Planets according to their Mundane Positions in the Celestial Figure.

Operation 1st for the ⊙'s Pole.

As Semi-Diurnal Arc of ⊙ (co-arc)	102° 47′	P. log.	9·7567
Is to his whole Ascensional Difference	12 47		1·1486
So is the Sun's Right distance from the 10th	32 5		7490
To ⊙ Ascensional Difference under his own True Pole	3 59	+	1·6543

Note.—The proportional logarithm of 102° 47′ is 0·2433, this taken from Radius 10·0000 leaves 9·7567 for the co-arc, according to SS. 67 and 68.

S. 113.—Operation 2d, by Formula No. 12.

As Tangent of the ⊙'s Decl. (co-arc)	13° 57½′	0·604567
Is to Radius sine	90 0	10·000000
So is Sine of ⊙'s Ascl. Diff. (under the required Pole)	3 59	8·841774
To the Tangent of ⊙'s true Pole	15 37	9·446341

S. 114.—Observe, that Mr. Worsdale, by his method of taking the Pole of the Sun, makes it 15° 43′, and the Ascensional Difference under that Pole 4° 1′, and therefore there will be the difference of a few minutes of a degree between the Arc of Direction given by him and by these calculations. He would say, If ⅓ of ⊙'s S. D. Arc give the Polar Elevation of the 11th house, what will the ⊙'s distance in R. A. from the 10th give? and the answer is the Pole of the ⊙ according to that method, and for a Planet situated in the 11th, that is, any where between the cusps of the 11th and 12th houses. He would take the excess over ⅓ of the Planet's S. D. Arc, and call that the distance from the 11th, and would then say, As ⅓ S. D. Arc of the Planet is to the difference of Polar Elevations of the 11th and 12th, what will the distance from the 11th as aforesaid give? and the answer is, the proportional part to be added to the Pole of the 11th house and the sum is taken for the Pole of the Planet as was required. This method will do very well for finding the Poles of the Planets for the Celestial Planispheres; but when we work by the rules of spherical trigonometry it is equally easy to perform our calculations, so as to obtain the most exact results, as to do otherwise.

S. 115.—The Precepts and Examples, Direct Directions in the Zodiac,

Are the directions in which the significator is carried forward according to the succession of the signs, unto the completion of the Aspect, under the Significator's own Pole of Elevation.

For example, in the Nativity of the Emperor Napoleon, let it be required to direct the ☉ to the Sextile of ♀ in Zodiac. In this nativity we find ♀ in 7° 1′ ♋, and consequently the Sextile of ♀ falls in ♍ 7° 1′. Now we must proceed to calculate the Right Ascension and Declination of ♍ 7° 1′, the place of this aspect: these having been found, we next find the ascensional difference of the same under the Sun's own Pole of Elevation; then, after having found the ascensional difference for the said place of the aspect, find thereby the O. A. of this place of aspect, and, lastly, from the O. A. of the Sextile of ♀ thus found subtract the O. A. of the ☉ under his own pole, and the remainder will be the Arc of Direction of the Sun to the Sextile of ♀ in the Zodiac. By way of rendering the working of this more clear and easy to the student, we shall now calculate it at full length.

First.

S. 116.—For the Right Ascension of the Sun.

As Radius, sine of	90°	0′	10·00000
Is to Cosine of the Oliquity of the Ecliptic	23	28	9·96251
So is Co-Tangent of the long. of ☉ from 0° 0′ ♋	52	43	9·88158
To Co-Tangent of R. A. from 0° 0′ ♋	55	4	9·84409
Now to the R. A. of 0° 0′ ♋	=90	0	
Add the R. A. of ☉ from 0° 0′ ♋	55	4	
The sum is the Sun's R. A.	145	4	

S. 117.—To find the Sun's Declination.

As Radius, sine of	90°	0′	10·00000
Is to the sine of the Sun's greatest Decl.	23	28	9·60012
So is Cosine of Sun's Longitude from 0° 0′ ♋	52	43	9·78230
To sine of Sun's Declination north	13	57½	9·38242
The Tangent of 13° 57½′ is			9·38242

S. 118.—For the Sun's Oblique Ascension under his own Pole.

From the R. A. of the Sun	145· 4
Subtract the Ascensional Difference under ☉'s Pole	3·59
The O. A. of the ☉ under his own Pole is	141· 5

In the next place we have to find the R. A., &c. of ♍ 7° 1′, the place of Venus's Sextile.

S. 119.—For the Right Ascension

As Radius, sine of	90°	0′	10·00000
Is to Cosine of the Sun's greatest Declination	23	28	9·96251
So is the Co-Tang. of the aspects Lon. from 0° 0′ ♋	67	1	9·62750
To Co-Tangent of R. A. from 0° 0′ ♋	68	45	9·59001
Then to the R. A. of 0° 0′ ♋	90	0	
Add the Aspect R. A. from 0° 0′ ♋	68	45	
The sum is the R. A. of the Aspect	158	45	

S. 120.—To find the Declination of the Aspect.

As Radius, Sine of	90°	0′	10·00000
Is to Sine of the Sun's greatest Declination	23	28	9·60012
So is Cosine of Longitude from 0° 0′ ♋	67	1	9·59158
To Sine of Aspect's Declination	8	57	9·19170
The Tangent of Declination	8	57	9·19725

S. 121.—For the Ascensional Difference.

As Radius	90°	0′	10·
Is to Tangent of the Sun's Pole	15	37	9·44634
So is Tangent of the Aspect's Declination	8	57	9·19725
To Sine of its Ascensional Difference	2	31	8·64359

S. 122.—For the Oblique Ascension of the Aspect.

From the Aspect's R. A.	158·45
Subtract the Ascensional Difference	2·31
There remains the O. A. of the Sextile of Venus under the Pole of the Sun	156·14

S. 123.—For the Arc of Direction.

From the O. A. of the Sextile of Venus under the Pole of the Sun	156·14
Subtract the O. A. of the Sun under his own Pole	141· 5
The Arc of Direction of the Sun to the Sextile of Venus in Zodiac is	15· 9
Mr. Worsdale makes this Arc of Direction	15·10

the results being within 0° 1′, nearly identical.

S. 124.—To Equate the Arc of Direction, and point out the Time of the Accident or Event according to the Placidian Method, or Solar Measure of Time.

To the Sun's R. A. at the time of birth	145· 4
Add the Arc of Direction	15· 9
The sum is	160·13

S. 125.—Next find the degree, &c. of longitude in the Zodiac which corresponds to 160° 13′ of R. A., which is to 70° 13′ from the beginning of Cancer: this may be done either by the Tables of Right Ascension or by Spherical Trigonometry, as by Formula No. 2, having the Sun's R. A. given to find his longitude.

As Radius.....	Sine 90.°	0′	10·00000
Is to Cosine of Sun's greatest Declination.....	23	28	9·96251
So is Tangent of R. A. from Cancer.....	70	13	10·44407
To Tangent of longitude from 0°· 0′ ♋.....	68	35	10·40658

which answers to 8° 35′ of the sign Virgo. Look in the Ephemeris for the year of birth, in this case in the Ephemeris for the year 1769, and see how many days of 24 hours each the Sun requires to arrive in 8° 35′ of Virgo; for every complete day allow one year, and for two hours reckon one month. By the Ephemeris for 1769, we find that the Sun arrived at 8° 35′ of Virgo on the 31st of August, at 8½ hours P.M., being 16 days and about 10½ hours after birth; and therefore points out the time of the accident or event to have been 16 years and about 5 months and a quarter of the native's age.

S. 126.—How to construct a very exact Solar Scale of Years, whereby most of the trouble of equating the Arcs of Directions may be saved.

Some students of great experience, when they intend to make many calculations in a Nativity, construct a scale of years for the measure of time, by finding the Sun's R. A. for each complete 24 hours after birth, arranging their numbers in order, as the R. A. for the 1st day, for the 2d day, the 3d day, &c., for 60 or 70 or 80 such complete days in succession; and by subtracting the Sun's R. A. at birth from his R. A. 24 hours after birth, there remains the solar measure for one year; and subtracting the Sun's R. A. from birth from his R. A. 48 hours after birth, there remains the solar measure for two years: and by doing this for 60 or 70 or 80 complete days after birth, they make a very exact solar scale of years for the given geniture for as many years as they desire; and by which they can instantly see, almost without any trouble, the exact time of the Native's age when, according to the Arc of Direction, any event might be expected to happen.

S. 127.—N.B. By beginning with the noonday nearest the hour of birth, and finding the Sun's R. A. to that time, and then find the R. A. of the Sun for the next noonday, doing this for as many days as the scale is intended to shew years, subtracting the first R. A. from every other R. A. successively; this will produce a scale of years equally as correct as by the former plan, and will save all the trouble of finding the Sun's longitude for each successive 24 hours.

It may be proper here to remark, that, if the preceding direction of ☉ ✶ ♀ in Zodiac had been calculated by tables of oblique ascensions, the work would have appeared much shorter to the eyes of the unexperienced, although, in reality, it requires both more time and more trouble than by the method I have used; but whether we calculate by the common method of tables of oblique ascensions, &c., or whether we work by spherical trigonometry, to calculate all the

Directions of a Nativity is a work of vast labour, and requires much time and patience; and whatever degree of exactness we may acquire thereby in the calculations, it will scarcely ever make amends for the trouble bestowed in the processes, except we do it for the amusement of our leisure hours, and then we should derive much gratification; but for the purposes of the practical Professor, my Celestial Planispheres will be found to perform the calculations with wonderful expedition, and yet sufficiently exact for every reasonable purpose; and even the most liberal patrons of the astral sciences would not remunerate the Professor for performing the work by any other mode than by the planispheric process; which cannot fail to render the acquisition of my planispheres a matter of great importance to all Professors, and also to students who have but a few leisure hours to spare in the pursuit of these sublime sciences.

Directions in the Zodiac may be calculated in a manner nearly similar to that used for Mundane Directions, by taking the distances of both the significator and promittor, or place of aspect from a given angle or house of the natal figure, and finding the semi-arc, &c., of both the significator and place of aspect, and then working by the rule of proportion, as you would in calculating a Mundane Direction; thus, for

Example.

S. 128.—Calculate the Direction of the Sun to the Sextile of Venus in the Zodiac.

In the Nativity of Napoleon the R. A. of the Midheaven is..	112°	59′
The Right Ascension of the Sun.....	145	4
Right Ascension of the Aspect.....	158	45
And therefore the distance of the Sun from Meridian.....	32	5
The Aspects' distance from the Midheaven.....	45	46
The Semi-diurnal Arc of the Sun under Lat. 41° 40′ is	102	47
The S. D. Arc of the place of Aspect 7° ♍ 1′ under Lat. 41° 40′ is.....	97	57

The proportion, when stated, may either be worked by the Rule of Three (having first reduced the degrees and minutes all into minutes), or equally correct, and a vast deal quicker, by the Tables of Proportional Logarithms—thus:

			P. logs.
S. 129.—If the Semi-diurnal Arc of the Sun (co-ar.)	102°	47′	9·7567
Gives his distance from the 10th.....	32	5	·7490
What will be given by the S. D. Arc of the Aspect	97	57	·2643
The answer is the secondary distance of the Aspect from the 10th.....	30	34	·7700

Then from the primary distance of the Aspect.....	45·46
Subtract its secondary distance.....	30·34
There remains the Arc of Direction of Sun to Sextile of Venus in Zodiac.....	15·12

which is only three minutes of a degree different from the arc, as before; a difference, indeed, scarcely worth regarding.

S. 130.—N.B. In calculating Directions in the zodiac observe, when the significator (or planet to be directed) is posited in the descending part of Heaven, that you should use the oblique ascensions of the opposite place in the zodiac of the significator, and also of the opposite place of the aspect, which will produce the same result as though you calculated by oblique descensions, and is generally considered a more convenient process; at least it is so if you are working by tables of oblique ascension: however, it is right to observe, that when you work by the oblique ascensions of the opposite places, it is requisite to add 180° in each case to the right ascension of the significator, &c., and when the sum exceeds 360°, use the excess above 360°: but by Spherics it is equally easy to work by oblique descensions.

Of Converse Directions in the Zodiac.

This shall be exemplified by directing the Sun to the body of Saturn in the zodiac by converse motion. In the Nativity of Napoleon,

S. 131.—To find the Circle of Position of Saturn, and by that means the Ascensional Difference of Saturn under his own True Pole.

(For the Precept, see Section, No. 54.)

As the Semi-diurnal Arc of Saturn (co-arc.)	110°	3′	9·7863
Is to 90 degrees of the Equator	90	0	·3010
So is Saturn's distance in R. A. from the 10th	3	47	1·5755
To the distance of Saturn's circle of position upon the Equator	3	55	1·6628
Which, taken from Saturn's distance from 10th, there remains the Ascensional Difference of Saturn under his own true Pole	0	52	

We next,

S. 132.—Find the Pole of Saturn by Formula No. 12.

As Tangent of Saturn's decl. (co-arc.)	21°	4′	0·414427
Is to Radius	90	0	10·000000
So is sine of Saturn's Ascl. Difference	0	52	8·179713
To Tangent of Pole of Saturn	2	15	8·594140

The Pole of Saturn is calculated according to the common method, as in the following

Example.

As ⅓ Semi-diurnal Arc of Saturn (co-arc.)	36°	40′	9·3090
Is to Pole of the 11th House	16	54	1·0274
So is Saturn's distance from the 10th	4	47	1·5755
To the Pole of Saturn	2	12	1·9119

There is in this case a difference of 0·° 3′ only between the Poles of Saturn found by the true method and the common way; but, if

Saturn had been near the cusp of the 11th, the error would have been more than 0° 3′. The two different methods having been exemplified, the student can avail himself of that which he most approves of.

S. 133.—To find the Ascensional Difference of the Sun under the Pole of Saturn.

To Tangent of the Pole of Saturn	2° 15′	8·594140
Add the Tangent of the Sun's Declination	13 57½	9·395433
Sine of Ascensional Difference required	0 34	7·989573

For the Oblique Ascensions (see Formula No. 17).

From the Right Ascension of the Sun	145° 4
Subtract the Ascensional Difference	0·34
The Oblique Ascension of the Sun is	144·30
From the Right Ascension of Saturn	117·46
Subtract Saturn's Ascensional Difference	0·52
	116·54

S. 134.—For the Arc of Direction.

From the Oblique Ascension of the Sun	144·30
Subtract Saturn's Oblique Ascension	116·54
The Arc of Direction of the Sun to the body of Saturn, in the Zodiac converse	27·36

In Converse Directions in the zodiac, as may be seen by the preceding example, the Significator is directed under the polar elevation of the Promittor; but, more correctly speaking, the fact is this, that the Significator remains in his first position, and the Promittor is in reality the planet directed, not by a converse, but by a direct motion, according to the succession of the signs to the Aspect, or Significator in the zodiac.

And it may now be well to remark, that some Directions produce nearly the same results when directed Mundo as in the Zodiac, as will be seen in its proper place (see S. 128, 129); that the Sun, directed conversely to the body of Saturn, gives for the Arc of Direction 27° 37′, differing only one single minute of a degree from the Direction in the Zodiac.

S. 135.—Precept how to Direct any Planet to Aspects in the Zodiac, with Latitude.

When any significator or planet, as, for example, the Moon, having latitude at the place where the aspect is completed, is required to be directed to any conjunction, or to any aspect in the zodiac, let her latitude at the place of aspect be found by means of an Ephemeris, &c.; then her right ascension, declination, oblique ascension, or oblique descension, &c., must be found thereunto: then take oblique ascension of the Moon (or planet) at the place she is in at the time

of birth from the oblique ascension of the place of the aspect as aforesaid; and the difference will be the Arc of Direction required, under the Moon or planet's own proper pole of elevation; that is to say, that both the oblique ascension of the place of aspect, and the oblique ascension of the planet at the time of birth, are to be taken under the planet's own pole of elevation, according to the preceding Formulæ.

S. 136.—By referring to the Nativity of Napoleon, we see the Sun is in 22° 43′ ♌, and that the planet Jupiter is in ♏ 15° 9′; it is therefore plain that the sinister square aspect of the Sun is found in 22° 43′ ♏. Now, if we would direct the Sun to the square of Jupiter in zodiac by direct motion, as it is commonly called, but which is, in reality, directing the planet Jupiter to the square of the Sun, we find what latitude Jupiter has in 22° 43′ ♏. Thus, we look for the Ephemeris for 1769, and the 3d of October, about 18 hours P.M., Jupiter was found in 22° 43′ ♏, with 0° 43′ of north latitude. Next, we find the right ascension and declination of this place of aspect by Formula No. 4 or No. 5, and its oblique ascension must be found under the pole of Jupiter. And the polar elevation of Jupiter is found by Formulæ No. 21 and 12, in the manner exemplified in finding the poles of the Sun and Saturn(SS. 112, 113, and 132); and the oblique ascension of Jupiter is also found under Jupiter's own pole: and by subtracting the less oblique ascension from the greater we obtain the Arc of Direction required.

S. 137.—All zodiacal directions are calculated in the manner so clearly explained in the examples which I have here given; and it would be useless to multiply examples and enlarge this book beyond the intended limit, because any intelligent student will, by the examples in this treatise, perfectly understand the manner of performing all the calculations required in the astral sciences. I have purposely omitted any examples or instruction about directing the Sun in the crepusculine parallel, or arc of Twilight. I do not think it has any foundation to support it; and I cannot find, among a considerable number of students who have made such calculations, any that approve of them: all say, shew us a reason why the Sun, when under the earth, should not be directed according to his semi-nocturnal arc as well as the other planets that happen to be in the 1st, 2d, 3d, 4th, 5th, or 6th houses. To shew my readers that I have paid much attention to this subject, it will suffice to state that, during the years 1809, 1810, 1811, and 1812, I devoted a great portion of my leisure hours to investigate every thing relating to Directions of the Sun in the crepusculine parallels and obscure spaces. Not at all satisfied with this discovery by Placidus, I tried to improve upon what Placidus had done; and the result was, that in 1811 I wrote three Essays, in all twenty-three pages closely written, with new Rules and Formulæ for all the various Directions of the Sun when posited in the crepusculines, or in the obscure spaces; and even then I was not satisfied with this part of the doctrine of Placidus. Mr. Wilson, in his Astrological Dictionary, has shewn how these Crepusculine Directions are calcu-

lated. He has taken his examples from the "Primum Mobile of Placidus de Titus," but he has performed the calculations in a manner far more clear and intelligible than was done by Placidus himself. As a book of general reference on the subject of the astral sciences, to the intelligent student I strongly recommend the Dictionary. I agree with Mr. Wilson in almost all his opinions, except in what he says about the Rectification of Nativities; and in that, I beg leave to say, that I have seen many instances of great truth and utility in the Rectification of Nativities by the past accidents or events of the Native's life. It is a doctrine well worthy of the best attention of all students of the astral sciences.

CHAPTER VII.

OF THE PART OF FORTUNE, OR LUNAR HOROSCOPE.

S. 138.—This point or place in the heavens, where the rays of stellar influences emanating from the sun and moon are concentrated, or brought to a focus, is still but imperfectly understood by a great many students. After the antient Ptolemy, Placidus appears to be the only author who properly understood this matter; but Placidus has expressed himself in a manner so obscure and difficult to be understood, that it is requisite that another author should explain Placidus' principles in a better and clearer manner than he himself has done. I have therefore submitted to the student my own rules and explanations, for those persons who may desire to understand this matter clearly.

S. 139.—In every Nativity the Part of Fortune ⊕ is always as far from the degree and minute of the zodiac ascending as the moon would be distant, if the natal Sun were placed on the eastern horizon, or point ascending, in degrees, &c., of oblique ascension; the zodiacal places of the sun and moon in this finding of distance being precisely the same as in the Nativity. The oblique ascensions of the sun and moon being taken under the latitude of birth, therefore,

S. 140.—To find the Oblique Ascension of the Part of Fortune.

Subtract the O. A. of the sun from the O. A. of the moon; the remainder is the distance of the moon from the sun, which distance add to the O. A. of the first house, the sum is the O. A. of the Part of Fortune. Note.—If the O. A. of the moon be less than the O. A. of the sun, add 360° to the O. A. of the moon, and subtraction can then be made.

S. 141.—Then to find the Right Ascension of ⊕.

Formula No. 22.

If the Decl. of ☽ be North, add Asc. Diff. of the ☽ to the O. A. of ⊕.
If the Decl. of ☽ be South, take Asc. Diff. of the ☽ from the O. A. of ⊕.

The sum, or the remainder, will be the R. A. of the Part of Fortune, having precisely the same declination as the moon, both in name and in quantity. And the R. A. and declination of this point being thus made known, its zodiacal longitude and latitude may both be truly found by Formula No. 9.

Another method of finding the R. A. of the ⊕ than the one given above, I shall now transcribe from Placidus, communicated to him by Negusantius, a learned Italian philosopher about two centuries ago. Negusantius says, add the moon's R. A. to the O. A. of the first house, and subtract the sun's O. A. from their sum; the remainder is the R. A. of the Part of Fortune, with the same declination as the moon. The R. A. of ⊕ will be the same as by the first method.

Example.

S. 142.—Required the true Mundane Position, and the R. A. of the Part of Fortune, in the Nativity of the Emperor Napoleon.

The O. A. of the Moon is	316°	35′
Subtract the O. A. of the Sun	132	17
Oblique distance of the Moon from the Sun	184	18
which is the distance of Part of Fortune from the Ascendant.		
To which add the O. A. of the Ascendant	202	59
The sum is	387	17
Reject	360	0
The remainder is the O. A. of the Part of Fortune	27	17
Asc. Diff. of ☽, that is, Asc. Diff. of Part of Fortune, subtract	16	18
The R. A. of ⊕ therefore is	10	59

And the Declination of ⊕ is the same as the Declination of ☽, 17° 30½′ South.

From the distance of ⊕ from the Ascendant	184°	18′
Subtract the ☽'s Semi-nocturnal arc	106	18
There remains ⊕'s distance from the fourth house	78	0

upon the Parallel of Declination of the Moon. This is the true mundane position of the ⊕. And again, by subtracting the Part of Fortune's distance from the fourth, or lower meridian, we find its distance below the west horizon, thus,

From Semi-nocturnal arc of ⊕	106°	18′
Subtract ⊕'s distance from the fourth	78	0
The remainder is the distance of the Part of Fortune below the west	18	18

We will now, by Formula No. 9, find the zodiacal longitude and latitude of ⊕ in Napoleon's Nativity.

S. 143.—*Example.*

Given the Right Ascension, 10° 59′, and Declination, 17° 30′ 30″ South of ⊕, to find its zodiacal longitude and latitude.

By Formula No. 9, say,

As Radius Sine of	90°	0′	0″	10·0000000
Is to Sine R. A. à ♈ or ♎ or Cosine R. A. à ♋ or ♑	10	59	0	9·2799484
So is Co-tangent Decl.	17	30	30	10·5010575
To Tangent of 4th ∠	31	7	47	9·7809959
Now per Formula 9, from 4th ∠ subtract	23	28	0	
The difference is the 5th ∠	7	39	7	

S. 144.—Second Operation.

For the Latitude say, (9·9324733)

As Cosine of 4th ∠ (co-arc)	31°	7′	47″	0·0675267
Is to Cosine of 5th ∠	7	39	47	9·9961041
So is Sine of Declination	17	30	30	9·4783421
To the Sine of Latitude, South	20	23	3½	9·5419729

By the 9th Formula the latitude is south, because it says, that when the 5th ∠ is less than 90°, the latitude will be of the same name as the declination. In this Example the declination is south, and therefore, per Formula, the latitude is south.

S. 145.—Third Operation.

For the Longitude of ⊕ say, (9·7134681

As Sine 4th ∠ (co-arc)	31°	7′	47″	0·2865319
Is to Sine 5th ∠	7	39	47	9·1249838
So is Tan. of R. A. à ♈ or ♎ / Co-Tan. of R. A. à ♋ or ♑	10	59	0	9·2879773
To Tan. longitude à ♈ or ♎ / Co-Tan. longitude à ♋ or ♑	2	51	57	8·6994930

By these calculations we see that in the Nativity of Napoleon ⊕ was in ♈ 2° 51′ 57″, with 20° 23′ 3½″ of south latitude. We will next calculate the R. A. of ♈ 2° 51′ 57″, and the declination thereof, with 20° 23′ 3½″ of south latitude; these numbers being true to even less than a second.

S. 146.—By Formula No. 4,

As Radius				10·0000000
Is to Sine of longitude from 0° ♈ 0′	2°	51′	57″	8·6989472
So is Tangent of	23	28	0	9·6376106
From 1st ∠	110	23	3½	
To Tangent of 4th ∠ subtract	1	14	36¼	8·3365578
There remains the 5th ∠	109	8	27¼, because this 5th ∠ exceeds 90°, use cosine complement	
to 180° =	70	51	32¾, or the sine of 19° 8′ 27¼″ the excess above 90° as the cosine of 109° 8′ 27¼″.	

S. 147.—For the Declination. (9·9998977)

As Cosine of 4th ∠ (co-arc)	1°	14′	36¼″	0·0001023
To Cosine of 5th ∠ Sine	19	8	27¼	9·5157313
So is Cosine of	23	28	0	9·9625076
To Sine of Declination required	17	30	30	9 4783412

S. 148.—For the Right Ascension. (9·9793997)

As Cosine of Declination (co-arc)	17°	30′	30″	0·0206004
Is to Cosine of longitude from 0° ♈ 0′	2	51	57	9·9994565
So is Cosine of ⊕'s latitude	20	23	3½	9·9719145
To Cosine of ⊕'s R. A.	10	59	0	9·9919714

S. 149.—We see that the process of calculations performed by Formula No. 4 proves the perfect correctness of what was done in the same by Formula No. 9; having reproduced, even to the fraction of a second, the same right ascension and declination as that belonging to the ⊕; and therefore most satisfactorily proves that the zodiacal longitude and latitude found by our method is the true place in the zodiac of the Part of Fortune, both in longitude and latitude. *Note.*—By the Formula No. 4, the ⊕'s latitude, 20° 23′ 3½″, is added to 90°, and the sum is the first ∠, because the longitude and latitude are of different names, one being north and the other south. In using the Formula-slates, it is a good method to draw a line with our pencil under the sign we reckon from; thus, when I reckon from ♈, I draw a line under, thus ♈; and if I reckon from ♊, I underline it, thus ♊; or from ♎, or from ♑, thus ♑; wherever I find it in the Formula. In this way one is sure to write down every number in its proper place.

The reader will find that the ⊕ is very clearly explained and exemplified in that part of this Treatise which teaches the use and construction of the Celestial Planispheres.

CHAPTER VIII.

THE CALCULATION OF MUNDANE DIRECTIONS.

S. 150.—PROVIDED that proper attention has been paid to the instruction that has been delivered in the first, second, and third chapters, concerning the Division of the Figure of the Heavens, the Aspects and Distances, &c., it is the Author's opinion that the rules and processes contained in this chapter will be easily understood by the intelligent reader.

S. 151.—GENERAL RULES.

1st. The twelve houses being divided (see Chapter I) into four Quadrants, namely, from the cusp of the first to the cusp of the fourth house, is the first Quadrant; from the cusp of the fourth unto the cusp of the seventh house, is the second Quadrant; from the cusp of the seventh to the meridian, or tenth house, is the third Quadrant; and from the cusp of the tenth unto the cusp of the Ascendant, or Horoscope, is the fourth Quadrant.

S. 152.—Observe, when the Aspect is completed in the same quadrant in which the planet is posited (at the moment of birth), that the difference between the primary and secondary distances will be the Arc of Direction.

S. 153.—*Rule* 2.

But when the Aspect is completed in a different Quadrant to that in which the planet is posited, then must the secondary distance projected on the other side of a determinate angle, or house (to complete the Aspect), be added to the primary distance of the planet on this side of the same angle, or house, and the sum will be the Arc of Direction required. I suppose that by this time my reader knows that the angles are, the cusps of the first, fourth, seventh, and tenth houses of the Celestial Figure.

S. 154.—These two general rules contain in themselves a summary of the methods of working Mundane Directions; but as I am desirous that every one who reads this work may perfectly understand the processes of calculation, I have added the following particular rules also, all from my own manuscript Treatise, written about twenty years before the date of the first edition of my book on the Celestial Planispheres (published in the year 1830), for the purpose of refreshing my own memory in these sciences, however long I might have laid aside the study thereof; and these rules and remarks have completely answered the purpose, for, on just reading them once over, I recollected every process as well as if I had been in the daily practice of making such calculations. Here follow the

Special Rules.

Direct Directions in Mundo.

S. 155.—*Rule* 1.

The Significators' Semi-Arc, or one-third the Semi-Arc, commonly called the double Horary times, are placed first in the analogy; in the second place is put the Significator's distance from an angle or house; in the third place is put the Promittor's Double Horary times, or the Semi-Arc (diurnal if above the earth when the aspect is completed); but the nocturnal double horary times, or Semi-nocturnal Arc, &c. must be taken if the aspect be finished below the earth; the fourth number, or answer, is the Promittor's secondary distance from the determinate angle or house from which the aspect is formed; which secondary is to be subtracted from the said Promittor's primary distance, if produced in the same quadrant in which the primary distance was taken, and the remainder will be the Arc of Direction. But if the Promittor's secondary distance be projected into a different quadrant to that in which the said Promittor is found in the Nativity, the sum of the primary and secondary distances will then be the Arc of Direction required.

S. 156.—Thus, by Analogy,

As the Significator's Double Horary times, or Semi-Arc
Is to its distance above or below a certain Angle or House,
So is the Promittor's Double Horary times or Semi-Arc
To the Promittor's secondary distance above or below a certain Angle or House.

S. 157.—*Example.*

Let it be required in the Nativity of Napoleon to direct the Sun to the sextile of Saturn in Mundo by Direct Direction (☉ ⚹ ♄ M. D. D.). This aspect is completed when the planet Saturn arrives at the same proportional distance from the cusp of the ninth as the Sun is distant from the cusp of the eleventh house. The Sun being on the western side of the eleventh, Saturn must, at the completing of the aspect, be on the western side of the ninth. Let the reader remember, once and for all, that the cusps of the houses here spoken of are not meant as the zodiacal degrees upon the cusps; but that one-third part of each planet's Semi-Arc complete is here meant as the cusp of a house in mundo. Thus,

From the Double Horary times of the Sun, or ⅓ his S. D. Arc	34·16
Subtract his distance from the tenth	32· 5
There remains the Sun's distance from the eleventh house	2·11

Saturn is in the fourth quadrant in the Nativity, and is 4° 47′ distant from the cusp of the tenth on the east side thereof; but Saturn

completes the sextile aspect to the Sun in the third Quadrant, therefore Saturn's secondary will be added to his primary distance from the ninth for the Arc of Direction. Now, because Saturn was 4° 47′ east of the tenth at the time of birth, ⅓ S. D. Arc of ♄ added to 4° 47′, viz. 36° 41′+4° 47′=41° 28′, the primary distance of Saturn from the cusp of the ninth. This being clearly explained, we proceed to calculate by the

S. 158.—*Analogy.*

			P. Logar.
As ⅓ Semi-diurnal Arc of ☉ (co-arc)	34°	16′	9·2796
Is to Sun's distance from the eleventh	2	11	1·9161
So is ⅓ Semi-diurnal Arc of Saturn	36	41	0·6908
To Saturn's secondary distance from the ninth	2	20	1·8865
Add Saturn's primary distance from the ninth	41	28	
The sum is the Arc of Direction	43	48	of the Sun to the sextile of Saturn in mundo by Direct Direction.

S. 159.—There is another mode of finding this and similar directions much practised by experienced students; that is, to direct a planet to an extreme large Arc of Direction, perhaps to one so large that it might not come up during the Native's life; then, having found the said extreme Arc of Direction, gain the other Arcs of Direction by subtracting from it the number of degrees it exceeds the other Aspects; thus, let us direct the Sun to the quartile of Saturn in mundo by Direct Direction.

From the S. D. Arc of the Sun	102·47
Subtract the Sun's distance from the tenth	32· 5
There remains the Sun's distance from the Ascendant	70·42

S. 160.—By the Analogy.

			P. Logar.
As the Semi-diurnal Arc of the Sun (co-arc)	102°	47′	=9·7567
Is to the Sun's distance from the first house	70	42	0·4059
So is the Semi-diurnal Arc of Saturn	110	3	0·2137
To Saturn's secondary distance from the tenth	75	41	=0·3763
Add Saturn's primary distance	4	47	
The sum is the Arc of Direction	80	28	of the Sun to the square of Saturn in mundo by Direct Direction.

From the Arc of Direction to the Quartile	80·28
Subtract ⅓ S. D. Arc, or one house of Saturn in mundo	36·41
There remains the Arc of Direction to the Sextile	43·47

differing only 0° 1′ from the Arc of ☉ * ♄ M. D. D., as was obtained by the former calculation.

S. 161.—From the Arc of Direction to the Quartile ..... 80·28
Subtract $\frac{1}{5}$ of the S. D. Arc of Saturn=22° 0′$\frac{4}{5}$, say..... 22· 1

There remains the Arc of Direction ..... 58·27

of the Sun to the quintile of Saturn by Direct Direction in mundo. Here remember that Saturn's S. D. Arc, 110° 3′, is Saturn's Diurnal Mundane Square, being three houses, or the mundane quartile formed by Saturn in his progress from his primary position towards the west; and the quartile exceeds the quintile by $\frac{1}{5}$ part of the quartile, or $\frac{1}{5}$ the space of three houses; and therefore the $\frac{1}{5}$ being subtracted from the Arc of Direction to the quartile, leaves that of the quintile.

S. 162.—From the Arc of Direction to the Quartile ..... 80·28
Subtract half the Semi-diurnal Arc of Saturn ..... 55· 1

There remains the Arc of Direction ..... 25·27

of the Sun to the Semi-quartile of Saturn in mundo, Direct Direction. I hope the intelligent student will see that by this method he may greatly shorten the process of calculation; and I trust that no student whatever will have occasion to say that I have not illustrated these scientific calculations in as clear a manner as the nature of the subject would permit.

S. 163.—*Example*

Of a Direction being completed in a different Hemisphere to that in which the Planet was posited at the Time of Birth.

In the Nativity of Napoleon the dexter trine of the Sun in mundo falls as much below the seventh, or west angle, as the Sun is distant from the eleventh, in proportion to the semi-nocturnal arc of the planet, to be carried on to the completing of the Aspect. Then let it be required to direct,

S. 164.—The Sun to the Trine of Uranus (♅) in Mundo by Direct Direction.

			P. Logar.
As the semi-diurnal Arc of the Sun (co-arc)....	102°	47′	= 9·7567
Is to the Sun's distance from the eleventh.....	2	11	1·9161
So is the Semi-nocturnal Arc of Uranus	76	17	0·3728
To the secondary distance of Uranus below the west	1	37	= 2·0456
To this secondary add the primary distance of ♅ above the west angle.....	30	3	
Arc of Direction of the Sun to the trine of ♅ M. d. d.	31	40	
Add $\frac{1}{6}$ of the Semi-nocturnal Arc of Uranus....	12	43	
The Arc of Direction of the Sun to the Sesqui-quadrate of Uranus, Mund. Direct Dn., is	44	23	

And in this manner the larger Arcs of Direction can be found, by adding that proportion of the Semi-arc that was wanting to make up the larger Aspect, or Arc of Direction.

Rule 2.

S. 165.—In the Converse Directions, the Promittor remains at rest, and the Significator is carried on to the completion of the Aspect. The numbers of the proportion as thus disposed:

As the Promittor's Double Horary times, or Semi-arc,
Is to its distance above or below a certain Angle or House
So is the Significator's Double Horary times, or Semi-arc,
To the Significator's secondary distance above or below a certain Angle or House.

S. 166.—*Example.*

Let it be required to direct the Sun to the Body or Conjunction of Saturn in Mundo, by Converse Direction.

The Analogy.

		P. Logar.
As the Semi-diurnal Arc of Saturn (co-arc)	110° 3′	9·7863
Is to Saturn's distance from the tenth	4 47	1·5755
So is the Semi-diurnal Arc of the Sun.....	102 47	0·2433
To the Sun's secondary distance from the tenth ..	4 28	1·6051

From the Sun's primary distance from the tenth	32° 5′
Subtract the secondary distance	4 28
The Arc of Direction of the Sun ☌ ♄ Mundo Converse..	27 37

S. 167.—This second special rule further says,—If the Aspect be completed in the same Quadrant, then will the difference between the primary and secondary distances be the Arc of Direction. But if the Aspect be completed in another Quadrant, then that in which the Significator (or the planet that is to move onward to the Aspect) is posited in the figure of birth, then must the Significator's secondary distance projected on the other side of a determinate house or angle be added to the said Significator's primary distance on this side of the same angle or house; the sum will be the Arc of Direction. The four following rules, enumerating each house of the Celestial Figure respectively, will include every thing that need be desired in this department of the Astral Sciences.

S. 168.—*Rule* 3.

Let it be remembered that the mundane motions of the planets are all, in reality, performed conversely, as respects the houses of the Celestial Figure. Therefore the planet which is really brought

by a converse motion to the proportional distance of another planet, if the said planet so carried onward by converse motion be posited in the first, second, or third house, and completes the Aspect above the horizon, must have its secondary distance above the horizon added to the said planet's primary distance (in oblique ascension) from the east angle, or first house, and the sum of the two distances will be the Arc of Direction.

But if the planet so posited in the first, second, or third house, completes the Aspect in the first, second, or third house, then will the difference between the primary and secondary distances be the Arc of Direction. We now proceed to the fourth special rule.

S. 169.—*Rule* 4.

In like manner of any planet posited in the twelfth, eleventh, or tenth house; and if it completes the Aspect while posited in the twelfth, eleventh, or tenth house, the difference between the primary and secondary distances will be the Arc of Direction required. But if the Aspect was completed in the ninth, eighth, or seventh house, then must the secondary distance from the meridian towards the west be added to the planet's primary distance from the meridian (on the eastern side,) and the sum will be the Arc of Direction required.

S. 170.—*Rule* 5.

If the planet which is to be carried onward to the Aspect by its own converse motion be posited in the ninth, eighth, or seventh house, if it complete the Aspect while in the ninth, eighth, or seventh house, the difference between its primary and secondary distances from the tenth or seventh house will be the Arc of Direction. But should any planet be posited in either of the aforesaid houses, and if to complete the Aspect the said planet be carried below the horizon, then must the secondary distance below the west be added to the planet's primary distance above the west angle, and the sum will be the Arc of Direction required.

S. 171.—*Rule* 6.

If any planet posited in the sixth, fifth, or fourth house, completes the Aspect while posited in the sixth, fifth, or fourth house, then will the difference between its primary and secondary distances from the seventh or fourth house be the Arc of Direction.

But if to complete the Aspect the planet moves onward into the third, second, or first house, then must the secondary distance from the fourth be added to the primary distance from the fourth house, and the sum will be the Arc of Direction required. By way of example, in the Nativity of Napoleon, let it be required to direct the sun to the parallel of Venus in mundo by direct direction. The R. A. of the tenth is 112·59, and the R. A. ♀ is 97° 29′, and therefore Venus' primary distance from the tenth is 15° 30′.

The proportion is thus stated, and calculated with the proportional logarithms, by the

S. 172.—*Analogy.*

			P. Logar.
As ⅓ Semi-diurnal Arc of the Sun (co-arc)	34°	16′	9·2796
Is to his distance from the Midheaven	32	5	0·7490
So is ⅓ the Semi-diurnal Arc of Venus	36	20	0·6950
To Venus' secondary distance from the tenth	34	1	0·7236
Subtract Venus' primary distance	15	30	
And the Arc of Direction will be	18	31	of the Sun

to the parallel of Venus in mundo by Direct Direction, as Placidus would call it, but which, in reality, is the direction of Venus to the parallel of the Sun by Converse Direction: but I suppose we must not call it so, for fear of offending those who have always been used to call such directions by the other name.

S. 173.—The Sun to the Sextile of Venus in Mundo by Direct Direction.

Here Venus will be, when the direction is complete, as far from the ninth on the west side as the Sun is distant from the eleventh house on its west side; and therefore the resulting proportion or fourth number must be added to ⅓ of Venus' S. D. Arc 36° 20′, because when Venus is ⅓ of her S. D. Arc from the tenth (westerly), Venus will then be on her cusp of the ninth house. Then we say by

S. 174.—*Analogy.*

			P. Logar.
As the Semi-diurnal Arc of the Sun (co-arc)	102°	47′	= 9·7567
Is to the Sun's distance from the eleventh	2	11	1·9161
So is Venus' Semi-diurnal Arc	109	1	0·2178
To Venus' proportional distance from the ninth	2	19	= 1·8906
To which add ⅓ S. D. Arc of Venus	36	20	
Their sum is the secondary distance	38	39	of Venus
from the tenth house, from which subtract the primary distance	15	30	
The Arc of Direction of ☉ * ♀ in M. D. D. is	23	9	

S. 175.—*Note.* We might have used ⅓ the Semi-arc of each planet in the above Analogy; but I prefer, when it can be done, to use the whole Semi-Arc, because the resulting logarithm generally will be more correct than by using parts only of the Semi-Arcs.

The above is, I believe, the shortest method of working this direction (except by the planispheres). We might have the Sun's distance from the tenth, and then we should have had to find Venus' distance from the eighth house towards the east for the place where the sextile of the Sun would be completed by Venus; but this last method, as it is usually done, would be much more trouble than the process as performed above.

S. 176.—We will, by way of example, take the distance of Venus from the eighth house; thus, from ⅔ S. D. Arc of ♀ .... 72° 40′
Subtract Venus' distance from the tenth 15 30

There remains the primary distance of ♀ from the eighth.. = 57 10

This distance could be found several other ways; but none so easy and concise as the method just made use of. Then by the

S. 177.—*Analogy.*

As ⅓ Semi-diurnal Arc of the Sun (co-arc)	34°	16′	9·2796
Is to the Sun's distance from the tenth	32	5	0·7490
So is ⅓ Semi-diurnal Arc of Venus.....	36	20	0·6950
To Venus' secondary distance from the eighth.....	34	1	·7236

Then from Venus' primary distance from the eighth 57 10
Subtract the secondary distance 34 1

The Arc of Direction of ☉ * ♀ in M. D. D. as before 23 9

There are several other ways of obtaining the distance of Venus from the eighth house, as by adding the mundane * of ♀ to the R. A. of the tenth, and subtracting the R. A. of ♀ from that sum, or by taking the distance of ♀ from the west angle, and subtracting the space of one house, &c.

S. 178.—THE SUN TO THE PARALLEL OF VENUS IN MUNDO BY CONVERSE DIRECTION.

The Proportion is thus stated, &c.

			P. Logar.
As the Semi-diurnal Arc of Venus (co-arc).....	109°	1′	=9·7822
Is to Venus's distance from the tenth.....	15	30	1·0649
So is the Semi-diurnal Arc of the Sun	102	47	0·2433
To the Sun's secondary distance from the tenth..	14	37	1·0904

Then from the Sun's primary distance from the tenth 32 5
Subtract his secondary distance 14 37

The Arc of Direction of ☉ Par. ♀ M. D. C. will be 17 28

S. 179.—THE SUN TO THE BODY OF VENUS IN MUNDO BY CONVERSE MOTION.

The full calculation of the direction is subjoined.

			P. Logar.
As the Semi-diurnal Arc of Venus (co-arc)	109°	1′	9·7822
Is to her distance from the midheaven	15	30	1·0649
So is the Semi-diurnal Arc of the Sun	102	47	0·2433
To the Sun's secondary distance	14	37	1·0904
Add the Sun's primary distance	32	5	
The Arc of Direction of	46	42	of the Sun

to the conjunction or body of Venus in Mundo by Converse Direction; and although the statement of the question and the result as regards the fourth number, 14° 37′, is precisely as before, it was nevertheless quite proper to work it out at full length. It will be observed in this direction, that the direction is finished in a different quadrant of the figure to that in which the Sun is posited at first, and therefore the primary and secondary distances are added to produce the Arc of Direction.

S. 180.—OF COMPOUND PARALLELS IN MUNDO, COMMONLY CALLED RAPT PARALLELS.

In this kind of directions two planets are considered as being carried onward at the same time by their converse motion in Mundo, so that each planet according to its respective semi-arc, or double horary times, is placed at the same proportional distance from a certain angle as another planet is placed, according to the other planet's semi-arc, &c., one planet being placed before the given angle, and the other planet being placed after the said angle at the moment the direction is completed: this is called a Rapt Parallel.

In calculating these Rapt Parallels we must use $\frac{1}{3}$ the semi-arc of each planet, or otherwise we could not work them by the proportional logarithms, which only extend as far as 180 degrees, as the sum of two planets' demi-arcs often exceeds 180°.

S. 181.—When this kind of Parallel is formed upon either the tenth or fourth house, the Right Ascension of one is subtracted from the Right Ascension of the other planet; the difference is called the Right Distance, which reserve. When the two planets form the said parallel to the eastern horizon or first house, then the distance between the two planets is taken in oblique ascensions for the latitude of birth. But, if the parallel be made to the west angle, the planets' distances are taken in the oblique descensions of the same latitude of birth. The sum of both the planets' semi-arcs, or, as before observed, one-third thereof (will be better), is used, together with the right or oblique distance between the two planets, as in the

following example in the Geniture of Napoleon. Let it be required to direct,

S. 182.—The Sun to the Rapt Parallel of Saturn.

From the Right Ascension of the Sun	145° 4′
Subtract the Right Ascension of Saturn	117 46
There remains the Right Distance	27 18
The Double Horary Times of the Sun	34 16
The Double Horary Times of Saturn	36 41
Sum of both Planets' Double Horary Times	70 57
From the Right Ascension of Saturn	117 46
Subtract the Right Ascension of the Midheaven	112 59
Saturn's Primary Distance	4 47

S. 183.—The Proportion is thus stated:—

		P. Logar.
As the sum of both Double Horary Times (co-arc.)	70° 57′	9·5957
Is to the Double Horary Times of Saturn	36 41	·6908
So is the Distance in Right Ascension	27 18	·8191
To Saturn's Secondary Distance	14 7	1·1056
To which add Saturn's Primary Distance from the 10th	4 47	
And the Arc of Direction of ☉ R. Par. ♄	18 54	

And by proceeding in a similar manner, you may calculate any other compound or Rapt Parallels of the Planets.

EXEMPLIFICATION.

S. 184.—Of Formula No. 8.

Let it be required to find what degree of the Ecliptic ascends when the O. A. is exactly 90° from ♈ 0° 0′ and 90° from ♎ 0° 0′ at London, Latitude 51° 31′ North.

As Radius sine of	90° 0′	10·00000
Is to Sine of	23 28	9·60012
So is Tangent of Latitude	51 31	10·09965
Resulting number is		9·69977

When the O. A. is exactly 90°, the resulting number is the Tangent of 26° 36′ from 0° ♋ 0′, namely, 26° 36′ ♋ ascends; but when the O. A. is 90° from 0° ♎, then the resulting logarithm is the Co-tang. of 63° 24′ from 0° ♎ 0′, therefore 3° 24′ of ♐ ascends.

SECTION 185.

A LIST OF BOOKS OF MATHEMATICAL TABLES,

PROMISED IN SECTION 66.

VERY USEFUL TO THE ASTRONOMICAL STUDENT.

1st. Trotter's Tables of Sines and Tangents to six figures besides the Index, with a Table of the Logarithms of all numbers to 10,000. This is a very good book, and very cheap. Price 3s.

2d. *Logarithmic and Trigonometric Tables,* to *seven* places of Decimals; the Logarithms of the natural numbers 100,000, and the Log. Sines, Tangents, Co-sines, and Co-tangents to every *ten seconds* for the first five degrees, and to every *thirty seconds* for the remainder of the Quadrant. The Logarithmic *difference* is given for each *ten seconds* of the Sines and Tangents, whereby the results of calculation can be readily found *to a second.* Price 12s. in cloth boards. After Taylor and Callet's large and *expensive* Tables, the Book No. 2 of this list comes next. The Tables are well arranged, the type most beautiful and distinct, and to those Students who can afford the purchase, I think it my duty to recommend this very commodious and excellent Book of Tables in the strongest terms of commendation. No. 1 and 2 are published by Simpkin, Marshall, and Co. London.

Note.—If I have forgot to remark elsewhere in this Book, I will here inform the Student, that with Tables like those of No. 2 aforesaid, he can, by using seven figures besides the Index, push his calculations to the greatest exactness; but when he does not wish for such extreme precision, but desires expedition in his calculations, he may use six or five figures only, besides the Index; but suppose he has Tables with only five Decimals, he cannot by any *means supply* the wanting figures, nor be exact in his calculations.

3d. Tables requisite to be used with the Nautical Almanack. Price 5s. The second and later editions of the Requisite Tables have the Logarithmic Sines to six Decimals, and the Tangents to five places; they also contain a Table of Proportional Logarithms for three degrees, and for every second in the three degrees; by changing the titles in this Table, viz. marking the minutes as degrees, and the seconds as minutes, the student will have a Table of Proportional Logarithms for 180 degrees, and for every minute in the 180°. A table of vast utility to every student in the Celestial Sciences, as he may see by the various examples of direction, &c. calculated by the same Tables; and the places of the Planets to any hour and minute in the twenty-four hours may be easily found by these Proportional Logarithms, &c. Then the Proportional Logarithm of 24 degrees will be the P. Log. of twenty-four hours. See an example in section (S. 287 A), the answer or proportional found in this manner, and added to the Planet's longitude on the preceding noonday, will be the longitude of the Planet for the time given, if the Planet be direct; but when the Planet is retrograde, it must be subtracted therefrom.

S. 185 A.—I have mentioned the American Land Clearing Machines, &c. in the preface. The Land Clearing Machines can be worked either by men or by horses; but in reference to the American Land Clearing Engine, it is a locomotive saw mill, worked by steam, and, like the land clearing machines, leaves no stump standing up, but cuts the trees down level with the ground, so that a carriage may pass over where the tree before stood. I invented them in the year 1817. Not being a citizen, I could not take out a patent, but afterwards made interest; and these inventions were patented to me by a special Act of the American Congress, on the 3d of March, 1821.

T. OXLEY.

CHAPTER IX,

BEING THE

SECOND PART

OF THE

GEM OF THE ASTRAL SCIENCES.

Oxley's abridged Tables of Right Ascensions and Declinations.

S. 186.—TABLE No. 1. The Sun's Declination to every Degree of his Longitude, with the Differences to the nearest Second.

Deg.	0 ♈ North, 6 ♎ South Declin.	Diff.	1 ♉ North, 7 ♏ South Declin.	Diff.	2 ♊ North, 8 ♐ South Declin.	Diff.	Deg.
	° ′ ″	′ ″	° ′ ″	′ ″	° ′ ″	′ ″	
0	0 0 0	23 53	11 29 5	21 1	20 10 25	12 32	30
1	23 53	23 54	11 50 6	20 50	20 22 57	12 10	29
2	47 47	23 52	12 10 56	20 38	20 35 7	11 48	28
3	1 11 39	23 51	12 31 34	20 25	20 46 55	11 25	27
4	1 35 30	23 50	12 51 59	20 13	20 58 20	11 1	26
5	1 59 20	23 48	13 12 12	20 0	21 9 21	10 38	25
6	2 23 8	23 46	13 32 12	19 46	21 19 59	10 14	24
7	2 46 54	23 43	13 51 58	19 32	21 30 13	9 50	23
8	3 10 37	23 40	14 11 30	19 18	21 40 3	9 26	22
9	3 34 17	23 37	14 30 48	19 3	21 49 29	9 1	21
10	3 57 54	23 33	14 49 51	18 49	21 58 30	8 36	20
11	4 21 27	23 30	15 8 40	18 33	22 7 6	8 11	19
12	4 44 57	23 25	15 27 13	18 17	22 15 17	7 46	18
13	5 08 22	23 20	15 45 30	18 1	22 23 3	7 21	17
14	5 31 42	23 15	16 3 31	17 45	22 30 24	6 54	16
15	5 54 57	23 9	16 21 16	17 28	22 37 18	6 29	15
16	6 18 6	23 3	16 38 44	17 11	22 43 47	6 3	14
17	6 41 9	22 57	16 55 55	16 53	22 49 50	5 37	13
18	7 4 6	22 51	17 12 48	16 35	22 55 27	5 11	12
19	7 26 57	22 44	17 29 23	16 17	23 0 38	4 44	11
20	7 49 41	22 36	17 45 40	15 58	23 5 22	4 17	10
21	8 12 17	22 28	18 1 38	15 40	23 9 39	3 50	9
22	8 34 45	22 20	18 17 18	15 20	23 13 29	3 24	8
23	8 57 5	22 12	18 32 38	15 0	23 16 53	2 57	7
24	9 19 17	22 2	18 47 38	14 40	23 19 50	2 30	6
25	9 41 19	21 53	19 2 18	14 19	23 22 20	2 2	5
26	10 3 12	21 44	19 16 37	13 58	23 24 22	1 35	4
27	10 24 56	21 34	19 30 35	13 38	23 25 57	1 8	3
28	10 46 30	21 23	19 44 13	13 17	23 27 5	0 41	2
29	11 7 53	21 12	19 57 30	12 55	23 27 46	0 14	1
30	11 29 5		20 10 25		23 28 0		0
Deg.	Declin. 11 ♐ South, 5 ♑ North.	Diff.	Declin. 10 ♒ South, 4 ♌ North.	Diff.	Declin. 9 ♓ South, 3 ♋ North.	Diff.	Deg.

Table 2.

The Right Ascension of the Sun or of a Planet without Latitude for every Degree of the Zodiac; these numbers being given to the nearest tenth of a minute of a Degree, with the Differences in minutes and tenth parts, for expeditiously finding the correct Right Ascensions.

Section 187.

Deg.	♈	Diff.	♉	Diff.	♊	Diff.	♋	Diff.	♌	Diff.	♍	Diff.
	° ′ dec.	′ dec.	° ′ dec.	′ dec.	° ′ dec.	′ dec.	° ′ dec.	′ dec.	° ′ dec.	′ dec.	° ′ dec.	′ dec.
0			27 54·3	57·4	57 48·7	62·5	90 0·0	65·4	122 11·2	62·4	152 5·7	57·3
1	55·0	55·1	28 51·7	57·5	58 51·2	62·8	91 5·4	65·4	123 13·6	62·2	153 3·0	57·0
2	1 50·1	55·0	29 49·2	57·7	59 54·0	62·9	92 10·8	65·4	124 15·8	62·1	154 0·0	57·0
3	2 45·1	55·1	30 46·9	57·8	60 56·9	63·0	93 16·2	65·4	125 17·9	61·8	154 57·0	56·8
4	3 40·2	55·1	31 44·7	58·0	61 59·9	63·3	94 21·6	65·3	126 19·7	61·5	155 53·8	56·7
5	4 35·3	55·1	32 42·7	58·2	63 3·2	63·3	95 26·9	65·3	127 21·2	61·7	156 50·5	56·6
6	5 30·4	55·1	33 40·9	58·2	64 6·5	63·5	96 32·2	65·2	128 22·9	61·3	157 47·1	56·5
7	6 25·5	55·2	34 39·1	58·5	65 10·0	63·7	97 37·4	65·2	129 24·2	61·2	158 43·6	56·3
8	7 20·7	55·3	35 37·6	58·7	66 13·7	63·8	98 42·6	65·2	130 25·4	60·9	159 39·9	56·2
9	8 16·0	55·2	36 36·3	58·8	67 17·5	63·9	99 47·8	65·1	131 26·3	60·8	160 36·1	56·2
10	9 11·3	55·3	37 35·1	58·9	68 21·4	64·1	100 52·9	65·0	132 27·1	60·6	161 32·3	56·0
11	10 6·6	55·4	38 34·0	59·2	69 25·5	64·2	101 57·9	64·9	133 27·7	60·4	162 28·3	55·9
12	11 2·0	55·4	39 33·2	59·3	70 29·7	64·3	103 2·8	64·8	134 28·1	60·2	163 24·2	55·9
13	11 57·4	55·5	40 32·5	59·5	71 34·0	64·4	104 7·6	64·8	135 28·3	60·1	164 20·1	55·6
14	12 52·9	55·6	41 32·0	59·7	72 38·4	64·5	105 12·4	64·6	136 28·4	59·9	165 15·7	55·8
15	13 48·5	55·7	42 31·7	59 9	73 42·9	64·7	106 17·0	64·6	137 28·3	59·7	166 11·5	55·6
16	14 44·2	55·7	43 31·6	60·0	74 47·6	64·7	107 21·6	64·4	138 28·0	59·4	167 7·1	55·5
17	15 39·9	55·9	44 31·6	60·3	75 52·3	64·9	108 26·0	64·3	139 27·4	59·4	168 2·6	55·4
18	16 35·8	55·9	45 31·9	60·4	76 57·2	64·9	109 30·3	64·2	140 26·8	59·2	168 58·0	55·4
19	17 31·7	56·0	46 32·3	60·6	78 2·1	65·0	110 34·5	64·1	141 26·0	58·9	169 53·4	55·3
20	18 27·7	56·1	47 32·9	60·8	79 7·1	65·1	111 38·6	63·9	142 24·9	58·8	170 48·7	55·3
21	19 23·8	56·3	48 33·7	60·9	80 12·2	65·1	112 42·5	63·8	143 23·7	58·7	171 44·0	55·3
22	20 20·1	56·3	49 34·6	61·2	81 17·3	65·2	113 46·3	63·7	144 22·4	58·4	172 39·3	55·1
23	21 16·4	56·5	50 35·8	61·3	82 22·5	65·3	114 50·0	63·5	145 20·8	58·3	173 34·4	55·2
24	22 12·9	56·6	51 37·1	61·5	83 27·8	65·3	115 53·5	63·3	146 19·1	58·2	174 29·6	55·1
25	23 9·5	56·7	52 38·6	61·7	84 33·1	65·3	116 56·8	63·2	147 17·3	58·0	175 24·7	55·1
26	24 6·2	56·8	53 40·3	61·8	85 38·4	65·4	118 0·0	63·1	148 15·3	57·8	176 19·8	55·1
27	25 3·0	57·0	54 42·1	62·1	86 43·8	65·4	119 3·1	62·9	149 13·1	57·7	177 14·9	55·0
28	26 0·0	57·0	55 44·2	62·2	87 49·2	65·4	120 6·0	62·7	150 10·8	57·5	178 9·9	55·1
29	26 57·0	57·3	56 46·4	62·3	88 54·6	65·4	121 8·7	62·5	151 8·2	57·4	179 5·0	55·0
30	27 54·3		57 48·7		90 0·0		122 11·2		152 5·7		180 0·0	
	♈		♉		♊		♋		♌		♍	

S. 188.—*Remarks on this Table.* This Table, for finding the Right Ascension of the Sun or the Right Ascension of a Planet without latitude, is abridged from the Manuscript Tables that I calculated true to seconds all throughout the whole circle. The exactness of seconds is not required by the student of the Celestial Sciences; the nearest minute of a degree is sufficiently exact for his purposes: but, then, in order to have the nearest minute, we must have a fraction smaller than a minute. I have, therefore, reduced the seconds into tenths of a minute, so that 1-tenth is equal to 6 seconds, 2-tenths to 12 seconds, 3-tenths to 18 seconds, 4 tenths to 24 seconds, 5 tenths to 30 seconds;

TABLE 2.

The Second Part for finding Right Ascensions of the Sun and of any Planet without Latitude.

deg.	♎	Diff.	♏	Diff.	♐	Diff.	♑	Diff.	♒	Diff.	♓	Diff.
	° ′ dec.	′ dec.	° ′ dec.	′ dec.	° ′ dec.	′ dec.	° ′ dec.	′ dec.	° ′ dec.	′ dec.	° ′ dec.	′ dec.
0	180 0·0	55·0	207 54·3	57·4	237 48·7	62·5	270 0·0	65·4	302 11·2	62·4	332 5·7	57·8
1	180 55·0	55·1	208 51·7	57·5	238 51·2	62·8	271 5·4	65·4	303 13·6	62·2	333 3·0	57·0
2	181 50·1	55·0	209 49·2	57·7	239 54·0	62·9	272 10·8	65·4	304 15·8	62·1	334 0·0	57·0
3	182 45·1	55·1	210 46·9	57·8	240 56·9	63·0	273 16·2	65·4	305 17·9	61·8	334 57·0	56·8
4	183 40·2	55·1	211 44·7	58·0	241 59·9	63·3	274 21·6	65·3	306 19·7	61·5	335 53·8	56·7
5	184 35·3	55·1	212 42·7	58·2	243 3·2	63·3	275 26·9	65·3	307 21·2	61·7	336 50·5	56·6
6	185 30·4	55·1	213 40·9	58·2	244 6·5	63·5	276 32·2	65·2	308 22·9	61·3	337 47·1	56·5
7	186 25·5	55·2	214 39·1	58·5	245 10·0	63·7	277 37·4	65·2	309 24·2	61·2	338 43·6	56·3
8	187 20·7	55·3	215 37·6	58·7	246 13·7	63·8	278 42·6	65·2	310 25·4	60·9	339 39·9	56·2
9	188 16·0	55·2	216 36·3	58·8	247 17·5	63·9	279 47·8	65·1	311 26·3	60·8	340 36·1	56·2
10	189 11·3	55·3	217 35·1	58·9	248 21·4	64·1	280 52·9	65·0	312 27·1	60·6	341 32·3	56·0
11	190 6·6	55·4	218 34·0	59·2	249 25·5	64·2	281 57·9	64·9	313 27·7	60·4	342 28·3	55·9
12	191 2·0	55·4	219 33·2	59·3	250 29·7	64·3	283 2·8	64·8	314 28·1	60·2	343 24·2	55·9
13	191 57·4	55·5	220 32·5	59·5	251 34·0	64·4	284 7·6	64·8	315 28·3	60·1	344 20·1	55·6
14	192 52·9	55·6	221 32·0	59·7	252 38·4	64·5	285 12·4	64·6	316 28·4	59·9	345 15·7	55·8
15	193 48·5	55·7	222 31·7	59·9	253 42·9	64·7	286 17·0	64·6	317 28·3	59·7	346 11·5	55·6
16	194 44·2	55·7	223 31·6	60·0	254 47·6	64·7	287 21·6	64·4	318 28·0	59·4	347 7·1	55·5
17	195 39·9	55·9	224 31·6	60·3	255 52·3	64·9	288 26·0	64·3	319 27·4	59·4	348 2·6	55·4
18	196 35·8	55·9	225 31·9	60·4	256 57·2	64·9	289 30·3	64·2	320 26·8	59·2	348 58·0	55·4
19	197 31·7	56·0	226 32·3	60·6	258 2·1	65·0	290 34·5	64·1	321 26·0	58·9	349 53·4	55·3
20	198 27·7	56·1	227 32·9	60·8	259 7·1	65·1	291 38·6	63·9	322 24·9	58·8	350 48·7	55·3
21	199 23·8	56·3	228 33·7	60·9	260 12·2	65·1	292 42·5	63·8	323 23·7	58·7	351 44·0	55·3
22	200 20·1	56·3	229 34·6	61·2	261 17·3	65·2	293 46·3	63·7	324 22·4	58·4	352 39·3	55·1
23	201 16·4	56·5	230 35·8	61·3	262 22·5	65·3	294 50·0	63·5	325 20·8	58·3	353 34·4	55·2
24	202 12·9	56·6	231 37·1	61·5	263 27·8	65·3	295 53·5	63·3	326 19·1	58·2	354 29·6	55·1
25	203 9·5	56·7	232 38·6	61·7	264 33·1	65·3	296 56·8	63·2	327 17·3	58·0	355 24·7	55·1
26	204 6·2	56·8	233 40·3	61·8	265 38·4	65·4	298 0·0	63·1	328 15·3	57·8	356 19·8	55·1
27	205 3·0	57·0	234 42·1	62·1	266 43·8	65·4	299 3·1	62·9	329 13·1	57·7	357 14·9	55·0
28	206 0·0	57·0	235 44·2	62·2	267 49·2	65·4	300 6·0	62·7	330 10·8	57·5	358 9·9	55·1
29	206 57·0	57·3	236 46·4	62·3	268 54·6	65·4	301 8·7	62·5	331 8·3	57·4	359 5·0	55·0
30	207 54·3		237 48·7		270 0·0		302 11·2		332 5·7		360 0·0	
	♎		♏		♐		♑		♒		♓	

30 seconds; 6 tenths to 36 seconds; 7 tenths to 42 seconds; 8 tenths to 48 seconds; and 9 tenths to 54 seconds: with a little practice the student will use these Tables more expeditiously than the common tables hitherto in use. I have given the difference of Right Ascension between every degree throughout the twelve signs, so that without any more trouble, but a move on the middle piece of the sliding Gunter, he may instantly get the proportional part in minutes and tenths; which add to the next less degree of the Sun's longitude in these Tables, will be the Right Ascension of the Sun, true to the nearest tenth of a minute.

TABLE 3.

Oxley's Abridged Table of Equations, or Equivalents for expeditiously finding the Planets' Declinations with Latitude.

With North Latitude in ♈ ♉ ♊.
With South Latitude in ♎ ♏ ♐.

	Deg.	1	2	3	4	5	6	7	8	9	
		° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	
♈ ♎	0	0 55	1 50	2 45	3 40	4 35	5 30	6 25	7 20	8 15	30
	5	0 55	1 50	2 45	3 40	4 35	5 30	6 25	7 20	8 15	25
	10	0 55	1 50	2 46—	3 41	4 36	5 31	6 26	7 21	8 16	20
	15	0 55½	1 50½	2 46—	3 41	4 36½	5 31½	6 26½	7 22—	8 17	15
	20	0 56—	1 51	2 46½	3 42	4 37½	5 33—	6 28½	7 23½	8 19	10
	25	0 56	1 52	2 48	3 44	4 39	5 35	6 30	7 26	8 22	5
	30	0 56	1 52	2 48	3 44	4 40	5 36	6 32	7 28	8 24	0 ♍ ♑
♉ ♏	0	0 56	1 52	2 48	3 44	4 40	5 36	6 32	7 28	8 24	30
	5	0 57	1 53	2 50	3 46	4 43	5 39	6 35	7 31	8 28	25
	10	0 57	1 54	2 51	3 47	4 44	5 41	6 38	7 34	8 31	20
	15	0 57	1 54	2 51	3 48	4 46	5 43	6 40	7 37	8 34	15
	20	0 57	1 55	2 52	3 50	4 48	5 45	6 42	7 40	8 38	10
	25	0 58	1 56	2 55	3 53	4 51	5 49	6 47	7 45	8 43	5
	30	0 58¼	1 57—	2 55+	3 54	4 52½	5 51	6 49½	7 48	8 46½	0 ♌ ♒
♊ ♐	0	0 58¼	1 57—	2 55+	3 54	4 52½	5 51	6 49½	7 48	8 46½	30
	5	0 59	1 58	2 57	3 56	4 55	5 54	6 53	7 52	8 51	25
	10	1 0—	1 59	2 58	3 57	4 56	5 55	6 54	7 53	8 52	20
	15	1 0—	1 59	2 59	3 59	4 58	5 58	6 57	7 56	8 56	15
	20	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10
	25	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	5
	30	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	0 ♋ ♓
		1	2	3	4	5	6	7	8	9	

With North Latitude in ♋ ♌ ♍.
With South Latitude in ♑ ♒ ♓.

RULES

For using these new Tables of Equations, or Equivalents of Declination.

S. 190.—*Rule First.*

If the longitude and latitude of the planet are both north or both south, add the Equation or Equivalent found in the Tables (together with the proportion due for the odd minutes of latitude) to the Ecliptic Declination of the planet, the Sun will be the planet's Declination as required with latitude.

S. 191.—*Rule Second.*

When the longitude and latitude of the planet are of different names, one of them being north and the other south, proceed thus. If the Equivalent is a less sum than the Ecliptic Declination, subtract the Equivalent from the Ecliptic Declination, and the remainder will be the planet's declination of the same name as the longitude: but if the equivalent be greater than the Ecliptic Declination belonging to the planet's longitude, we must subtract the Ecliptic Declination from the Equivalent, and the remainder will be the planet's Declination with latitude, which Declination will be of a contrary name to the planet's longitude. This often happens when a planet has great south latitude in the first ten degrees of Aries, or in the last ten degrees of Virgo; or, when a planet has great north latitude in the first ten degrees of Libra, or the last ten degrees of Pisces.

Table 4.

S. 192.—Oxley's abridged Table of Equations, or Equivalents for expeditiously finding the Planets' Declinations with Latitude.

With South latitude in . . . ♈ ♉ ♊
With North latitude in . . . ♎ ♏ ♐

	DEG.	1	2	3	4	5	6	7	8	9	DEG.	
♈ ♎	0	0 55	1 50	2 45	3 40	4 35	5 30	6 25	7 20	8 15	30	
	5	0 55	1 50	2 46	3 41	4 36	5 31	6 26	7 21	8 16	25	
	10	0 55	1 50+	2 46	3 41	4 36	5 31	6 26	7 21	8 16	20	
	15	0 55	1 50+	2 46	3 41	4 37	5 32	6 27	7 23	8 18	15	
	20	0 56	1 52	2 48	3 44	4 40	5 35	6 31	7 26	8 21	10	
	25	0 56	1 52	2 48	3 44	4 40	5 35	6 31	7 26	8 22	5	
	30	0 56	1 52	2 48	3 44	4 40+	5 36	6 32	7 28	8 24	0	♍ ♓
♉ ♏	0	0 56	1 52	2 48	3 44	4 40	5 36	6 32	7 28	8 24	30	
	5	0 56	1 53	2 50	3 46	4 43	5 39	6 35	7 32	8 29	25	
	10	0 57	1 54	2 51	3 48	4 45	5 42	6 39	7 36	8 33	20	
	15	0 58	1 55	2 52	3 49	4 47	5 44	6 41	7 38	8 36	15	
	20	0 58	1 56	2 54	3 52	4 50	5 47	6 45	7 42	8 40	10	
	25	0 58+	1 56	2 54	3 52	4 51	5 49	6 48	7 45	8 43	5	
	30	0 59	1 58	2 56	3 55	4 54	5 53	6 52	7 51	8 49	0	♌ ♒
♊ ♐	0	0 59	1 58	2 56	3 55	4 54	5 53	6 52	7 51	8 49	30	
	5	0 59	1 58	2 57	3 56	4 55	5 54	6 53	7 52	8 51	25	
	10	0 59	1 58	2 57	3 57	4 56	5 56	6 55	7 54	8 54	20	
	15	1 0—	2 0—	3 0—	3 59	4 59	5 59	6 58	7 58	8 58	15	
	20	1 0	2 0—	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10	
	25	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	5	
	30	1 0	2	3 0	4 0	5 0	6 0	7 0	8 0	9 0	0	♋ ♍
		1	2	3	4	5	6	7	8	9		

With South latitude in . . . ♋ ♌ ♍
With North latitude in . . . ♍ ♒ ♓

S. 193.—Note. The figures 1, 2, 3 to 9, at the top and bottom of each Table, shew the degrees of the Planets' latitude; 0, 5, 10, 15, &c., shew every fifth degree of the Planets' longitude. The Equations belonging to these degrees of longitude and latitude are found in the angle of meeting in each Table, thus:— A Planet with 1 degree of latitude in 10 of ♈, the Equation is 0° 55′; but for 4 degrees of latitude the Equation is 3° 41′, and + put after an Equation indicates it is a little more than that number; but — put after an Equation indicates it is a fractional part of a minute less, too little to be expressed. Having sufficiently explained the contents of these six new astronomical Tables, I shall now endeavour to shew their application to the Celestial Sciences, in as clear a manner as the nature of the subject will permit, by various Examples.

Example 1.

S. 194.—In the Geniture of the Emperor Napoleon. Required the Declination of the Sun in 22° 43′ ♌. Here we refer to Table No. 1, and we find that, between the 22d and 23d degree of ♌, the difference of declination is 0° 19′ 32″, the declination is decreasing; then by analogy say, as 60′ : 19′ 32″ : : 43′ : 14′ 0″.

The declination of 22 ♌ is	14° 11′ 30″
Subtract the proportional part for 43′, because the declination in ♌ decreases	0 14
Declination of the Sun required	13 57 30 N.

Table 5.

S. 195.—Oxley's abridged Tables of Equations for finding the Planets' Right Ascensions with Latitude.

With North latitude in ♈ ♉ ♊ } Subtract.
With South latitude in ♎ ♏ ♐ }

	DEG.	1	2	3	4	5	6	7	8	9	DEG.	
♈ ♎	0	0 24—	0 48	1 12	1 36	2 0	2 24	2 47	3 12	3 37	30	
	5	0 24—	0 48—	1 12	1 36	2 0—	2 24—	2 47	3 11	3 36	25	
	10	0 24—	0 47	1 11	1 35	1 59	2 23	2 47	3 11—	3 36—	20	
	15	0 23	0 47—	1 10	1 34	1 58—	2 22—	2 46	3 10	3 34	15	
	20	0 23—	0 46	1 8	1 32½	1 56	2 20—	2 43	3 7	3 31	10	
	25	0 22	0 45—	1 7½	1 30	1 53	2 16	2 40	3 4	3 28	5	
	30	0 22—	0 43	1 5	1 27	1 50	2 12	2 35	2 58	3 21½	0	♍ ♓
♉ ♍	0	0 22—	0 43	1 5	1 27	1 50	2 12	2 35	2 58	3 21½	30	
	5	0 21—	0 42—	1 3—	1 24	1 45½	2 7	2 29	2 52	3 15	25	
	10	0 20—	0 39½	0 59½	1 20	1 40—	2 1	2 23	2 44	3 7	20	
	15	0 18	0 37	0 56—	1 15	1 34	1 54	2 13	2 33—	2 55	15	
	20	0 17	0 34	0 52—	1 9	1 27	1 45	2 4	2 22—	2 39	10	
	25	0 15½	0 31	0 47—	1 3	1 19	1 36	1 53	2 10	2 26	5	
	30	0 14—	0 27½	0 41½	0 56	1 10	1 25	1 40	1 55	2 11	0	♌ ♒
♊ ♐	0	0 14—	0 27½	0 41½	0 56	1 10	1 25	1 40	1 55	2 11	30	
	5	0 12—	0 23½	0 35½	0 48—	1 0	1 13—	1 26	1 39	1 52	25	
	10	0 9½	0 19	0 29	0 39	0 49	1 0—	1 11	1 21	1 32	20	
	15	0 7¼	0 14¾	0 22¼	0 30—	0 37¾	0 45¾	0 54	1 2	1 11	15	
	20	0 5—	0 10—	0 15	0 20½	0 25½	0 31	0 37	0 42	0 49	10	
	25	0 2½	0 5	0 7½	0 10¼	0 13	0 15½	0 18	0 22	0 26	5	
	30	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0	♋ ♈
		1	2	3	4	5	6	7	8	9		

In ♋ ♌ ♍ for North latitude } Add the Tabular Equations to the
In ♈ ♎ ♓ for South latitude } Ecliptic Right Ascensions.

S. 196.—*Example* 1*st brought over.* These Sexagesimal proportions may be found by different methods. If we work by the proportional logarithms, we must, instead of 60 for the first Term, use 9·5229 as a constant number, which, added to the proportional logarithms of the second and third terms, their sum, rejecting radius, will be the proportional logarithm of the answer required.

As 60′	60′ 0″	9·5229
Is to the difference	19 32	·9645
So is	43 0	·6918
To proportional logarithm of	14 0	1·1092

S. 197.—Or, still more briefly, by the logistical logarithms:—

Add logistical logarithm of	19′ 32″	4874
To logistical logarithm of .	40 0	1447
The logistical logarithm of	14 0	
	Answer .	6321

S. 198.—This is done by way of shewing how we may come within one or two seconds; but, as before observed, the nearest minute of a degree in the Sun or planets' Declination, &c., and we might instantly get the part proportional by the 2-foot sliding Gunter. Thus:—Opposite to 60′ on A place 19′ 5″ on B (the slide), then opposite to 43′ on A you will find 14′, very nearly, on B: by my sliding Gunter it is $13\frac{99}{100}$.

Table 6.

S. 199.—Oxley's abridged Equation Tables for finding the Planets' Right Ascension with Latitude.

With South Latitude in ♈ ♉ ♊ } Add.
With North Latitude in ♎ ♏ ♐ }

	DEG.	1	2	3	4	5	6	7	8	9	DEG.	
♈♎	0	0 24	0 48	1 12	1 36—	2 0—	2 24—	2 47	3 12	3 36	30	
	5	0 24	0 48—	1 11	1 35	1 59	2 23	2 47	3 11	3 34	25	
	10	0 24 —	0 47	1 11	1 34	1 58	2 21	2 46	3 8	3 31	20	
	15	0 23½	0 47—	1 10—	1 33—	1 56	2 19	2 43	3 6	3 28	15	
	20	0 23—	0 46—	1 8	1 31—	1 53	2 16	2 39	3 2	3 24	10	
	25	0 22	0 44	1 6	1 28	1 50	2 12	2 34	2 56	3 18	5	
	30	0 21	0 43 —	1 4	1 25	1 46	2 7	2 28	2 49	3 10	0	♍♑
♉♍	0	0 21	0 43—	1 4	1 25	1 46	2 7	2 28	2 49	3 10	30	
	5	0 21—	0 41	1 1	1 21	1 42—	2 2—	2 22	2 41	3 0	25	
	10	0 19½	0 39—	0 58	1 17	1 36	1 55	2 14	2 33	2 51	20	
	15	0 18	0 36	0 54	1 12	1 30—	1 47	2 5	2 22	2 39	15	
	20	0 17—	0 33½	0 50	1 6	1 23—	1 39	1 56	2 11	2 25	10	
	25	0 15	0 30	0 45	1 0	1 15	1 29	1 44	1 58	2 10	5	
	30	0 13	0 27—	0 40—	0 53	1 6—	1 19	1 32	1 44	1 55	0	♌♒
♊♐	0	0 13	0 27—	0 40—	0 53	1 6—	1 19	1 32	1 44	1 55	30	
	5	0 11½	0 23—	0 34	0 45	0 56	1 7	1 18	1 29	1 38	25	
	10	0 9—	0 19—	0 28—	0 37	0 46	0 55	1 4	1 12	1 19	20	
	15	0 7	0 14	0 21	0 28	0 35	0 42	0 49	0 55	1 0—	15	
	20	0 5	0 10—	0 14	0 19	0 24	0 28	0 33	0 37	0 41	10	
	25	0 2½	0 5—	0 7¼	0 9½	0 12—	0 14	0 17	0 18	0 20	5	
	30	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0	♋♑
		1	2	3	4	5	6	7	8	9		

With South Latitude in ♋ ♌ ♍ } Subtract these Tabu-
With North Latitude in ♑ ♒ ♓ }
lar Equations from the Ecliptic Right Ascensions.

S. 200.—*Example* 2.

Let be required by these New Tables to find the Right Ascension of the Sun in 22° 43′ ♌.

Here we look into Table No. 2, and we find that between the 22d and 23d degrees of ♌ the difference in Right Ascension is 58° 4′.

Then, by proportion, as 60′ : 58′·4 : : 43 : 41·8.

The Right Ascension of 22 ♌ is	144° 22′ ·4 or =	144° 22′ 24″
Add part proportional for 43′	0 41 ·8 or =	41 48
The Right Ascension of the Sun	145 4 ·2 or =	145 4 12

S. 201.—A greater exactness than given by any other Tables equally concise, being within 3 seconds of the Sun's R. A. found by spherics. Our object is not to be so nice as to work by seconds, but to be sure of always finding the R. A. and Declinations to the nearest minute: as in the above example the tenths are 8 and 4 = 12 tenths, or 1 minute 2 tenths, and we take 145·4 as the ⊙'s R. A., and are certain it is true to the very nearest whole minute. Thus, by the sliding Gunter, opposite to 60 on A, place 58·4 on B, then opposite to 43 on A we find 41·8 on B, the proportional required.

Examples of finding the Declinations of Planets having Latitude.

For a Demonstrative Diagram, see Plate No. 3, Figure 6.

S. 202.—In this Diagram Eq. Eq. represent the Equator, and the line ♓ 20 25, ♈ 5, 10, 15, 20, 25 represent a small portion of the Ecliptic: this line is an angle of 23° 28′ to the line Eq. Eq. These lines are not drawn curved, as spherical projections usually are, because so small a portion of the sphere is here represented as not to occasion any error in the demonstration. Here *a* represents the 17th degree of ♈.

Example.

S. 203.—Required the Declination of the Planet or Star *n* in ♈ 17° 0′ with 9° north latitude? Here the longitude and latitude are both of one name, viz. both north.

In Table No. 1 (rejecting seconds) the declination of 17 is ♈, which is called the Ecliptic Declination, is 6° 41 N.

The Equation of Declination of 17 ♈ & 9° N. lat. is + 8 18

The sum is the declination of the Star *n* 14 59 N.

In Table 3 to 15 ♈ belongs 8° 17′, the equation with 9° of latitude, and to 20 ♈ belongs 8° 19′, the equation with 9° north latitude, and therefore the equation for 17 ♈ and 9° north latitude will be 8° 18′ very nearly. The Right Ascension of the Star *n* would be at *x* on the equator, shewn by a perpendicular let fall from *n* to *x*, and ♈ *x* is the arc of the Right Ascension. *a*—*m* is the parallel of declination of 17 ♈ in the ecliptic, and its distance from the equator is equal to *m*, *x*, and *n*, *m* is the equivalent of *a*, *n*, or is the equivalent of 9° north latitude measured on the line of declinations, and *a*—*z* is the ecliptic declination of 17 ♈; and, therefore, by adding the equation, or equivalent *n*, *m* = 8° 18′ to *a*—*z*, or its equal *m*, *x* = 6·41 N., we have the sum total of the Star's declination equal the perpendicular *n*, *m*, *x*, or 14° 59′, the Star's absolute declination north.

Example.

S. 204.—Required the Declination of a Planet in 17 ♈ with 3° south latitude. Here the longitude and latitude are of different names, one being north and the other south. Let ♀ be the planet; then from

a to ♀ will be the planet's latitude 3° south, and ♀ — *y* will be the planet's declination; and where the line ♀ — *y* intersects the equator at *y* marks the planet's right ascension = ♈ *y*; and because *z* marks the right ascension of 17° ♈ in the ecliptic, and *y* marks the right ascension of the planet, ♀, *g*, or its equal *y*—*z*, will be the equation of right ascension.

In Table No. 1 the Ecliptic Declination of 17 ♈ is	6°	41′	N.
By Table No. 4, the equation for 3 south latitude = *a*—*g* is	2	47	
There remains ♀, *y* or *g*—*z*, the declination north	3	54	

This is an example of south latitude and north declination, because the equation is less than the ecliptic declination, therefore the declination must be of the same kind as the longitude, viz. north.

Example.

S. 205.—Let it be required to find the Declination of a Planet or Star *t* in 17 ♈ with 9° south latitude. See Plate No. 3, Fig. 6, where the line *a*, *t* is the 9° south latitude. A perpendicular let fall from the star *t* intersects the equator at *v*, and passing onwards also intersects the parallel of the ecliptic declination of 17° ♈ at the point *d*, thus forming the right angled triangle *a*—*d*, *d*, *t*, and *a*—*t* in triangle *d*, *t* is the extent of declination equivalent to the 9° of latitude *a*—*t*, and *d*, *a*, equal to *v*—*z*, the equation of the star's right ascension; and the arc of the R. A. is ♈, *v*, and *v*—*t* is the planet's declination.

Now we find in Table No. 4, that the equivalent of 9° south latitude equal *d*—*t*, is	8°	19′	
From which subtract *a*—*z* or *d*—*v*	6	41	
and there remains the Star's declination, *v*—*t*, south	1	38	

And by the rule (S. 191) it must be south declination, because the equivalent for the 9° of latitude is greater than the Ecliptic declination, and the Diagram evidently proves it is so. Now this is an example of south latitude and south declination in a northern sign.

Examples of finding the Right Ascensions of any Planet or Star with Latitude not exceeding 9 Degrees, by these New Tables.

S. 206.—Let it be required to find the R. A. of a Planet or Star in 17 ♈ with 9° north latitude. Here the latitude and longitude are both north.

In Table No. 2 we find the Ecliptic R. A. of 17 ♈ is	15°	39′	9″
And by Table No. 5 we find the Equation of R. A. is	3	32	8
There remains the R. A. of 17 ♈ with 9° N. lat. = ♈ *x* =	12	7	1

Note.—Table 5, to 15 ♈ and 9° N. latitude belongs 3° 34′, the Equation, and to 20 ♈ and 9° N. latitude belongs 3° 31′ for the Equation of R. A., and therefore the proportion for 2 degrees of longitude will be $1\frac{3}{10}'$. One minute and two-tenths taken from the 3° 34′ for the 15° ♈, leaves 3° $32\frac{8}{10}'$ due to 17 ♈ with 9° N. latitude, because the Equation is decreasing as the longitude increases. See Plate No. 3, Fig. 6.

S. 207.—*Example.*

Required to find the Right Ascension of a Planet or Star in 17 ♈ with 9° South latitude. Here the longitude and latitude are of different names. See Plate No. 3, Fig. 6.

The Ecliptic R. A. of 17 ♈ equal ♈—*z*, is	15°	39′	9″
By Table No. 6 we find the Equation of 17 ♈ with 9° South latitude is equal *z*—*v*, or *a*—*d*.. } +	3	26	4
The sum of the R. A. equal ♈ *v*	19	6	3

In Table 6th, to 15 ♈ with 9° south latitude, belongs 3° 28′ for the Equation; and for 20° ♈ with 9° south latitude, there belongs 3° 24′ for the Equation of Right Ascension; the difference of these Equations is 0° 4′, and therefore 2 degrees of longitude will give $1\frac{6}{10}'$; and 3° 28′ — 1·6, leaves 3° 26′ 4″, the Equation due to 17 ♈ with 9° south latitude. In these two last examples we might have taken the proportion mentally, as being 1 minute for the reduction of the Equation instead of 1·2; and in this example we should have said 2 minutes nearly, and have used 2 minutes for the reduction of 3° 28′, thus leaving 3° 26′ for the Equation. In these cases we should have found both the Right Ascensions true to the nearest minute of a degree.

S. 208.—By making my readers well understand this, they will see plainly that my Abridged Tables will furnish them with a very concise and expeditious means of calculating the right ascensions and declinations of the Planets required in the study and practice of the Celestial Sciences; and then, by finding the Ascensional Differences by means of the Tables of Sines and Tangents, Directions of all kinds may be wrought with great expedition, by means of these New Tables of Right Ascensions and Declinations.

Example.

Required by these New Tables to find the Right Ascension and Declination of ♀ in 7° 1′ ♋ with 3° 10′ South Latitude.

S. 209.—For the Declination.

The Ecliptic Declination of 7° 1′ ♋ is very nearly	23°	17′	N
The Equation (Table 4th) south latitude, subtract	3	10′	
The Declination of ♀ with 3° 10′ south latitude is	20	7	

S. 210.—For the Right Ascension.

The Ecliptic R. A. of 7° 0′ ♋	97°	37′	4″
Proportional part for 1 minute of longitude add	0	1	1
The Ecliptic R. A. of ♀ is	97	38	5
The approximate Equation of R. A. for 3° 10′ S. lat., taken mentally from the 6th Table for 7 ♋ 1	0	10	2
Which gives the R. A. done in a quick manner	97	28	3

S. 211.—From a vast number of experiments and comparisons of the results given by these New Tables, I believe that almost every person of a moderate capacity may mentally estimate how much is to be added to or subtracted from the Equations contained in the Tables, within about 30 seconds, or half-a-minute of a degree; and, consequently, always get the right ascension and declination true to the nearest minute. I shall now give an example of finding the R. A. of ♀ in 7° 1′ ♋ with 3° 10′ south latitude, to the greatest nicety, the proportional parts being found by the two-feet sliding Gunter. For the Equation of the right ascension, as below, see Table No. 6.

With 3° South Latitude.			With 4° South Latitude.		
For 5° ♋ 0′ Equation =	0°	7′ 2″	For 5° ♋ 0′ Equation =	0°	9′ 5″
For 2 1 Equation =	0	2 7	For 2 1 Equation =	0	3 6
For 7 ♋ 1 Equation is, with 3° S. Latitude	0	9 9	For 7 ♋ 1 Equation is, with 4° S. Latitude	0	13 1
For the Equation due to 0° 10′ of lat. more than the 3 degs., add	0	0 5	From the above	0	13 1
			Subtract	0	9 9
The correct Equation	0	10 4	Difference	0	3 2

Then with this 0° 3′ 2″ we get the proportional for the 0° 10′ of latitude:—

As $60' : 3\frac{2}{10}' :: 10' : 0\frac{53}{100}'$, which $\frac{53}{100}$ we call $\frac{5}{10}$.

S. 212.—For the Right Ascension of ♀.

From the Ecliptic R. A. of ♀	97°	38′	5″
Subtract the correct Equation of R. A.	0	10	4
The R. A. of ♀ with 3° 10′ South Latitude is	97	28	1

This differs only two-tenths of a minute from the results obtained by mentally proportioning the Equations, shewing that these Tables

will enable us to attain sufficient exactness in the quickest manner possible. ♀ R. A. by Spherics is 97° 27′ 49″, or 97° 28′ within 11 seconds. And this sufficiently proves the great exactness and utility of the Abridged Tables of Right Ascensions and Declinations. They are called Abridged Tables, because reduced from others that I originally calculated to the nearest second.—T. O.

THE GEM OF THE ASTRAL SCIENCES,

CHAPTER 10.

BEING THE FIRST CHAPTER OF THE

THIRD PART OF THIS BOOK,

AND

THE COMPLETE GUIDE

TO THE

USE AND CONSTRUCTION OF THE CELESTIAL PLANISPHERES.

S. 213.—The author of this work, believing that there are many students of the Celestial Philosophy who would not wish to have the trouble, and could not spare the time to make the very numerous projections required in constructing the Planisphere of the Zodiac, the Quadrant of Latitude, and the Curve Patterns for drawing the different poles of the twelve houses, for the convenience of such persons he has published separately from this Book a Planisphere of the Zodiac, a Quadrant of Latitude, a set of Curve Patterns for every Latitude from the Equator to Sixty Degrees of Latitude; and a Planisphere of the twelve Houses for London. These five copper-plates are printed on strong paper; but, before they can be used as patterns, or instruments in projecting the Planispheres of Nativities, it will be necessary to paste them on cardboard, or pasteboard, to give them strength and stiffness. The design of the first chapter of the third part of this book is to give the purchasers the most plain, easy, and effectual instructions how to prepare the copper-plate impressions so as to serve for patterns in projecting and using the Celestial Planispheres. In addition to mentioning the things that should be done, it is sometimes necessary to mention what ought not to be done: this rule shall now be observed in regard to these instructions for fitting up the Celestial Planispheres for use.

S. 214.—1st. The pasteboard, &c. on which you intend pasting the Planispheres must not be too thick or too strong; for if it

is too strong, it will be impossible to cut them out correctly to the extreme outline. The proper thickness for the pasteboard is that of a common playing card: there is to be met with in Manchester, and some other manufacturing towns, a very thin dark-coloured kind of mill-board not thicker than pasteboard; there is also an extraordinary thick kind of drawing paper, called lino paper, which is or ought to be as thick as common card-board, the aforesaid *very* thin mill-board; for mind it must be very thin, and the lino paper are made of one substance throughout, and will not split as paste-board sometimes does after you have pasted the Planispheres upon it, because paste-board is made of several thicknesses of paper, one pasted upon the other. There is mill-board of very great thickness, but if you use mill-board it must not be thicker than common card-board. If this instruction be carefully observed, the Planispheres may then be easily and correctly cut to the outline, and will serve the purpose as well as though you had gone to the expense of having these instruments made of brass.

S. 215.—Note. Each chapter in this Third Part of the book has two numbers prefixed, the number in Arabic figures being the number of the chapter reckoned from the beginning of the book. The other, expressed in Roman numerals, is the number that belongs to it in this Treatise on the Celestial Planispheres.

S. 216.—2d. *Of making the Paste.* As flour and water boiled together are not sufficiently adhesive, it is recommended that to eight ounces of the best wheaten flour you add one ounce and a half of good glue, the glue to be dissolved by itself in a small quantity of water; the flour and water to have one boil up by themselves, then while boiling add the dissolved glue; stir the whole mass together; and let it boil well, stirring it all the while: this kind of paste should not be used when hot, but when moderately warm. To prevent the paste being lumpy, the flour should first be well mixed with a small quantity of cold water, and a little more water, and still a little more, to be added until a sufficient quantity be mixed with it; then set the mixture on the fire, and keep stirring it continually till it boils: then add the glue as aforesaid. The paste should be of a moderate consistency, so that with a brush it may be spread both easily and equally on the paper, and upon the paste-board, &c.; but it must not be so thin as to run off, as, if the paste be made too thin and watery, it will not be sufficiently binding: according to my experience, the thickness of treacle answers very well.

S. 217.—3d. You must not paste the Planispheres on canvass, nor upon any kind of cloth, as it would shrink or contract unequally, and thereby spoil them. 4th. You must not paste the Planispheres on different kinds of substances; that is to say, do not paste some of the plates on boards of wood, others on pasteboard, and others on paper, or on sheets of metal; for if you do, the copper-plate impressions will not shrink or contract equally, which would cause them not to correspond in length and breadth, whereby they would be spoiled; but if the whole set of copper-plate impressions be pasted upon one

and the same kind of material, be it card-board, paste-board, or mill-board as aforesaid, according to the instructions given in this Chapter, then will the said Planispheres, when dry, be found to correspond as accurately one with another, as do the engraved copper-plates from which they were printed.

S. 218—N.B. From what has just been stated, you cannot expect those Planispheres which have not been pasted upon any substance of paste-board, &c. to correspond in length and breadth with those that have been so pasted. 5th. *How to paste on the Planispheres.* I would recommend that the paste-board, &c. and also the copper-plates that are to be pasted upon it, be all of them made of the same dampness as printers damp their paper for printing on (but by no means must they be any damper); for, being pasted in this damp state, the copper-plates, and what they are pasted on, will not wrinkle nor blister, and both of them will dry uniformly, and thus preserve the true proportions engraved upon the copper. I damped mine by immersing them in a large tub of clean water, one by one, instantly drawing each out of the water, as I did the piece of card-board (on which each plate was to be pasted), and laying them each smooth on a flat board, each piece of card-board and each copper-plate one upon the other, slanting the board a little for the superfluous water to drain off, and so left them for about six hours previous to pasting them, looking at them several times in the mean time, to see they did not get too dry.

S. 219.—Be sure to make plenty of paste, or glue, that you may paste all the five at one time, and with a material of the same uniform quality and consistence, as it would be almost impossible to use two different boilings of glue or of paste that would be exactly alike. This injunction must be strictly observed, if you would wish the Planispheres to retain their exact relative proportions one with another. And when two pasted surfaces have been brought together, lay a smooth sheet of clean dry paper over the printed side of the copper-plate; then, with a soft linen or silk handkerchief, folded up, pass several times over the sheet of paper, until all the creases and wrinkles that may be in the copper-plate have been made to disappear, and the whole surface shall be smooth and even. It is best to begin about the middle of the plate, and pass the handkerchief over both ways to the end; very softly at first, and then with a little more pressure afterwards, the copper-plate being covered all the time with the sheet of paper as aforesaid, to prevent injury to the copper-plate. Do not dry them before the fire; but put them in some place where they will dry gradually, which will require about fifty hours. They should be perfectly dry before any thing more be done to them.

S. 220.—6th. Previous to glazing and varnishing the patterns of Curves contained in Plates No. 7 and No. 8, let each pattern, after being pasted on pasteboard and well dried, be marked and numbered on the back or pasteboard side with the same latitudes as upon the printed sides, to prevent mistakes in using them, as each pattern consists of two different latitudes. Observe, that upon

each pattern is marked E. E., and the dots shew the place of the Equator. With a needle or fine pointrel pierce through each pair of dots; then with your steel drawing-pen and ink (*not a steel writing-pen*) make a fine line on the back of the pattern, through these two points, and it will shew you the place of the Equator; because in using these patterns it is necessary to turn them over, and still know that you are using the proper curve; for this reason they must be marked upon the back in the same manner as upon the printed side.

S. 221.—The Quadrant of Latitude, viz. Plate No. 9, upon the index line with a fine needle prick through each degree, or through every fifth degree (if very saving of your labour); mark where the point of the needle passed through with a steel drawing-pen and ink, and draw an index line on the back of the Quadrant; and after this instrument has been glazed and varnished, cut away carefully all superfluous matter quite close to the outline: the Quadrant of Latitude will then be ready for the various uses described in this Treatise.

S. 222.—7th. *Of Gumming and Varnishing*, &c. After the Planispheres have all been pasted and dried, or glued, upon thin pasteboard, &c., as before directed, and have been pressed flat under a bookbinder's press, the next thing to be done is to gum them, or glaze them lightly over on both sides with gum arabic water, or with isinglass dissolved in water; but, what is still much cheaper, and will answer the purpose equally well, is the white size made use of by carvers, gilders, and picture frame-makers, for glazing of prints previous to their being varnished. This size must be warmed a little when used, and spread lightly and thinly over the Planispheres by means of a varnishing-brush that is two or three inches broad. Three or four pennyworth of this size will be sufficient for all the plates that are required to be glazed. When dried in the air for two or three days, you may then proceed to varnish them over on both sides with white copal, or some other suitable white, hard, and transparent varnish. The reason why they should be varnished on both sides, as well as to keep them clean, is, to prevent them warping; for, if varnished only on one side, the varnish would draw them hollow on that side; but when equally varnished on both sides, they will remain even and flat, and more ready for use.

S. 223.—N.B. Plates Nos. 6, 7, 8, 9, and 10, and the Plate of the Zodiac, must not be cut out until after the aforesaid processes of pasting and drying, glazing and drying, and varnishing and drying afterwards, have been all done respectively. It would not answer to cut out the curves, &c., to their outlines, and paste them, &c., after they had been cut out. I write and speak from experience. Also remember, that after these Plates have been cut to the outlines ready for use, they must be kept dry: it would be highly improper to wet them in any way, as by wetting they would lose their proper mathematical curvature, and thereby be spoiled. I have found that the

bookbinders are the most clever men at fitting up the Planispheres; they finish them as smooth and even as a looking-glass.

S. 224.—Before concluding these instructions and remarks about fitting up, I shall once more repeat, that much depends upon the manner in which the Celestial Planispheres are fitted up for use (and there is not the least difficulty in doing this; it is only necessary to observe the instruction here given); for although the copper-plate engravings were all set off with the same openings of the compasses, and all engraved with the utmost exactness by the same mathematical instruments, and therefore are all exactly of the same dimensions, and consequently, if properly managed, would give the truest results that could possibly be desired of mathematical instruments of this kind, yet, if mismanaged in fitting up, the Planisphere of the Zodiac would be made to differ three or four degrees in length, when compared with the Planisphere for London, or the Planisphere of the Nativity of the Emperor Napoleon.

A similar difference would result from one Planisphere being printed upon one kind of paper, and the other Planispheres upon paper of a different kind and quality; but in order that the purchasers of this work may be enabled to derive every reasonable pleasure and satisfaction in using these Planispheres, the end of the third Chapter (twelfth and third) contains instructions for easily obviating the aforesaid difference in the length of the zodiacal Planisphere, should it, through any cause whatever, be found to occur.

CHAPTER 11.

Planis. II.

INTRODUCTORY INSTRUCTIONS, WITH OBSERVATIONS ON THE MOST PROPER INSTRUMENTS TO BE USED IN PROJECTING THE CELESTIAL PLANISPHERES.

S. 225.—To those persons who are really desirous of attaining perfection in projecting the Celestial Planispheres, it is believed that it will be very acceptable to shew, in the most familiar and easy manner, how to perform this, and also to point out to them what instruments are most proper for these purposes. And as my work on the Celestial Planispheres has already fallen into the hands of many persons who have never before handled either a pair of compasses, or any other mathematical instrument, I am extremely desirous that all such persons may be enabled, as they certainly will, by carefully following these easy instructions, in a short time to construct the Planispheres with great exactness; and therefore the mathematicians who are expert in the use of mathematical instruments will excuse me for giving such ample directions for the use of instruments with which they themselves are so very familiar.

S. 226.—Of Instruments.

1st. *The Parallel Ruler.*—This being an instrument so well known and so easily procured, I shall only remark that it ought to be at least twelve inches long, though fifteen or sixteen inches long is still better. The price of such a ruler *new* is from three to four shillings.

S. 227.—2d. The common pair of compasses are well known to almost every man, though he may never have used a pair in his life. The compasses ought to have each leg at least ten inches in length, so as to be able to take an extent of half the length of the Planisphere at one opening. But I do not approve of the use of the common compasses in these projections, except for measuring off the Directions, as they are not sufficiently exact where much accuracy is required: and will therefore proceed to describe,

S. 228.—3d. The Steel Beam Spring adjusting Compasses. (See Plate 1, Figure 1.)—The whole of this instrument is made of the best steel. The bow B is a very strong steel spring, and is spring tempered, and is of one piece with the leg L, and the leg H. A is the adjusting screw, and N the nut-screw that works upon it; M M is the beam, or bar; S is the sliding leg, and P its thumb-screw, by which it is made tight upon the bar. The leg L admits of an adjustment backwards and forwards of about an inch. *Use.*—These compasses are to be used when the extent is greater than can be taken with the screw and spring divider compasses (Figure 2, Plate 1). When you would use these beam spring adjusting compasses, slacken the screw P of the sliding leg S, until that leg is quite loose, and will easily slide backwards and forwards upon the beam; this being done, slide the limb S backwards or forwards, until the distance between the point of the leg L and the point of the leg S is nearly the distance you desire; then turn and tighten the screw P, so that the leg S may be quite firm upon the beam; and by turning the adjusting nut N either backwards or forwards, as occasion may require, you will be enabled to measure or set off any distance you desire with very great exactness, even to the ten-thousandth part of an inch, provided that each leg of the compasses be very finely pointed. Thus, for example; if it were required to set off 180 degrees of right ascension upon the Planisphere of any Nativity you were about to calculate, proceed in this manner:—slacken the screw P, then slide the leg S backwards or forwards, until the distance between the two points of the compasses be about half a degree more, or half a degree less, than 180 degrees; tighten the screw P, which fastens the leg S; next turn the adjusting nut N either backwards or forwards, as occasion requires, until you have taken in the exact distance required.

S. 229.—N.B. I manufacture these beam compasses at from twelve to sixteen shillings each, which are vastly superior articles to the mahogany beam compasses sold by mathematical instrument makers at a guinea-and-a-half each; which can seldom be depended

on, as they have each two adjusting screws, and the effect of the second screw is often to change the point of the compass from the distance you had set it to.

S. 230.—It may be well to observe, that, previous to using these steel beam compasses, the leg L should be made firm and tight, by turning the nut N until the leg L is brought about half an inch nearer to the leg H than it is when slack; when thus fixed, the adjustment can be made either backwards or forwards with great exactness, and the compasses will then remain firm and true for setting off or marking the distance required. After having thus adjusted the compasses, and having taken the measure or distance thereby, be careful not to touch or handle the nut N, nor the screw P, and rather prefer holding these compasses by the beam or by the legs; but by no means press down upon the beam when you mark off any distance. Always prefer a small dot, or a fine mark with the point of the compasses, to a coarse one; keep one foot of the compasses steadily fixed as a centre, and press lightly and perpendicularly upon the other foot, in marking any required distance. I will further remark, that where exactness is required, as in the projecting of the Celestial Planispheres, the fewer measurements whereby you would set off the whole length of the said projection or Planisphere, so much the better; thus, after the meridian, or line of the tenth house, has been marked upon the line of the equator, the next thing to be done is, to mark or set off by the compasses 180 degrees exactly, both to the right and to the left-hand side of the meridian line; and this gives the complete length of the Planispheric projection.

S. 231.—But it would be nearly impossible to have done it with the same exactness if the 180 degrees had been set off by several times turning over the compasses: for example, if 30 degrees were the distance taken in the compasses, and turned six times over from the meridian, you would perhaps say that would give 180 degrees. I beg leave from experience to observe, that it might give 180 degrees, but that it is far more likely it would not give that distance; for if, in fixing your compasses to take the 30 degrees, you took only five minutes of a degree more or less than the exact 30 degrees (and five minutes is, indeed, but a very short distance; for one degree is only the fourteenth part of an inch, and therefore five minutes is equal to the 168th part of an inch); then, admitting that the distance was only five minutes more or less than thirty degrees, this extent, turned six times over, would cause an error of no less than half a degree in the place of the line for the fourth house or lower meridian, the same error both to the right and left of the projection; and therefore the Planisphere would be no less than one entire degree either too long or too short, and consequently would be inaccurate in all the directions calculated thereby; for let it be remembered, that it is only by laying down the proportions of the different houses and poles of the planets correctly that we can reasonably expect to obtain correct results in the Arcs of Directions. I will further add, that

the steel beam spring adjusting compasses just described are a very important acquisition in constructing the Celestial Planispheres, for several reasons, as will plainly appear by considering,

S. 232.—1st. That these beam compasses are lighter than any pair of common compasses capable of taking in the same extent, and yet are sufficiently strong and firm.—2dly. That the points of these beam compasses being always perpendicular, or very nearly so, they will mark the distance by a smaller dot or finer stroke than can the common compasses; because the common compasses, when opened widely, will mark with the inside of each leg, instead of marking with the very points.—3dly. The legs of these beam compasses being not more than about one-fifth part the length of the legs of common compasses, will consequently not bend, spring, or give way, as others do when you press upon them to mark off any distance.—4thly. There being only one adjustment, and that a simple one, these beam compasses will remain exactly true to the distance you fix them, on account of the principles on which they are constructed, and the material of which they are made being all of the best steel: they are so far superior to the beam compasses manufactured by mathematical instrument makers, that I would not use the last mentioned, even if they would make me a present of the best they manufacture; as such cannot be depended upon, because both the legs of theirs slide upon the beam or bar; and after you have set them as true as you can to any required distance, they will be made untrue by tightening the screw to make the adjusting leg fast on the bar; and this I have many times proved by experiment, and have no hesitation in affirming that the beam compasses so made by the mathematical instrument makers cannot be depended on for purposes wherein great exactness is required. In the steel beam spring adjusting compasses which are constantly used by me in constructing and projecting my Planispheres, and for other purposes, the bar is fifteen inches long, and the width between the legs L and H one inch; so that these compasses will take any extent as far as sixteen inches with the greatest exactness: they are light and commodious for use, their weight being only five ounces, or not half so heavy as a pair of common compasses capable of taking off the same distance. Within these last fifteen years I have made many of these beam compasses that do not weigh more than from two to three ounces, and will take in the extent of twenty inches: these are sufficiently strong, and from their great lightness are much admired, as they can be applied to delicate purposes where heavy compasses would not be desirable.

S. 233.—4th. The screw and divider compasses, or, as they are commonly called, the spring dividers. After the Planisphere has had the lines of the Equator and of the tropics of Cancer and Capricorn described, and 180 degrees marked upon each of them to the right and left of the Meridian line by means of the beam compasses aforesaid, and each of these lines again divided into two parts of exactly 90 degrees each by the beam compasses; then will the spring dividers be found of most excellent service for accurately subdividing

the lines, and marking the places where the poles of the twelve houses, and also where the poles of the Semi-quartiles, Sesquiquadrates, and circles of the Quintiles, should be placed upon the Planispheres. The opening of the spring dividers, as may be seen by Figure 2, Plate 1, is regulated by a nut and screw, and therefore enables the person using them, if careful, to set off the divisions upon the Planisphere with very great accuracy. The pair which I generally use is about 6½ inches long, from each point to the top of the bow, and the legs will be tight and firm so as to take any distance correctly to the extent of four inches.

S. 234.—With the exception of the beam compasses, there are no compasses that ought to be opened wider than to an angle of 60 degrees, or to the length of one of their legs; for if opened wider, they are apt to spring or give way, when pressed upon to make a mark; and instead of making a fine dot or fine line with the points, they will mark by the inside of their legs rubbing upon the paper, and therefore cannot be well depended on for any larger distance than that abovementioned.

S. 235.—The T square, when correctly made, is a very useful instrument for drawing perpendiculars expeditiously upon any mathematical projection. It is generally made of some very hard wood, such as rose-wood, or lignum vitæ; and if the paper for the Planisphere be properly fixed upon the drawing-board, to draw a perpendicular by the T square, nothing more would be required than to place the cross C C of the T square firmly against the straight edge of the drawing-board; then will the blade B of the T square be perpendicular upon the paper, whereby you can instantly draw the perpendicular required (see Fig. 3, Plate 1).

S. 236.—Planisphere Drawing Board (see Fig. 7, Plate 1). Although some persons, through parsimonious economy, do without a drawing-board, it is nevertheless quite indispensable for projecting the Celestial Planispheres in a neat and accurate style. This drawing-board is very easily made, and should be eleven inches broad, thirty-three inches long, and one inch in thickness. It may be of mahogany, of good dry oak, or any other hard and firm wood not liable to warp. Deal board is quite unfit for this purpose, because it is so soft that the points of the compasses, by their weight only, would sink into it, and make large holes in the paper. The board must be perfectly straight on both edges, and very smooth and level on the surface on which you fix the paper; it should also be straight and square at both ends, and must have a square groove, *g g*, running perpendicularly across the whole width of the board: each groove should be about one-third of an inch deep, and the clear distance between the two grooves thirty inches. Each groove must have a square flat bar of wood, about ten inches and a half long, so as to fit easily in, and just a little thinner than the depth of the groove, so that, when the paper is fastened down, the bars shall not be above the level of the drawing-board. It is hardly necessary to say that these bars can be made tight, so as to hold the Planisphere firm in its place, by pressing the bar upon narrow slips

of paper, if needful. A single board of this kind may be had for about four shillings.

S. 237.—*Fixing the Paper upon the Board.*—Your paper should be about 31½ or 32 inches long, and 10 to about 10½ inches broad, cut quite straight on one edge; bring the straight edge of your paper close to the edge of your drawing-board, to that edge which will always be nearest to you when projecting or using the Planispheres, and let the edge of the paper be true, and even with the edge of the board the whole length of the paper; put each bar upon each end of the paper, press each bar gradually but firmly until the paper be pressed down into the grooves; and thus will the paper be fixed firmly and smoothly on the board, and will remain so as long as required.

S. 238.—Note. I find it to be a good plan always to dry the paper well by the fire, or otherwise, before it is fixed on the board; and if the paper become slack and uneven (as it will by expanding in damp weather), bring your Planisphere board within two or three feet from the fire; move it gradually backwards and forwards, so that the warmth of the fire may act equally all over the paper, and in this way we may make the Planisphere tight, smooth, and even upon the board. I always try after laying the board and Planisphere aside, before I begin to use them again, if the Planisphere retain its correct length, by placing the Planisphere of the zodiac upon it to see if the projection be exactly 360 degrees long: if it has expanded, and measures 361, 362, or 363 degrees, you bring it exactly right again in a moment almost by airing before the fire in the manner aforesaid; but if the Planisphere by being exposed to extreme dry air, as sometimes happens in hot dry weather, the projection, instead of measuring 360 degrees, has contracted, and measures a degree or two less, you have only to place it in a cellar or some other dampish place for about ten or fifteen minutes, and you will bring it to the exact full measure again. I have produced the same effect by holding the Planisphere a few minutes over a tub of water, six or eight inches above the surface of the water. The hints contained in this note will enable every ingenious student to keep the Planisphere, or any other projection, always in exact measure, if he desires it.

Preparatory Problems.

As some persons who purchase the Celestial Planispheres may have never handled a pair of compasses, and are therefore unacquainted with their uses, to such it may be advantageous to shew

How to divide a Straight Line into two equal Parts, and erect a Perpendicular, by the Compasses.

S. 239.—1st. To divide any given line A B into equal two parts.

From the points A and B, as centres, with any distance greater than half A B, describe arcs cutting each other in C and D; through the points where these arcs cross each other, draw the line C E D; and the point E, where it cuts A B, will be the middle of the line required. (See Fig. 4, Plate No. 1.)

S. 240.—2dly. To erect a Perpendicular. (See Fig. 5, Plate No. 1.)

Although the process just described produced a perpendicular, yet, whenever a perpendicular is required any where near the middle of a given line, the following method is generally preferred:—Upon the line P M, to draw a perpendicular to the point E. Thus, with one foot of your compasses on E as a centre, take any distance, suppose E A, and mark A and B at equal distances from E; then take any distance greater than this, and placing the compasses on A and B respectively, as centres, draw short arcs both above and below the line P M, crossing each other in C and D; next draw a line through the crossings from C to D, that line will be the perpendicular required.

S. 241.—3dly. To erect a Perpendicular near the End of Line.

From any point C as a centre, with the radius or distance C B, describe an arc cutting the given line in *r* and B; through *r* and C draw a right line cutting the arc in V. Lastly, draw the line B V, and it will be the perpendicular required. (See Fig. 8 Plate No. 1.)

Problem 4th.

To draw a Right Line at a given Distance from, and parallel to, another given Right Line.

S. 242.—*Example.* (See Fig. 6, Plate No. 1.)

Let it be required to draw a line D G, parallel to the line A B, to the extent of 23° 28′ of Declination, distant from the line A B.

1. From the line of Declination upon the Planisphere of the Zodiac, take in your compasses the extent of 23° 28′.

Note.—23° 28′ being often wanted, this distance is engraved upon the line of Declinations on the Ecliptic Slider.

2. From any two points *r*, *s*, in the line A B, with the given distance as a radius, describe the arcs *n* and *m*.

3. Draw the line D G to touch those arcs without cutting them, and it will be the parallel to the line A, as was required.

S. 243.—In pages 30, 31, 32, 33, 34, and 35, it was shewn in the most clear and ample manner how the Poles of the Houses were found, as was also the erection of a Figure of the Heavens by Spherical Trigonometry; but as there are some other poles and proportions required in constructing the Celestial Planispheres, we shall next give examples of finding these additional poles and proportions.

Our examples will be taken from the Nativity of the Emperor Napoleon, and we have shewn that for his Latitude of Birth 41° 40′ North, the Ascensional Difference of 23° 28′, the Declination of the Parallels of Cancer and Capricorn is 22° 44′ very nearly; and we find that two-thirds of this Ascensional Difference is 15° 9′; and this 15° 9′, by Formula No. 12, will give the Pole of the mundane sextile, or Pole of two houses distant from the upper or lower meridian. As the quintile Aspect is equal to the sextile and one-

fifth part of the sextile added thereunto, therefore one-fifth of 15° 9′ is 3° 1′ 48″, say 3° 2′; and 3° 2′ added to 15° 9′, the sum is 18° 11′, the Ascensional Difference that we must use to find the Polar Elevation of the quintile from the tenth house, which falls below the Poles of the eighth and twelfth houses. Then as ⅓ the Ascensional Difference (22° 44′) is 7° 35′, and this 7° 35′ gives the Pole of the eleventh, therefore from 7° 35′ take the 3° 2′ aforesaid, and there remains 4° 33′ for the Ascensional Difference that will give the Pole of the quintile from the cusp of the first house, where the Aspect falls a little above the eleventh house. This Pole, or rather the Poles of the quintiles found from the fifth of the Ascensional Difference for the sextile as aforesaid, is the Pole inserted in the Table of Proportions; and is set off to the right or left, or on both sides of the upper and lower meridians, and from the pole of the quintile; or rather say, its proportion thus placed. I greatly prefer to draw the Poles below the twelfth and eighth, or just above the eleventh and below the third houses. I have sometimes done so; and after giving instruction how to do it both ways, I leave the student to select that mode which pleases him best.

S. 244.—For the Pole of the Circle of Quintile, as inserted in the Tables of Proportions.

			P. Logar.
As Tangent of Sun's greatest Declination (co-arc)	23°	28′	0·362389
Is to Radius Sine	90	0	10·000000
So is the Sine of Asc. Difference	3	2	8·723595
To the Tangent of	6	57	9·085984

which is the Pole of the Circle of Quintiles required.

S. 245.—For the Circle of Position of the Quintile below the Twelfth House, and to find its Ascensional Difference, &c.

			P. Logar.
As 90°	(co-arc)		9·6990
Is to 72° (the Quintile)			0·3979
So is the Semi-diurnal Arc aforesaid	112°	44′	2·2032
To the Quintile in Mundo, or Par. ♋ and ♑	90	11	
Subtract the Quintile on the Equator	72	0	0·3001
The Ascensional Difference is	18	11	
Subtract the Sextile's Ascensional Difference	15	9	
There remains ⅕ the Ascensional Difference	3	2	

the same precisely as found by the former method, and a proof of the correctness thereof.

S. 246.—Observe, if we projected the Pole of the Quintile below the twelfth, &c. we should lay off the 72° distance from the tenth and fourth houses upon the line of the Equator, and the distance 90° 11′ from the tenth and fourth would be laid off upon the Parallels of

Cancer and Capricorn. We shall now treat of another Pole and other Aspects. One-half the Ascensional Difference aforesaid 22° 44′ is 11° 22′; this will give the Pole of the Semi-quartile to the Ascendant which falls in the middle of the eleventh and third houses; the same Pole will also be the Polar elevation of the sesqui-quadrate to the Ascendant, which falls in the middle of the fifth and ninth houses. These Poles are all found by Formula No. 12, as shewn in Sections No. 97 & 99.

S. 247.—And for Latitude 41° 40′ North, by proceeding in a similar manner, we have found

The Pole of the circle of the Quintile's Proportion is.....	6°	57′
Pole of the Quintile to the first house just above the 11th is	10	21
Pole of the Quintile to the 10th falling below the 12th is....	35	43
Pole of the Semiquartile and Sesquiquadrate is	24	25

These introductory instructions being well understood by the student, I believe he will find it now perfectly easy to project the Celestial Planispheres by the rules and processes contained in the next chapter.

CHAPTER 12.

PLANIS. III.

PROGRESSIVE LESSONS, OR EASY PROCESSES IN PROJECTING THE CELESTIAL PLANISPHERES.

Process 1st. (See Plate No. 2).

S. 248.—To draw the Line of the Equator of the Planisphere.

YOUR paper being fixed upon the drawing-board, as before directed, take in your compasses the extent of about 4½ inches; then at the distance of about three inches from each groove place one foot of the compasses upon the straight edge of your paper; describe two arcs, as has already been taught in Problem 4th, S. 242. Next take your straight edge ruler, and draw a fine line, thirty inches long, so as to touch both these arcs without cutting them; and this line will represent the Equator of your intended Projection.

Note.—If this process be properly performed, the line of the Equator will be a true parallel to the edge of the drawing-board.

Processes 2d and 3d.

To draw the Meridian Line, or Line of the Tenth House.

S. 249.—Process 2d. Take a point *c* on the Equator, as near the middle of it as you can judge (say fifteen inches from each groove); then with one foot of your compasses on *c* as a centre, mark on the line two equal distances, *c a* and *c b*; then with *a* and *b* as centres, describe two arcs above and two arcs below the line, as was taught in Problem II, page 82, S. 240.

S. 250.—Process 3d. Through the points where the arcs *d*, *e*, cross each other, draw a line about four inches below and the same distance

above the line of the Equator; and this last drawn line will be the line of the Meridian, or Tenth House.

Note.—This line may be instantly drawn by help of the T square; but every student ought to know how to do it independently of that instrument.

Processes 4th and 5th.

To draw the Tropics or Parallels of Cancer and Capricorn.

S. 251.—Process 4th. From the line of Declinations upon the Planisphere of the zodiac take in the compasses the extent of 23° 28′; then from any two points upon the Equator of your intended Planisphere, each point being about three inches from the end thereof, describe two arcs above and two arcs below the Equator as *n*, *m*, — *x*, *y*.

Process 5th. With your straight edge ruler draw a line to touch the arcs *n* and *m*, and also another line to touch the arcs *x* and *y*, but without cutting them, the whole length of the Planisphere; and the upper line *n*, *m*, will be the parallel of ♋ ♋ (Cancer), and the lower line *x*, *y* will be the parallel of ♑ ♑ (Capricorn). Both these should be fine lines, and should be drawn very carefully, so as to be exactly 23° 28′ from the Equator.

Process 6th.

S. 252.—To set off the Line of the Fourth, or Lower Meridian.

1st. Take in your compasses at one opening, with great care and exactness, 180° of right ascension from the line of degrees engraven upon the straight edge of the ecliptic slider; next set one point of your compasses as a centre very exactly upon that place where the line of the tenth house cuts the parallel of Cancer, and with the other foot of the compasses, both to the right and left upon the parallel of Cancer, make a mark; and in like manner, placing one point of the compasses exactly where the Meridian cuts the parallel of Capricorn, make two other marks, one to the right and the other to the left, upon the parallel of Capricorn. Draw through these marks two lines perpendicular to the Equator, and these two lines at 180° from the tenth will be the beginning or line of the fourth house, or lower Meridian, as was desired: mark these two lines 4, 4, — 4, 4, as in the diagram of Process the 6th: each line should be the same length as the line of the tenth.

Process 7th.

S. 253.—To set off the Limits of the Six Houses above and also the Six Houses below the Horizon.

To render these instructions easy and intelligible, we will shew how to project the Planisphere for some particular latitude; and by way of example let it be for latitude 41° 40′ North, the birth place of the Emperor Napoleon.

S. 254.—If the reader will please to turn to page 94 of this work, he will there find a Table of polar elevations of the houses, from 1 to 60 degrees of latitude inclusively, with the spaces of three houses and of one house upon the parallels or tropics of Cancer and Capri-

corn for each integral degree of latitude; so that, by making proportion, these numbers may be found for any intermediate latitudes: remembering, however, that the tenth and fourth houses never have any polar elevation, and that the first and seventh houses have always the latitude of the given place for which you would project the Planisphere. But as there are some other circles or curves to be drawn besides the twelve houses, to provide for them you will accordingly find in page 95 a table of the polar elevations, and of the spaces to be used in setting off the proportions for the Circles of the Semi-quartiles and Sesquiquadrates, and of the quintile Aspects, as they are to be marked upon the lines of the tropics or parallels of Cancer and Capricorn. As I have already carried the reader step by step through the processes of calculating these numbers, I shall now present him with the results in a tabulated form.

S. 255.—TABLE OF PROPORTIONS OF THE CELESTIAL PLANISPHERE FOR AJACCIO, LATITUDE 41° 40′ NORTH, THE BIRTH PLACE OF NAPOLEON.

Houses, &c.	Poles.	Spaces upon the Parallels of Cancer and Capricorn.	Spaces in Degrees.	Spaces upon the Equator.
	° ′		° ′	° ′
10th and 4th	0 0	1 House is =	37 35—	30 0
11th and 3d, 5th and 9th	16 54	2 Houses =	75 9	60 0
12th and 2d, 6th and 8th	31 3	3 Houses =	112 44—	90 0
1st and 7th	41 40			
Semi-quartile	24 25	=	56 22	45 0
Sesquiquadrate	24 25	=	169 6	135 0
Quintile	6 57	=	15 2	12 0

S. 256.—*Note.* In all the tables contained in this book, where you see — or dash of the pen after any number, it indicates the number is a very little less than the number marked; but this mark + after any number, shews that it exceeds the number expressed by a fraction so very small as could not be described without descending to a much lower denomination than was convenient to be expressed in the tables.

7th Process. (For Latitude 41° 40 North.)

S. 257.—1st Part. Take 90 degrees of right ascension in your compasses, and set off this distance upon the Equator, both to the right and left of the Meridian: be very careful that this point be exactly at half the distance between the lines of the tenth and fourth, both to the east and west of your projection.

S. 258.—2dly. Take in your compasses the space of three houses, or 112° 44′, or $112\frac{7}{10}'$. Upon the parallel of Cancer, exactly where it is intersected by the line of the tenth, place one point of your

compasses, and with the other point make a fine mark or dot to the right and left upon this said parallel of Cancer.

A line or measure for the space of three houses is engraved upon the Ecliptic Slider, to be ready for this purpose.

S. 259.—3dly. With the same distance (112° 44′) in your compasses, and upon the parallel of Capricorn in both places, exactly where it is cut by the line of the fourth, place one point of your compasses, and with the other point of the compasses make a fine dot or mark upon the parallel of Capricorn; do this both to the right and left, towards the tenth house.

S. 260.—4thly. Number these points neatly with the numerals 1, 1, 1, and 7, 7, 7, as shewn by the example, Figure 7, Plate No. 2; because it is through these points or limits that the line of the horizon will pass, which constitutes the east and west angles, or the beginnings of the first and seventh houses, and therefore shews the rising and setting of the sun, moon, and other planets, each upon its own proper parallel of declination.

Process 8th.

How to subdivide the Equator, and the Parallels of Cancer and Capricorn, into twelve equal Parts.

S. 261.—1st. By the 7th process the Equator was divided into four equal parts, or quadrants, of 90 degrees each. Divide again each of these parts into three other equal parts. Let this be done with great exactness; do not rest satisfied with just taking 30 degrees hastily from the scale of right ascensions, but by trial ascertain, by turning your compasses very carefully three times over, that the distance in your compasses is precisely one-third part of each Quadrant, neither more nor less, before you make the marks upon the Equator.

S. 262.—2d. Upon the parallel of Cancer divide the space marked 10 and 1, and the space marked 10 and 7, each into three equal parts. For the latitude of 41° 40′ N., the space of one house is 37° 35′—; this may be taken either from the line of houses, or the line of right ascensions. Nor rest satisfied with thus taking this distance in your compasses, but, by turning your compasses three times over, see if it measures the distance exactly; but if not, then by repeated trials, if needful, get in your compasses exactly one-third of the space 10 to 1, and 10 to 7, before you make the marks, which is easily done by turning the thumb-nut of the screw-dividers a little backward or forward. Having thus carefully divided the parallel of Cancer,

S. 263.—3d. Proceed to the parallel of Capricorn. Having still the aforesaid distance in your compasses, divide each of the spaces contained between the line of the fourth, both ways, from ♑ 4 to 1, and from ♑ 4 to 7, into three equal parts.

S. 264.—4th. Number the different divisional points, by writing the figures, not upon the very points, but a little above or a little below them, as is done in the example, see Figure 8, Plate No. 2.

Process 9th.

S. 265.—To project the Lines of the East and West Angles.

By the former processes the equator and the tropics are properly divided and numbered: we must now proceed to introduce the curve lines, but, as the easiest plan, begin with the Horizon.

S. 266.—1st. Although very few persons ever constructed more than four or five Planisphere Patterns or Curves, which they made serve them for every different latitude, which would have a tendency to make their projections very inaccurate, they dreaded the labour of making a greater number of Patterns; but, great as the trouble was, I constructed a Curve for every latitude from one to sixty degrees, besides the Curves for the latitude of London 51½° and 53½° of latitude, in all 62 Patterns or Curves, for as many latitudes: which was a work of vast labour. But the result of this splendid Collection of Curve Patterns is, that we can now project Planispheres with great exactness for all places between the Equator and sixty degrees of North and South latitude; for, in drawing the curve of the Horizon, if we have laid down the divisions correctly as taught in the preceding Problems, we shall be sufficiently exact in describing that line upon the Planisphere if we take the Curve marked for the nearest integral degree of latitude. Now, in the Example for Napoleon's Nativity, the Planisphere of which we are explaining the Projection, the latitude is 41° 40′ North: we look among the Patterns, and select the nearest latitude, which is for 42 degrees, and use it thus,

S. 267.—2d. Place the Equator of this Pattern exactly to point No. 1 on the Equator of your projection, and bring the north edge of the Pattern to point No. 1 upon the parallel of Cancer, and the south edge to point No. 1 upon the parallel of Capricorn: being thus fixed, try if the point of your steel drawing-pen will touch the three points, 1, 1, 1, aforesaid: if it will, then draw a fine clear line from the line 4 to the line 10, and this will be the line of the Eastern Horizon. Apply the same Pattern or Curve to the points 7, 7, 7, and thereby in the same manner draw the curve line 4, 7, 7, 7, 10, which will be the line of the Western Horizon, or 7th house. See Figure 9, Plate No. 2.

N.B.—Always remember in these processes to keep the north ends of all the Curve Patterns marked N ♋ upppermost upon the tropic of Cancer.

Process 10th.

To draw the Poles of the 2d and 12th, 6th and 8th Houses.

S. 268.—By referring to the Table of Proportions in p. 86, we see that the Polar Elevation of these houses is 31° 3′ for the latitude of Ajaccio. From among the Curves for different latitudes take the nearest latitude which is the Curve for 31°; apply the Equator of this Pattern to the point No. 2 on the Equator of your projection, and let the south edge of this Curve be brought to the point No. 2 upon the parallel of Capricorn: try if the point of your drawing-pen

will pass exactly through these points; if it will, the curve is properly fixed: then draw the line 2, 2, and this line will be the pole of the 2d house. Apply the same curve in the same manner to the points marked 12, 12, and draw the pole of the 12th house. Apply the same Pattern in the same way to the points 6, 6, and 8, 8, and in like manner draw the poles of the 6th and 8th houses.

Process 11*th.*

S. 269.—To draw the Poles of the 11th and 3d, of the 5th and 9th Houses.

By referring to page 86, we see the Pole of these Houses is 16° 54′: among the Curve Patterns take the nearest degree, which is the Curve for 17 degrees of latitude; apply this Curve (in the manner taught in Process 10th) to the points marked 11, 11, and thereby draw the pole of the 11th house. Apply the same Curve in a similar mode to the points 3, 3, and 9, 9, and 5, 5, and thereby draw the poles of the 3d and 5th, and of the 9th houses; and in this manner will all the twelves houses of the Heavens have been projected upon the Planisphere as required. (See Figure 11, Plate No. 2.)

Process 12*th.*

To introduce the Supernumerary Circles, or Poles of the Semi-quartile, Sesquiquadrate, and Quintile Aspects.

S. 270.—Observe, 1st, that the circles of the Semi-quartile and Sesquiquadrate fall exactly half way between the poles of the 2d and 3d, the 5th and 6th, the 8th and 9th, and the 11th and 12 houses; and, therefore, the distance of the Semi-quartiles and Sesquiquadrates is always 45° from the 10th and 4th, the 1st and 7th, upon the line of the Equator; but, upon the tropics, the distance aforesaid is always half the Semi-diurnal Arc of the parallel of Cancer from the Meridian above the Horizon: and so, also, it is half the Semi-nocturnal Arc of the parallel of Capricorn from the 4th house below the Horizon for each respective latitude of the place of birth.

S. 271.—The Circle of the Quintile is one-fifth part of the Mundane space of two houses distant from the lines of the 10th and 4th houses, and therefore upon the line of the Equator its distance is always 12 degrees; and upon the parallels of Cancer and Capricorn the distance is one-fifth part of two houses from the 10th and from the 4th, be the extent of two houses whatever it may be for the given latitude of birth.

S. 272.—*Note.* The space of 45 degrees for the Semi-quartile and Sesquiquadrate, and of 12 degrees upon the Equator for the Circle of Quintiles, being the same for all latitudes, is the reason these numbers are not given in the Table of Proportions in page 95.

We will now pass from preparatory observations to perform the

12*th Process.*

S. 273,—1st. From the 10th and 4th upon the Equator set off 45 degrees both ways; that is, exactly half the distance between the

10th and 1st, and between the 10th and 7th, and also between the 1st and 4th, and the same distance between the 4th and 7th houses upon the Equator.

S. 274.—2d. Upon the parallel of Cancer set off exactly half the distance between the 10th and 1st, and between the 10th and 7th; this, for the latitude of Ajaccio, is 56° 22′. (See Table, page 86.)

S. 275.—3d. Upon the parallel of Capricorn mark the said half distance 56° 22′ between the 4th and 1st and the 4th and 7th; mark these divisional points where they occur with ⊏ the Semi-quartile and ⊏⊐ the Sesquiquadrate.

S. 276.—4th. We see, by the little Table given in page 86, that for our present Example the Pole of the Semi-quartile and Sesquiquadrate is 24° 25′; from among the Curve Patterns select that for 24° of latitude, which is quite exact enough for our purpose; apply the Equator of this pattern (for 24° of latitude) to the Equator of your projection, and apply the other part of the pattern to each mark upon the tropics; and with your steel drawing-pen describe the four Curves marked with the characters for Semi-quartile and Sesquiquadrate, in the manner already taught for describing the Poles of the other Circles. (See Figure 12, Plate 2); also Plate No. 4, which is the complete Planisphere of the Nativity of the Emperor Napoleon, and is considered by excellent judges to be a splendid specimen of Planispheric Projection.

Now for the Circle of Quintiles.

S. 276 A.—1st. Upon the Equator mark off 12 degrees from the 10th. I prefer doing this both to the right and left of the Meridian; I do the same from the line of the 4th towards the 1st and towards the 7th.

2d. By the Table in page 86, for the latitude 41° 40′ the space of the Circle of the Quintile is 15° 2′ upon the Tropics: mark this distance upon the parallels of Cancer and Capricorn, as explained in the first part of this Process.

S. 276 B.—3d. Take the curve pattern for the pole or latitude of 7 degrees (being the nearest to the Pole given in page 86), and apply this curve, and thereby draw the lines or circles of the Quintiles after the manner taught for drawing the other poles. (See Fig 12, Plate No. 2), and also the large Planisphere of the Nativity of Napoleon aforesaid.

S. 276 C.—The student will please to observe that a steel writing pen, or a common writing pen, must not be used for these purposes. It could not be applied with exactness, as it would moreover blot the paper and spoil the Projection: the only proper instrument is the steel drawing-pen which is found in cases of mathematical instruments, but which, if desired, may be bought separately.

S. 276 D.—By attending to the instructions now given, and by attentively examining the Examples given in the Plate of Progressive Lessons, it is believed every person who desires, however humble his previous acquirements may be, will hereby be enabled to perform all the projections of the Planispheres both with great ease and exactness; but, to give further facilities herein, we shall proceed to offer some

additional instruction to that which has already been given on the manner of finding the circles of positions of the planets, and of describing their poles upon the Celestial Planispheres, with other useful information connected with these subjects.

S. 276 E.—Table of Planispheric Proportions for London Latitude 51° 31′ N.

Houses, &c.	Poles.	Spaces upon the Parallels of ♋ and ♑.	Parallels in Degrees.	
	° ′		° ′	
10th and 4th	0 0	1 House =	41 2	
11th and 3d, 5th and 9th	23 47	2 Houses =	82 4	
12th and 2d, 6th and 8th	40 52	3 Houses =	123 6	
1st and 7th	51 31			
Semi-quartile	33 16		61 33	
Sesquiquadrate	33 16		184 39	
Circle of Quintiles † ..	10 13		16 25	
Quintile to the 1st just above the 11th, and just below the 3d	14 52	B	24 37	from 10th and 4th
Quintile to the 10th, which falls below .. the 12th	45 46	C	98 29	from 10th

S. 276 F.—The Circle of Quintiles marked † is the one I make use of. I scarcely need repeat that on the Equator I set off 12 degrees from the 10th and 4th, and its distance from the Meridian on the Tropics is 16° 25′. All the distances or spaces in the foregoing Table for London are upon the parallels of Cancer and Capricorn. Those students who may feel disposed to introduce the Quintiles marked B and C, will please to observe that B upon the Equator is just 18° from the Meridian, although 24° 37′ therefrom upon the parallel of Cancer; and the Quintile marked C is upon the Equator just 72° distant from the 10th, though upon the parallel of Cancer it is 98° 29′ distant from the Meridian. After the student has projected the Planisphere of Napoleon, I strongly recommend him to project a Planisphere for the latitude of London: by so doing he will be qualified to project a Planisphere for the place of his own birth, or for any other place he may desire, and in this will be greatly assisted by the instruction given in pages 78, 79, 80, 92, and 93.

Notes and Observations.

S. 276 G.—Observe, that although some Planispheres might require to take in the whole 90° of Declination both North and South of the Equator, yet for the Planispheres for Nativities it would not be necessary to extend the breadth of the actual projection more than 50 degrees North and South Declination, nor even so much as this,

as it is not required to work Directions to any Star or Planet with more than 9 degrees of latitude, the declination of which cannot be more than 32° 28′; therefore if the complement of the latitude of the birth to 90 degrees does not exceed 50 degrees, take in your compasses the complement of the latitude measured upon the scale of Declinations, and set it off from the Equator upon both lines of the 4th, both to the North and South; draw two lines with black lead pencil through these points, each line parallel with the Equator, and the two pencil lines will shew how far the poles of the houses should be extended.

S. 276 H.—Example. The latitude of Napoleon's birth place is 41° 40′ N. This taken from 90°, leaves the complement 48° 20′; and 48° 20′, or rather say 48½°, measured on the scale of Declinations, and set off as aforesaid to the north and south of the Equator, will be the limits to which the poles of the houses may be drawn.

S. 276 I.—Example 2d. The latitude of London is 51½ degrees; this taken from 90° leaves the complement 38½ degrees; and 38½ degrees of Declination set off to the North and South of the Equator in the manner aforesaid will be the limits for drawing the poles of the houses for the latitude of London. See the respective Planispheres for London and for the Nativity of the Emperor Napoleon which I have published: they will be perfect guides to the student in these Planispheric Projections.

Note. For this and other useful purposes, a line of Co-latitudes is engraved upon the Ecliptic Slider.

S. 276 J.—2d. Should any person wish to have every part of the parallels of ♋ and ♑ subdivided into 12 parts, &c. (see Fig. 9 of Plate No. 2), he may divide the space 1—4 and 7—4 on the parallel of ♋ each into three exact equal parts; as also the space marked 10—1, and 10—7, upon the parallel of ♑, may be each into three equal parts, the whole of the twelve subdivisions corresponding to the poles of the twelve houses, which being extended pass through these points. And each of these spaces, 1—4, and 7—4, and 10—1, and 10—7, may be divided each into two equal parts, to correspond with the poles of the Semiquartiles and Sesquiquadrates which poles should pass through these points. This will certainly conduce to great exactness in projecting the Planispheres, provided that you so place the curve pattern as to enable you to draw exactly through the three corresponding points for each house or division to be described upon the Planispheres; for in this case any curve pattern will answer very well, which, having its Equator upon the Equator of the intended projection, will at the same time touch the other two points marked upon the Parallels of ♋ and ♑.

S. 277.—For it is an axiom in mathematics, that any regular curve which will pass through three given points, will either be the exact curve required, or one that approximates very nearly to the required curve; and therefore may, without any sensible error, be used instead of it.

S. 278.—It may be well here to remark in reference to the Quintile, that if the proportion of the Quintile be marked upon any Planet's

parallel from the pole of the 12th towards the 1st house, or be set off from the pole of the 8th towards the 7th upon the same parallel, it will shew when the Planet is in quintile to the 10th.

S. 279.—But, if the proportion of the Quintile be marked upon any Planet's parallel from the pole of the 11th towards the 10th, or from the pole of the 3d towards the 4th house upon the same parallel, it will shew when the Planet comes in quintile to the ascendant.

Of the Place of the Bi-Quintile Aspect.—The proportion of the Quintile taken in your compasses, and the compasses being twice turned over from the pole of the 2d towards the 4th house, or, being thus set off from the pole of the 6th towards the 4th house, upon the Planet's parallel, will shew where the Planet comes in Bi-quintile to the 10th; but being set off in this manner from the pole of the 9th towards the 7th, or from the pole of the 5th towards the 7th house upon any Planet's parallel (of declination), will shew where the Planet comes in Bi-quintile to the ascendant.

The new beginner in Genethliacal Astronomy must remember, that all the Planets form their Mundane Aspects to the Angles of the Ascendant and Midheaven by converse motion upon their own parallels of Declination; that is, by a motion contrary to the order and succession of the houses: thus they move from the 1st into the 12th, and from the 12th into the 11th, and from the 3d into the 2d, and from the 2d into the 1st house, &c. &c. by their mundane motion. This being well understood, the demonstration afforded by aid of these Celestial Planispheres will render all Mundane Directions as also the calculations of those in the Zodiac perfectly easy.

S. 280.—*Some Examples of the Use of Logistical Logarithms.*

First, when the first Term exceeds 60 minutes,

If 84′ of Obl. Ascension.....	logistical logar. 1461
Give 60′ of longitude	0
What will 63′ of Oblique Ascension give..	212
Answer, 45′, the logistical logarithm.....	1249

Here the less logarithm is subtracted from the greater one.

Second, The first Term less than 60′, and the second Term greater,

If	45′ of longitude.....	1249
Give	63′ of Obl. Ascension.....	212
What will	60′ of longitude give.....	0
Answer,	84′ of Oblique Ascension	1461

Similar Examples are wanting in books containing the logistical logarithms.

S. 281.—A Table of the Poles of the Houses, and of the Proportions for laying down the Twelve Principal Divisions on the Celestial Planispheres, &c.

Lat. of Birth.	Poles of 11th & 3d.	Poles of 12th & 2d.	Space of 3 Houses.	Space of 1 House.	Lat. of Birth.	Poles of 11th & 3d.	Poles of 12th & 2d.	Space of 3 Houses.	Space of 1 House.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″		° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	0 20 0	0 40 0	90 26 3	30 8 41	31	11 26 22	21 57 25	105 7 10	35 2 23
2	0 40 0	1 20 2	90 52 7	30 17 22	32	11 53 39	22 45 26	105 44 20	35 14 47
3	1 0 4	2 0 5	91 18 14	30 26 5	33	12 21 32	23 34 7	106 22 30	35 27 30
4	1 20 6	2 40 9	91 44 22	30 34 47	34	12 50 2	24 23 24	107 1 40	35 40 33
5	1 40 15	3 20 19	92 10 36	30 43 32	35	13 19 10	25 12 59	107 41 50	35 53 57
6	2 0 25	4 0 33	92 36 55	30 52 18	36	13 48 58	26 3 39	108 23 10	36 7 43
7	2 20 42	4 40 50	93 3 20	31 1 7	37	14 19 29	26 54 42	109 5 40	36 21 53
8	2 41 0	5 21 16	93 29 52	31 9 57	38	14 50 53	27 46 32	109 49 35	36 36 32
9	3 1 27	6 1 50	93 56 34	31 18 51	39	15 23 5	28 39 7	110 34 55	36 51 38
10	3 21 59	6 42 30	94 23 25	31 27 48	40	15 56 12	29 32 23	111 21 45	37 7 15
11	3 42 10	7 23 17	94 50 26	31 36 49	41	16 30 15	30 26 30	112 10 16	37 23 25
12	4 3 27	8 4 18	95 17 40	31 45 53	42	17 5 22	31 21 25	113 0 35	37 40 12
13	4 24 27	8 45 28	95 45 8	31 55 3	43	17 41 34	32 17 12	113 52 50	37 57 37
14	4 45 34	9 26 50	96 12 50	32 4 17	44	18 18 54	33 13 52	114 47 10	38 15 43
15	5 6 51	10 8 26	96 40 48	32 13 36	45	18 57 36	34 11 34	115 43 54	38 34 38
16	5 26 3	10 50 17	97 9 4	32 23 1	46	19 37 28	35 9 56	116 42 50	38 54 17
17	5 50 4	11 32 23	97 37 40	32 32 33	47	20 18 51	36 9 30	117 44 40	39 14 53
18	6 11 59	12 14 44	98 6 : 3	32 42 11	48	21 1 51	37 10 7	118 49 30	39 36 30
19	6 34 11	12 57 17	98 35 50	32 51 57	49	21 46 33	38 11 53	119 57 40	39 59 13
20	6 56 36	13 40 13	99 5 30	33 1 50	50	22 33 1	39 14 40	121 9 20	40 23 7
21	7 19 22	14 22 34	99 35 40	33 11 53	51	23 21 30	40 18 43	122 25 5	40 48 22
22	7 42 20	15 7 5	100 6 10	33 22 3	52	24 12 8	41 24 3	123 45 20	41 15 7
23	8 5 39	15 48 54	100 37 10	33 32 23	53	25 5 10	42 30 47	125 10 40	41 43 33
24	8 29 17	16 37 19	101 8 40	33 42 53	54	26 0 46	43 38 50	126 41 35	42 13 52
25	8 53 24	17 19 59	101 40 50	33 53 37	55	26 59 11	44 48 23	128 18 55	42 46 18
26	9 17 47	18 7 25	102 13 30	34 4 30	56	28 0 50	45 59 35	130 3 40	43 21 13
27	9 42 27	18 50 38	102 46 50	34 15 37	57	29 6 4	47 12 33	131 57 0	43 59 0
28	10 7 55	19 36 39	103 20 50	34 26 57	58	30 15 20	48 27 26	134 0 20	44 40 7
29	10 34 58	20 23 5	103 55 30	34 38 30	59	31 29 14	49 44 30	136 15 40	45 25 13
30	10 59 46	21 10 5	104 31 0	34 50 20	60	32 48 33	51 3 59	138 45 25	46 15 8
	9th & 5th	8th & 6th				9th & 5th	8th & 6th		

S. 282.—In the first Edition of my Work on the Celestial Planispheres in 1830, I copied the Polar Elevations of the 11th and 3d and 12th and 2d Houses from the Primum Mobile of Placidus, and I added thereunto the spaces for One House and the spaces for Three Houses. I never said that I had calculated the said Tables copied from Placidus. I afterwards found, upon investigation, that the Polar Elevations given by that Author differed in some places 7 or 8 minutes of a degree from the result obtained by Spherics. This determined me to calculate an entirely new set of Tables of Polar Elevations, in which I have given the results to the nearest second; not that such nicety was required for our purpose, but to prove the originality of these Tables, such as cannot be found in any other book. The same may be said of the Table of Proportions given at page 95 (the next page); such are not to be found in Placidus, or in any other work.

S. 283.—Table of Proportions for setting off the Circles of the Semi-quartile and Sesquiquadrate, and of the Quintile and Biquintile Aspects, upon the Celestial Planispheres.

Lat. of Birth.	S□ & Sesq. □	Pole of S□	Quint. &c.	Pole of Quint.	Lat. of Birth.	S□ & Sesq. □	Pole of S□,&c.	Quint.	Pole of Quint.
	° ′	° ′	° ′	° ′		° ′	° ′	° ′	° ′
1	45 13	0 30	12 3	0 8	31	52 33	16 50	14 1	4 38
2	45 26	1 0	12 6	0 14	32	52 52	17 30	14 6	4 49
3	45 39	1 30	12 10	0 23	33	53 11	18 9	14 11	5 1
4	45 52	2 0	12 14	0 32	34	53 31	18 50	14 16	5 12
5	46 5	2 30	12 17	0 39	35	53 51	19 31	14 22	5 26
6	46 18	3 0	12 21	0 48	36	54 11	20 11	14 27	5 37
7	46 31	3 29	12 24	0 55	37	54 33	20 55	14 33	5 51
8	46 45	4 1	12 28	1 5	38	54 55	21 38	14 39	6 5
9	46 58	4 31	12 32	1 14	39	55 17	22 21	14 45	6 18
10	47 11	5 1	12 35	1 21	40	55 41	23 7	14 51	6 32
11	47 25	5 33	12 39	1 30	41	56 5	23 53	14 57	6 46
12	47 39	6 5	12 42	1 37	42	56 30	24 40	15 4	7 2
13	47 52	6 34	12 46	1 46	43	56 56	25 28	15 11	7 17
14	48 6	7 6	12 50	1 55	44	57 23	26 17	15 18	7 33
15	48 20	7 38	12 53	2 2	45	57 52	27 10	15 26	7 51
16	48 34	8 9	12 57	2 11	46	58 21	28 0	15 34	8 9
17	48 49	8 43	13 1	2 20	47	58 52	28 54	15 42	8 27
18	49 3	9 14	13 5	2 30	48	59 25	29 50	15 51	8 48
19	49 18	9 48	13 9	2 39	49	59 59	30 47	16 0	9 8
20	49 33	10 21	13 13	2 48	50	60 34	31 43	16 9	9 28
21	49 48	10 55	13 17	2 57	51	61 12	32 44	16 19	9 50
22	50 3	11 28	13 21	3 6	52	61 52	33 45	16 30	10 15
23	50 18	12 1	13 25	3 16	53	62 35	34 50	16 41	10 39
24	50 34	12 36	13 29	3 25	54	63 21	35 57	16 53	11 6
25	50 50	13 11	13 33	3 34	55	64 9	37 5	17 7	11 37
26	51 7	13 47	13 38	3 46	56	65 2	38 17	17 20	12 5
27	51 23	14 22	13 42	3 55	57	65 58	39 30	17 36	12 40
28	51 40	14 58	13 47	4 6	58	67 0	40 48	17 52	13 15
29	51 58	15 37	13 51	4 15	59	68 8	42 9	18 10	13 54
30	52 15	16 13	13 56	4 27	60	69 22	43 33	18 30	14 37

S. 284.—Having sufficient space here, I will remark that the Pole of any Planet may be found without any calculation, namely, by means of the Celestial Planispheres only. Thus, if a Planisphere be constructed with the curve Patterns for 1, 3, 5, 7, 9, 11, &c. and another for 2, 4, 6, 8, 10, 12, &c. degrees of latitude up to 60 degrees of latitude, the polar Elevation of a Planet may be very readily found without any calculation, thus: Having by the Planisphere Quadrant marked the Planet's circle of position upon the Equator, then by a perpendicular from the centre of the Planet to the Equator of the Planisphere, the distance from the circle of position to the perpendicular measured upon the Equator will be the ascensional difference of the Planet under his own Pole, by finding what the curve is that will with the same declination as the Planet has, give the same ascensional difference that will be the Polar Elevation of the Planet. Such a Plate for 1, 3, 5, 7, &c. to 59 degrees forms one of a set of Planispheres that are sold (separately from this Book) along with the Curve Patterns, &c.

TABLE OF DISTANCES.

S. 285.—That the Centre of the Sector or Quadrant of Latitude should be placed perpendicular from 0° ♋ 0′, or 0° ♑ 0′.

A Deg.	♈ North ♎ South Latitude Dist.	♈ South ♎ North Latitude. Dist.	♉ North ♏ South Latitude. Dist.	♉ South ♏ North Latitude. Dist.	♊ North ♐ South Latitude Dist.	♊ South ♐ North Latitude. Dist.	B Deg.
0	180° 0′	180° 0′	134° 18′	139° 57′	109° 12′	119° 52′	30
1	178 17	178 23	133 16	139 9	108 49	119 22	29
2	176 34	176 47	132 13	138 20	108 26	118 52	28
3	174 51	175 10	131 11	137 32	108 5	118 21	27
4	173 8	173 34	130 8	136 43	107 42	117 51	26
5	171 25	171 57	129 6	135 54	107 20	117 21	25
6	169 42	170 20	128 4	135 6	106 58	116 51	24
7	167 59	168 44	127 1	134 17	106 35	116 21	23
8	166 16	167 7	125 59	133 29	106 13	115 50	22
9	164 33	165 31	124 56	132 40	105 50	115 20	21
10	162 50	163 54	123 54	131 51	105 28	114 50	20
11	161 11	162 39	123 5	131 10	105 1	115 20	19
12	159 32	161 24	112 16	130 30	104 34	115 51	18
13	157 53	160 9	121 28	129 49	104 6	116 22	17
14	156 14	158 54	120 39	129 9	103 39	116 53	16
15	154 35	157 38	119 50	128 28	103 12	117 23	15
16	152 56	156 23	119 1	127 48	102 45	117 54	14
17	151 17	155 8	118 12	127 7	102 18	118 25	13
18	149 38	153 53	117 23	126 27	101 50	118 55	12
19	147 59	152 38	116 35	125 46	101 23	119 25	11
20	146 20	151 23	115 46	125 6	100 56	119 57	10
21	145 8	150 4	115 7	124 35	100 56	119 57	9
22	143 56	149 6	114 27	124 3	100 56	119 57	8
23	142 43	147 57	113 49	123 32	100 56	119 57	7
24	141 31	146 49	113 8	123 0	100 56	119 57	6
25	140 19	145 40	112 29	122 29	100 56	119 57	5
26	139 7	144 31	111 50	121 58	100 56	119 57	4
27	137 55	143 22	111 10	121 26	100 56	119 57	3
28	136 42	142 14	110 31	120 55	100 56	119 57	2
29	135 30	141 6	109 51	120 23	100 56	119 57	1
30	134 18	139 57	109 12	119 52	100 56	119 57	0
A	Dist. ♍ North ♓ South Latitude.	Dist. ♍ South ♓ North Latitude.	Dist. ♌ North ♒ South Latitude.	Dist. ♌ South ♒ North Latitude.	Dist. ♋ North ♑ South Latitude.	Dist. ♋ South ♑ North Latitude.	B

S. 286.—Instead of being given to every Tenth degree of the Zodiac, as in the former Editions of the Treatise on the Celestial Planispheres, the distances are now given for every degree of the Zodiac. This will save both time and trouble; for if the Centre of the Sector, or if the straight Edge Ruler of the Quadrant of Latitude, be set to the nearest integral degree given in this Table upon the Index line of the Quadrant, and a fine line drawn thereby through the Planet's Longitude and Parallel of Declination, the intersection will give the Planet's Right Ascension true within one or two minutes of a degree, as far as for 9 degrees of North or South Latitude.

S. 287.—A Table for converting Hours and Minutes of Hours into Degrees and Minutes of the Equator, and the contrary..

Time.	Deg.	Time	Deg.	Time	Degree.	Time	Deg. &c.	Time	Deg. &c.	Time	Deg. &c.
Hours	°	Min	° ′	Min.	° ′	Sec.	° ′	Sec.	′ ″	Sec.	′ ″
1	15	1	0 15	31	7 45	4	0 1	1	0 15	31	7 45
2	30	2	0 30	32	8 0	8	0 2	2	0 30	32	8 0
3	45	3	0 45	33	8 15	12	0 3	3	0 45	33	8 15
4	60	4	1 0	34	8 30	16	0 4	4	1 0	34	8 30
5	75	5	1 15	35	8 45	20	0 5	5	1 15	35	8 45
6	90	6	1 30	36	9 0	24	0 6	6	1 30	36	9 0
7	105	7	1 45	37	9 15	28	0 7	7	1 45	37	9 15
8	120	8	2 0	38	9 30	32	0 8	8	2 0	38	9 30
9	135	9	2 15	39	9 45	36	0 9	9	2 15	39	9 45
10	150	10	2 30	40	10 0	40	0 10	10	2 30	40	10 0
11	165	11	2 45	41	10 15	44	0 11	11	2 45	41	10 15
12	180	12	3 0	42	10 30	48	0 12	12	3 0	42	10 30
13	195	13	3 15	43	10 45	52	0 13	13	3 15	43	10 45
14	210	14	3 30	44	11 0	56	0 14	14	3 30	44	11 0
15	225	15	3 45	45	11 15	60	0 15	15	3 45	45	11 15
16	240	16	4 0	46	11 30			16	4 0	46	11 30
17	255	17	4 15	47	11 45			17	4 15	47	11 45
18	270	18	4 30	48	12 0			18	4 30	48	12 0
19	285	19	4 45	49	12 15			19	4 45	49	12 15
20	300	20	5 0	50	12 30			20	5 0	50	12 30
21	315	21	5 15	51	12 45			21	5 15	51	12 45
22	330	22	5 30	52	13 0			22	5 30	52	13 0
23	345	23	5 45	53	13 15			23	5 45	53	13 15
24	360	24	6 0	54	13 30			24	6 0	54	13 30
		25	6 15	55	13 45			25	6 15	55	13 45
		26	6 30	56	14 0			26	6 30	56	14 0
		27	6 45	57	14 15			27	6 45	57	14 15
		28	7 0	58	14 30			28	7 0	58	14 30
		29	7 15	59	14 45			29	7 15	59	14 45
		30	7 30	60	15 0			30	7 30	60	15 0

The utility of this Table must be evident even to the very beginner in Astronomical Studies: a similar Table is to be found in most Treatises of Astronomy, but not so extended as this Table is. I thought it most proper to give it an unmistakable form, by giving one part to convert minutes of Time into Degrees and minutes of the Equator, and also another part of the Table for converting Seconds of Time into Minutes and Seconds of a degree of the Equator. As one that has been for many years a Teacher of Mathematics, I know this to be the best and most useful form for this kind of Table.

S. 287 A.—If in 24 hours (co. ar.) Proportional logarithm ..... 9·1249
The ☽ moves 12° 48′..... 1·1481
How much in 14 h. 30 min. ..... 1·0939

Answer 7° 44′ Proportional log..... 1·3669

o

CHAPTER 13.

Easy Method of Setting a Figure of the Heavens by the Celestial Planispheres.

S. 288.—Many persons may not be aware that the Planisphere of the Zodiac will serve as a perpetual Almanack, or Calendar of the Sun's daily motion in longitude, which will be found exact enough for setting Figures for Horary Questions, or for approximate Figures of Nativities for giving inspectional or off-handed judgments upon them.

But for whatever purpose the Figure may be set, we should always, as a preliminary to the Calculation, pay proper attention to the Equation of Time.

Equation of Time.

S. 289.—As it is absolutely necessary that all Celestial Figures of Nativities, &c. be erected to true Solar Time. It may be well to shew him how to reduce Clock Time to Solar Time.

Rule 1.—When the Clock is faster than the Sun, subtract the Equation of Time from the Clock Time, and the remainder will be the true Solar Time required. But when the Clock is slower than the Sun, add the Equation of Time to the Clock Time, and the Sum will be the true Solar Time.

Rule 2.

To reduce Solar Time or Apparent Time to Mean or Clock Time.

S. 290.—When the Clock is faster than the Sun, add the Equation of Time to the Solar Time, and the Sum is the Clock Time, or Mean Time required.

When the Clock is slower than the Sun, subtract the Equation of Time from the Solar Time, the remainder is the Clock Time, or Mean Time required.

The Equation of Time is given for every day in the year in White's Ephemeris, and in most Almanacks. The second Table in Ferguson's Astronomy, by Dr. Brewster, is one of the very best that I have seen for this purpose.

S. 291.—By neglecting to reduce the Clock Time to Solar Time would sometimes cause an error of so much as four degrees, or more, in the Right Ascension of the Midheaven, and also make the whole Figure of the Heavens equally erroneous,

S. 292.—Observe, that the Clock Time here mentioned is that shown by a Clock which should have been set to Mean Time, and continue to keep it truly for a whole year together. Such are the Clocks made use of in the Astronomical Observatories, and also the Chronometers used for finding the longitude of ships at sea. But if your Clock goes truly, and be set every day at noon, or even

every second or third day at noon, by and according to the Sun Dial, then would your Clock shew Solar Time. And when your Clock shews Solar Time, for every Figure of the Heavens that you calculate thereby, or according to Solar Time, you must find the corresponding Mean Time, and to the Mean Time you must calculate the longitudes of the Planets, &c. from the Ephemeris, because the Planet's Geocentric longitudes and latitudes upon which the Genethliacal Astronomer makes his calculations are all calculated to Mean Time. It may be here well to remark, that neglecting to follow this advice, of calculating the Planets' places according to Mean Time, as abovementioned, would in calculating the Moon's Zodiacal place from an Ephemeris, &c. sometimes cause an error of 8′ or 10′ in the longitude, &c.

S. 293.—Of the Difference of Meridians.

Our Astronomical Tables and our Almanacks being calculated for the meridian of the Royal Observatory of Greenwich (near) London, it is necessary, in erecting Figures of Nativities, and in making other astronomical calculations for places which are east or west from Greenwich, that we should know what the corresponding time then is at Greenwich (*et vice versâ*); the difference of longitude between any two places being turned into time, at the rate of fifteen degrees to an hour, as shewn by the Table in page 97.

S. 294.—*Problem* 1.

The Time at Greenwich being given, to find the Time at any other place.

If the time at any place in east longitude be required, to the difference of the meridians add the given time at Greenwich; the sum is the time required at the other place.

But if the place be in west longitude, subtract the difference of meridians from the time at Greenwich; the remainder is the time required.

S. 295.—*Examples.*

1st. On the 14th of August, 1769, at 21 h. 19 min. 54 sec. P. M. at London, what was the time at Ajaccio, in the island of Corsica? Ajaccio is in 9° East Longitude.

To the given time at Greenwich (near London), ...	21h.	19m.	54s.
For 9° East Longitude, add	0	36	0
Time required at Ajaccio was	21	55	54

S. 296.—2d. At London, on the 6th of November, 1817, at 13 h. 46 min. 40 sec. P. M., what was the time at New York, in 74° 5′ West Longitude. In this case the difference of meridians is 74° 10′, which, turned into time, gives 4 h. 56 min. 20 sec.; then,

From the time at London	13h.	46m.	40s.
Subtract the difference of Longitude	4	56	40
There remains the required time at New York	8	50	0 P.M.

S. 297.—*Problem* 2.

The Time at any Place (whose Longitude is known) being given, to find what the Time is at Greenwich (London).

If the place be in east longitude, subtract the difference of meridians from the given time; the remainder is the time at Greenwich. But if the place be in west longitude, add the difference of meridians to the given time; the sum is the time at Greenwich.

S. 298.—*Examples.*

When it is 1h. 10m. P.M. at Paris, what is the time at Warsaw in Poland?

The Longitude of Warsaw is	East	21°	2′
The Longitude of Paris is	East, subtract	2	20
The difference of Meridians		18	42

And 18° 42′ turned into time by Table page 97, is	1h.	14m.	42s.
Add the time at Paris	1	10	0
The time at Warsaw was	2	24	42 P.M.

S. 299.—*Example* 2*d*.

A Gentleman, an intimate friend of the Author, was born at New York on the 6th of November, 1817, at 8 h. 50 min. P. M., mean clock time: what was the mean time then at Greenwich? The longitude of New York is 74° 10′ West, and 74° 10′ turned into time is ..... 4h. 56m. 10s.

Add the time at New York	8	50	0 P.M.
The mean time then at Greenwich was	13	46	40 P.M.

And this is the time to which the zodiacal longitudes of the sun, moon, and planets must be computed from the Ephemeris in calculating the Gentleman's Nativity to the estimate Time of Birth. In order that nothing may be wanting for the instruction of the student, I will to this Example add an illustration of applying the Equation of Time, and then of finding the right ascension, &c., of the mid-heaven.

S. 300.—The Time of Birth per clock at New York was	8h.	50m.	0s.
The Equation of Time for that moment, add	0	16	8
The Estimate Solar Time	9	6	8

And to this last found time the astronomical Figure of the Heavens must be erected.

Thus to the Right Ascension of time 9 h. 6 min. 8 sec. 136° 32′ 0″
Add the Right Ascension of ☉ (☉ 14° 19′ 39″ ♏) .. 221 51 40

The sum is the Right Ascension of the Midheaven = 358 23 40

which answers to ♓ 28° 15′ 0″. Now by adding 30° to the R. A. of the midheaven, &c., as taught in page 32, taking the R. A. of the tenth as 358° 24′, which is exact enough, we shall have the oblique ascensions of the eleventh house 28° 24′, of the twelfth = 58° 24′, the first = 88° 24′, of the second 118° 24′, and of the third house 148° 24′ is the oblique ascension. The polar elevations of the houses are easily found by the Table in page 94, by making proportion for the 43′; because the latitude of New York is 40° 43′ North; then, under the respective polar elevations the degree and minute of the zodiac may be very correctly found by proceeding in a similar manner to that given in pages 32, 33 and 34, for finding the cusps of the houses in the Nativity of the Emperor Napoleon. But by the Celestial Planispheres nothing more would be required than to bring 28¼ degrees of ♓ on the Ecliptic Slider to coincide with the line of the tenth house, taking care that the Equator of the Ecliptic Slider corresponded exactly with the Equator of the other Planisphere; and by observing where the poles or curves of the houses pass, the degree and part of a degree of the zodiac upon the cusp of each house is instantly shewn by the Ecliptic Slider. If the student has paid attention to the preliminary instruction before given, he will be able to perform the Problems by the Planisphere mentioned in the beginning of this chapter, which we shall now proceed to exemplify.

S. 301.—To find the Sun's Longitude on any given day by the Ecliptic Slider.

Place the bottom or cross of your T-square against the straight edge of the Slider; bring (the edge of) its upright stem to touch the given day of the month upon the line marked *January, February*, &c., and the same edge of the stem higher up will shew what degree of the zodiac the Sun is in on the given day.

S. 302.—*Example.* Let it be required to find the Sun's Longitude on the 17th of August, 1830?

The upright of the T-square being set to the 17th of August on the line of months, will point out 24° ♌ for the Sun's longitude. His right ascension on the straight edge of the Slider is 146 degrees; and the Sun's right ascension in time upon the line of hours is then equal to 9 hours 44 minutes, as shewn by the same edge of the upright of the T-square.

To Set or Erect a Figure of the Heavens by the Celestial Planispheres.

S. 303.—Having found the sun's longitude, either by the Ephemeris or by the method shewn above, with the right ascension

answering to it, you have only to add the right ascension in time, reckoned from the preceding noon, to the right ascension of the sun (in time.) Apply the Equation of Time in the manner taught in page 98, if the Equation be as much as half a minute. Use the sum of these two numbers of right ascension, if less than 24 hours; but if more than 24 hours, then reject 24 hours, and the remainder will be the right ascension of the midheaven in time, for the time to which you intend to set your figure. Set the stem of the T-square to this right ascension, and it will shew the corresponding degree of the zodiac, which will be on the tenth house: this being known, you have only to set the same degree of the zodiac of the Slider to correspond to the line of the tenth upon the Planisphere of the twelve house, taking care that the Equator of the Ecliptic Slider is true and coincident with the Equator of the Planisphere of the latitude of the place for which you set the figure. You have then only to observe where the poles of the houses cut the degree of the zodiac, and you will thereby see what degree of the zodiac is upon each house of the figure, the same as by a table of houses.

S. 304.—N.B. When the Planisphere of Zodiac or Ecliptic is applied as just before taught, and does not shew all the six eastern houses, it will in that case shew all the six western houses of the figure, whereby all the six eastern houses become known, being the same degrees of the opposite signs of the zodiac. This case occurs when any part of ♍ ♎ ♏ or ♐ happen to be upon the meridian; but for the latitude of London this takes place with any degree of the zodiac on the tenth house from the ninth degree of Leo to the end of Sagittarius. But even when this occurs the Planisphere may be made to shew all the eastern houses, by only making a fine dot or mark on the Planisphere (of the twelve houses), where ♐ ends upon the Ecliptic Slider: this done, remove the Slider, and apply 0° ♑ 0′ to the aforesaid mark, taking care that the Equators of both the Planispheres coincide; then will the Ecliptic Slider shew the cusps of those eastern houses that before were wanting.

CHAPTER 14.

Planis. V.

S. 305.—In addition to the instruction given in the preceding chapter for setting or erecting a Figure of the Heavens by the Celestial Planispheres, one more Example will now be given, namely, for setting, and also delineating, the Figure of the Nativity of the Emperor Napoleon. We have, in pages 84, 85, 86, 87, 88, and 90 to 93, carried the student quite through the projection of the Planisphere of the twelve houses for the birth-place of Napoleon, by a course of easy and progressive lessons; and we now suppose that our pupil has the said Planisphere stretched upon the drawing-board and placed before him, and waiting for our instruction how to delineate the Figure

of Napoleon's Geniture permanently thereupon, ready for introducing the planets also, in order to calculate the various directions, both mundane and zodiacal.

S. 306.—Thus, in the nativity before us of the Emperor Napoleon, the moment to which we shall set our figure is August 14th, 1769, at 21h. 55m. 54s. clock time; and the sun's longitude then ☌ 22° 43′; and the right ascension of the sun is 145° 4′. Therefore,

From the given clock time	21h.	55m.	54s.
Subtract the Equation of Time (the clock being before the Sun)	0	4	14
There remains the Solar Time, P.M.	21	51	40
Then to the Right Ascension of the Sun			145° 4′
Add the Right Ascension of Time, 21h. 51m. 40s., from the preceding day at noon			327 55
The sum is			472 59
Rejecting the whole circle			360 0
The Right Ascension of the Midheaven will be			112 59

Which we will call 113° on the Planisphere of the zodiac: as it is not reasonable to suppose that a single minute of a degree can be shewn upon this instrument, we must content ourselves with larger fractions of a degree, such as the sixth, the eighth, or the tenth part of a degree, either of the last mentioned fractions being a much greater nicety than could well be expected, but which can nevertheless easily enough be seen and discriminated by a good eye, and be readily marked off by a fine-pointed marker.

S. 307.—Now place the Planisphere of the Zodiac, or Ecliptic Slider, so that the Equator of the Slider may coincide exactly with the Equator of the mundane part of the Planisphere: in this manner slide the Ecliptic backwards or forwards until 113° on the lower edge of the Slider correspond exactly with the meridian or cusp of the tenth house; while thus fixed, draw the zodiacal curve, or Ecliptic, upon the intended Planisphere, and then observe what degrees of the zodiac are intersected by the different poles or cusps of the houses, and you will find 21¼° ♋ upon the cusp of the tenth house, and about 23¾° of ☌ intersected by the pole of the eleventh house, which is therefore the cusp of the eleventh house; and by observing in the same manner what degrees of the Ecliptic are intersected by the other poles of the houses, we shall find 23$\frac{9}{10}$° of ♍ on the cusp of the twelfth house; and on the ascendant, or first house, we find then ascending ♎ 18°; and on the cusp of the second house we find ♏ 15¼°, very nearly; and on the cusp of the third house is ♐ 16¾° as near as may be. The opposite houses have the same degrees of the opposite signs. Observe, that while the Ecliptic Slider is thus fixed in its proper meridional position, that, besides

drawing with a fine-pointed, hard, black-lead pencil, or steel drawing-pen, the figure and curve of the Ecliptic, you should make a small dot or fine stroke, and write the proper mark or astronomical character at the beginning of each sign of the zodiac; also mark every fifth and tenth degree of each sign with a very fine dot or stroke, and number each tenth degree thus, 10, 20. But when very great despatch is desired, it will be sufficient to mark the beginning of each sign respectively; and in the latter case write upon the cusp of each of the houses the number of the degrees and fractions of degrees intersected by them; and the Celestial Figure upon the Planispheric Chart will then be completely ready for the insertion of the planets.

S. 308.—N.B. One can hardly imagine, after the instruction already given, that it would be necessary to tell the student that the whole curve of the Ecliptic must be permanently marked upon the Planisphere of any Nativity; or to remind him of what was said at the end of the foregoing chapter, that the figure of that curve should be completed by applying 0° ♑ 0′ to the very point where ♑ ends. We shall now shew the utility of our Abridged Tables of Right Ascension by an

Example.

S. 309.—Having the Right Ascension given of the Sun or of the Meridian, to find the exact Degree and Minute of the Zodiac corresponding thereunto by Oxley's Abridged Tables of Right Ascension.

In the Nativity of the Emperor Napoleon the R. A. of the Midheaven is 112° 59′; let it be required to find exactly the degree and minute of the zodiac upon the cusp of the tenth, by Table No. 2, page 62.

Though it requires many words to explain the process properly, yet the work itself is almost done in a moment by these Tables.

In this Example our given number (in R. A.) is 112° 59′; we look in the Table No. 2 for the nearest number to this, but a less one, and we see in a moment that is 112° 42′ 5″, which answers to 21° of ♋; and the next greater number in the same Table is 113° 46′ 3″, which corresponds to 22° of ♋; and between these two numbers in the column of differences is 63·8, that is, $63\frac{8}{10}$.

From the given Right Ascension	112° 59′ 0″
Subtract the next less tabular number	112 42 5
The difference is	0 16 5

S. 310.—Then say, by the Rule of Three, if the difference of Right Ascension 63·8 give 60′ of longitude, what longitude will 16·5 of Right Ascension give?

Resolved thus by the sliding Gunter:—Opposite to 60 on A set 63·8 on B; then opposite to 16·5 on B we find 15·5+ on A, the

proportional of longitude required; which 15·5+ added to 21° of ♋ shews the longitude of the midheaven is a little more than 21° 15½′ of ♋: By Spherics it comes out 21° 15′ 31$\frac{1}{10}$″ ♋.

How to place the Planets in the Celestial Planispheres.

S. 311.—This operation consists of three separate parts; first, is the drawing upon the Celestial Chart each planet's proper parallel of declination, &c.; the second is, marking each planet's zodiacal longitude upon the line or curve of the Ecliptic; and the third part of the process is, to draw the planet's line of latitude from the Ecliptic.

S. 312.—*Example.* Let it be required to draw the Parallel and the Contra-Parallel of Declination of ♀ upon the Celestial Planisphere of Napoleon's Nativity.

The latitudes and longitudes for all the planets in this geniture being given in page 35 of this book, to this page we refer the student; and he will see the longitude of ♀ there is ♋ 7° 1′, and her latitude 3° 10′ south; and we there see that her declination is 20° 7′ north. But we will suppose that the declination was not found, and that we must find it. Thus:—If ♀ had no latitude, see by the Table of Declinations in page 61 that her declination in 7° 1′ of ♋ would be 23° 17′ north, very nearly; and then by referring to Table No. 4, in page 65, where each degree of latitude has its equivalent expressed, or turned into declination, by that Table we see that for 7° 1′ of ♋, the 3° 10′ of latitude will be equal to 3° 10′ of declination; and as the planet ♀ has south latitude, and because south latitude in any northern sign of the zodiac diminishes the ecliptic declination of the planet, therefore we subtract 3° 10′ from the ecliptic declination of ♀ 23° 17′ north, and there remains 20° 7′ for the declination of ♀ required. This being known, you take your very fine-pointed compasses, or spring-dividers; there is a Scale of Declinations engraved upon the Ecliptic Slider; set one foot of the compasses upon 0 upon the said Scale of Declinations, and extend the other foot to 20° and one-tenth of a degree, as near as you can judge (for we cannot expect to find the exact minute of the degree upon any such scale). With this declination in your compasses, place one foot thereof upon the Equator of your projected Planisphere, just where the Equator is intersected by the lower meridian line, or line of the fourth house; with the foot of the compasses there as a centre, make a mark upon the line of the fourth, both to the north and south of the Equator; do this upon the line of the fourth, both at the right side and on the left side of your Planisphere. Next take your straight-edge ruler, and draw a fine straight line 360 degrees long, or from line 4 to line 4 again on the north side of the Equator, through the points of declination aforesaid. Draw another line in the same way through the two marks on the south side of the Equator; the line on the north side of the Equator is the parallel declination of ♀, that on the south of the Equator is the contra-parallel of ♀.

S. 313—I will just now remark, that if the declination be marked also in the same manner upon the meridional line of the tenth house, it is a guide to the projector that the parallel may be correctly drawn. At each end of parallel declination of ♀, just outside of each line of the 4th, write a small, neat, and distinct character of the planet ♀; and at each end of the contra-parallel write *c* ♀. Do the same in regard to the other planets, until all their parallels and contra-parallels of declination are drawn upon the Planisphere, and marked with proper astronomical characters in the manner just explained in respect to the planet ♀.

S. 314.—When several of the planets have nearly the same declination, their parallels when drawn would be very near each other. In this case, I draw the parallels with different coloured inks; thus, for one planet I would describe his parallels with black, another's with blue, and those of the next planet with red ink: in this way the parallels and contra-parallels would be quite distinct, and known instantly, even if the lines were within a hair's breadth of each other.

S. 315.—Having completed the required parallels of ♀, the next thing to be done is to mark, as exactly as we can, the zodiacal longitude upon the curve of the Ecliptic already drawn upon the projected Planisphere. We take the Ecliptic Slider, and place it upon the projected Planisphere, with 0° ♈ 0′ and 0° ♎ 0′ exactly to coincide with these points already marked upon the Planisphere of the Nativity: when so fixed, with a fine pointrel we make a very fine dot or puncture in the paper at 7° ♎ 0′. As we cannot pretend to mark the odd minute of longitude, we next take the Quadrant of Latitude, and we place 0° ♈ 0′ on the Quadrant exactly to coincide with 0° ♈ 0′ on the Planisphere of the Nativity; and we make 0° ♎ 0′ on the Quadrant to correspond correctly to 0° ♎ 0′ on the projected Planisphere: and we know by the Table of Distances in page 96, that the distance to which the edge of the straight-edge rule must be placed upon the index line of the Quadrant is by that Table 119·57°, say 120°, for a planet with south latitude in 7° of ♎; still keep the edge of the rule to the said 120°, and at the other end of the rule draw a very fine line through the Ecliptic longitude of the planet ♀, viz., at the dot made at 7° ♎ as aforesaid, and where this line intersects the planet's parallel of declination is the centre of the (Planispheric) planet ♀, and corresponds in this projection exactly with the longitude, latitude, declination, and right ascension of the planet ♀, as required.

S. 316.—*Note.* The line just drawn by the help of the Quadrant is the planet's line of latitude. And in fixing the Quadrant of Latitude as abovementioned, we must always take care that the Equator of the Quadrant coincides as near as can be with the Equator of your projected Planisphere. Recollecting that when you apply the quadrant in the southern signs, you fix 0° ♑ 0′ of your Quadrant to 0° ♑ 0′ on the projection, and 0° ♈ 0′ or ♎ to correspond with either of these equinoctial points on the Planisphere,

always taking the distance to which the centre of the Sector, or of the index rule should be placed from the Table in page 96; and then proceed in the manner explained for the planet ♀.

For a planet that has no latitude, you have only to mark in his zodiacal longitude upon the curve of the Ecliptic, as exactly as you can with a pointrel or fine needle-point, and that will be the centre of the sun or of a planet having no latitude.

We now suppose the student has inserted all the other planets in the Planisphere of Napoleon's Nativity, in the manner taught for placing ♀ therein. And supposing that we had not found the semi-diurnal and semi-nocturnal arcs already given in page 35, we could have found sufficiently near by the Planisphere, as follows:—

S. 317.—Upon the planet's proper parallel of declination measure from the Meridian line to where that parallel intersects the curve of the horizon, that will be the semi-diurnal arc of the planet. But if you measure from the line of the fourth or lower meridian to where the planet's parallel intersects the horizon, that distance will be the semi-nocturnal arc of the planet. This can readily be done by the scale of degrees upon the straight edge of the Ecliptic Slider; take these distances carefully, and note them down either upon the margin of the Planisphere or on a separate paper.

CHAPTER 15.

PLANIS. VI.

HOW TO PROJECT THE ORBIT OF A PLANET, OR THE ORBIT OF THE MOON'S LATITUDE, IN A VERY EASY AND CORRECT MANNER, UPON THE CELESTIAL PLANISPHERES.

S. 318.—As there are persons who cannot understand a verbal description, nor any Rule however clear and easy, unless accompanied with an Example, for their satisfaction, and to oblige many purchasers of the first edition of the Treatise on the Celestial Planispheres, I will now present the student with a very easy and accurate method, with a suitable Example, of projecting the Moon's Orbit, or path of her latitude, upon the Celestial Planispheres.

S. 319.—*Example.*

Let it be required to project so much of the Moon's Orbit as will be requisite for directing to all the various zodiacal Aspects with latitude in Napoleon's Nativity.

Having already given ample instruction how to use the Quadrant of Latitude in placing the planets in their proper positions in the Celestial Charts in the preceding chapter, I shall now proceed to shew the method of using another of my new calculating instruments to the same purpose, namely, the Single Astronomical and Astrological Sector, represented in Figure No. 2 of Plate 3. But I will explain what astronomical requisites are to be used therein.

Rule.—From White's, or any other good Ephemeris, take out the Moon's longitude, latitude, and declination, beginning with the noon of the day before birth, and to ten or eleven days after the birth. Arrange these numbers ready for use, as in the following Table for the Emperor Napoleon's Nativity.

1769	Moon's Long.	Moon's Lat.	Moon's Decl.		1769	Moon's Long.	Moon's Lat.	Moon's Decl.	
	° ♈ ′	° ′	° ′			° ♈ ′	° ′	° ′	
Aug. 14	17 ♑ 11	2 N 8	20 S 15	*a*	Aug. 20	5 ♉ 29	4 N 55	6 N 39	*g*
15	29 33	3 4	17 17	*b*	21	19 18	4 29	11 41	*h*
16	12 ♒ 12	3 53	13 28	*c*	22	3 ♊ 16	3 47	16 8	*i*
17	25 12	4 31	8 53	*d*	23	17 16	2 51	19 42	*j*
18	8 ♓ 22	4 55	3 56	*e*	24	1 ♋ 20	1 45	22 9	*k*
19	21 48	5 1	1 N 19	*f*					

S. 321.—Take the Ecliptic Slider, and place the Equator of the Slider to agree exactly with the Equator of the Planisphere of the Nativity, and bring the degree and fraction of the degree upon the Slider (which belongs to the cusp of the tenth house), to coincide with the line 10 upon the Planisphere of the Nativity: it is then properly fixed. In Napoleon's Nativity, 21° ♋ 16′ (nearly) are upon the cusp of the tenth house; and having brought 21¼° ♋ upon the 10th, in the manner just stated, begin by marking upon the Ecliptic of the Planisphere of the Nativity the Moon's longitude, 17° ♑ 11′: next for 29° ♑ 33′; and thirdly, for 12° ♒ 12′: and so on until the Moon's longitude is carefully marked for all the eleven days contained in the foregoing Table, taking care to place the letters of reference, *a*, *b*, *c*, &c., to the corresponding longitudes. This being done, remove the Ecliptic Slider, and next take the Sector, which must be applied in the following manner:—

How to project the Line of any Planet's Latitude, by the Astronomical and Astrological Sector.

S. 322.—Observe, that the index line of the Quadrant of Latitude is a line which passes from 0° ♋ 0′ and 0° ♑ 0′, quite perpendicular to the line of the Equator upon the Planisphere of the Nativity; and when you use the Astrological Quadrant or either of my new Sectors, a perpendicular should first be drawn upon the Planisphere of the Nativity from 0° ♋ 0′ and 0° ♑ 0′, which may be done in an instant by the aid of the T-square. Then use the Sector in the following manner:—

S. 323.—Referring to the Table of Distances given in page 96, according to the zodiacal longitude the planet is in, set the inward edge of one leg of the Sector upon the aforesaid perpendicular, quite close to it; the degree upon the said limb of the Sector expressing the distance must be brought to coincide with 0° ♋ 0′ or 0° ♑ 0′ on the line of the Ecliptic, and then the centre on which the Sector

turns will be properly set to the required distance; this distance is reckoned from the Ecliptic line (and not from the Equator). One leg of the Sector being kept firm in this position, move the other limb until its divided edge touches the Ecliptic longitude of the planet, or of the longitude to which it is desired to draw a line of latitude; draw a fine line through this point about an inch long, either north or south, as the latitude may be, and this will be the line of the planet's latitude required. And the point where the line of latitude cuts the parallel of the planet's declination will be the true place of the planet's centre upon the Planispheres, both according to its longitude, latitude, declination, and right ascension.

We will now exemplify this instruction by beginning with the Moon's longitude on 14th August (see page 108). We see the Moon was then in ♑ 17° 11′, with 2° 8′ north latitude; we see by the Table in page 96, that to 17° ♑ with north latitude the distance is 116° 22′, but the integral number 116° will be near enough. Then to the perpendicular drawn from 0° ♑ 0′ on the Planisphere with the centre northward fix the Sector, and bring 116° on the Sector on the line of the Ecliptic at 0° ♑ 0′; move the other limb of the Sector until its graduated edge touch upon ♑ 17° 11′ in the Ecliptic; draw a fine line from 17° 11′ of ♑ northward about an inch, and this will be the true line of the Moon's latitude north. Next refer to the preceding Table of the Moon's longitude, &c., in page 108, and we find that to 17° ♑ 11′ and 2° 8′ north latitude belongs 20° 15′ of south declination. With a pair of fine-pointed compasses take 20¼ degrees from the line of declinations engraved upon the Ecliptic Slider; next take your T-Square, and slide it along your Planisphere board until the blade or upright touches the line of latitude drawn through 17° ♑ 11′ Now place one foot of the compasses upon the Equator of the Planisphere (of the Nativity), and keep the other foot of the compasses perpendicular to it, which you can easily do by help of the T-square; and thus, with one foot on the Equator, and the other foot carried perpendicular to it until it cuts the line of latitude, there make a dot or mark with the point of your compasses, which mark will be the place of the Moon's centre, with 2° 8′ north latitude and 20¼° south declination in 17° ♑ 11′. In Plate No. 4 this place is indicated by a dot near the letter *a*. Proceed in this manner to set off the line of latitude for 29° ♑ 33′, for 12° ♒ 12′, for 25° ♒ 12′, for 8° ♓ 22′, and for 21° ♓ 48′.

S. 324.—Secondly. Having drawn a long perpendicular, as before directed, through 0° ♋ 0′ across the whole breadth of the Planisphere of the Nativity, you now fix the Sector for the northern signs. To do this, bring the centre of the Sector southward; place the graduated edge of one leg upon the aforesaid perpendicular, and move the other limb so as to touch 0° ♈ 0′; the Sector is then ready for you to operate as desired.

It may be here proper to remark, that for any planet posited between the 10th degree of ♓ and the 20° ♈, or between the 10° of ♍ and 20th degree of ♎, the distances for each degree of longitude

vary considerably more than in other parts of the zodiac. Within the limit of 20° each way right and left of the equinoctial points, the distance belonging to each degree of longitude is from 1° 39′ to 1° 43′; so that, in estimating the distances by the numbers in the Table in page 96, it will be well to allow for every ¼ of a degree of the planet's longitude a proportional increase of the distance (*et vice versâ*), in order to project the line of latitude correctly. Thus, in the Planisphere before us we will let it be required to draw the line of latitude for the Moon in 5° ♈ 29′ with north latitude. By the aforesaid Table the distance belonging to 5° ♈ with north latitude is 171° 25′, and to 6° ♈ with north latitude the distance is 169° 42′: here the difference of the distances is 1° 43′, therefore the proportional for 0° 29′ is 0° 50′; and this 0° 50′ taken from 171° 25′, the distance for 5° ♈ with north latitude, leaves 170° 35′, the distance which belongs to 5° 29′ ♈ with north latitude. Now we are supposed to have the graduated edge of the Sector upon the perpendicular aforesaid; we bring 170½° upon that edge to coincide with 0° ♋ 0′ on the line of the Ecliptic; extend the other limb till its graduated edge touches 5° ♈ 29′, or, rather, 5½ degrees of ♈; and from that Ecliptic point draw a fine line about an inch long, and that is the line of latitude required for the Moon in 5° ♈ 29′ with north latitude. Proceed in a similar manner for the Moon in 19° ♈ 18′, for 3° ♉ 16′, for 17° ♉ 16′ and for 1° ♊ 20′; and after having set off the Moon's declination upon the line of latitude for each respective longitude beforementioned, we have then gained eleven different points in the Moon's orbit: these are indicated on the Plate No. 4 by the letters *a, b, c, d, e, f, g, h, i, j, k;* and by this means, and the following easy process, we are enabled most correctly to describe upon the Planisphere of the Nativity as much of the Moon's orbit as will be necessary for calculating the Nativity.

S. 325.—From among the Curve Patterns, or Planispheres, take out the pattern curve for 4° of latitude; place this curve for 4° of latitude so as to touch, at one and the same time, the three points *a, b,* and *c,* and then draw a line through these points by means of this pattern. Next fix the pattern in such a manner as to touch the three points *c, d,* and *e,* and then draw a line through these three points as far as the point *e.* This done, place the pattern so as to touch the three points *e, f,* and *g,* all at one time; draw a line through the points *e, f,* and *g.* Next apply the pattern so as to touch the three points *g, h,* and *i* (all at the same time); draw a line through the points *g, h, i.* Lastly, apply the pattern so as at once to touch the three points *i, j, k,* and draw by the pattern a line passing through these three points *i, j, k;* and the Moon's orbit will then be correctly described upon the Planisphere of the Nativity from the 17th degree of ♑ to the 1st degree of ♊, which is quite sufficient for all the zodiacal directions of the Moon in this Nativity.

S. 326.—The great utility of delineating the Moon's orbit upon the Planisphere is, that the orbit line being once drawn, if you desire to direct the Moon to any Aspect in the zodiac with latitude,

you have only to take the Ecliptic Slider, fix it upon the Planisphere of the Nativity (as before taught), and with a needle or fine pointrel mark on the Planisphere of the Nativity the zodiacal longitude of the Aspect by making a very small puncture, or fine dot; draw the line of latitude as aforesaid through this dot so as to intersect the Moon's orbit, and the point of intersection will be the place of the Moon's centre in the orbit line; then with your parallel ruler draw a line from this place (where the orbit line is cut by the line of latitude) to the pole of the Moon, parallel to the Equator; and this last drawn line will be the Arc of Direction required. And if the longitude of the Aspect be carefully marked upon the Ecliptic, and the line of latitude be properly drawn, according to the distances given in Table page 96 of this book, the Arc of Direction will not differ in any case more than the fifth of a degree from the result obtained by Spherical Trigonometry, and very rarely more than the tenth of a degree; for in a vast number of directions in zodiac, as well as in mundo, done by the Author of this work, he more frequently found the Arcs of Direction as given by his Planispheres to come within two or three minutes of a degree the same as by Spherics; and sometimes within a single minute, or 60th of a degree, which he could easily determine by a Diagonal Scale of Equatorial Degrees on brass; and, not to leave it in the power of any ill-natured person or sceptic to say that this is only mere assertion, an example of directing the Moon to the Trine of Venus in the zodiac is given in Sect. 467, to which we refer the student.

CHAPTER 16.

Planis. VII.

INSTRUCTIONS RELATIVE TO FINDING THE CIRCLES OF POSITION AND THE POLES OF THE PLANETS, &c., UPON THE CELESTIAL PLANISPHERES.

S. 327.—The student shall herein be taught to perform these problems both by numerical calculations, and also instrumentally. And as this book, and my Planispheres and Curve Patterns of Polar Elevations may fall into the hands of some students who have no books of Mathematical Tables, and who only wish to perform their operations by the Celestial Planispheres, for the satisfaction of such persons I shall give the method of calculating certain proportions by common arithmetic; premising, however, that such persons understand the Rule of Three.

To do this expeditiously and correctly the subjoined little Tables of Decimal Parts of a Degree, answering to a certain given number of Minutes of a Degree, will render the operation quite easy.

S. 328.—TABLE A.

Minutes.	Decimals of a Degree.
6	·1
12	·2
18	·3
24	·4
30	·5
36	·6
42	·7
48	·8
54	·9

S. 329.—TABLE B.

Minutes.	Decimals of a Degree.	Minutes.	Decimals of a Degree.
1	·017	30	·50
2	·033	33	·55
3	·05	36	·60
6	·10	39	·65
9	·15	42	·70
12	·20	45	·75
15	·25	48	·80
18	·30	51	·85
21	·35	54	·90
24	·40	57	·95
27	·45		

S. 330.—Table A is that most used for reducing the minutes belonging to any number of degrees into their equivalent decimal fractions of a degree, so that the whole is expressed as if a common number only. The Table B is to enable the student to see in a moment the value in minutes of a degree of the decimal fraction that comes out in the fourth number, or answer.

In stating a proportion for the use of the Planispheric Projections, the tenth of a degree, or 6 minutes, will be an expression sufficiently near to answer our purpose; and in estimating the tenths, if the number of minutes was only 3, or was less than 3 minutes, write a zero 0, to the right of your number of degrees in the first place of decimals; but if the number of minutes was 4, and did not exceed 9, then write 1 in the first decimal place; but if there be any number of minutes from 10 to 15, write down the decimal ·2; but if the number of minutes was 16, then we would write ·3 as the decimal fraction; or briefly thus, if the given number of minutes be 4 more than the minutes which belong to the next less fraction in Table A, then write down the next greater fraction as the fraction required, although it be 2 minutes less than that fraction. An Example will render this plain and easy.

S. 331.—*Example.*

Let it be required by this method to find the Circle of Position of the Planet Saturn in the Nativity of Napoleon.

THE ANALOGY.

			Dec.
As Semi-diurnal Arc of ♄	110° 3′	= 110°	·0
Is to 90 degrees of the Equator	90 0	= 90	·0
So is ♄'s distance from the tenth	4 47	= 4	·8
To the distance of ♄'s Circle of Position upon the Equator	3 55	= 3	·9
	or	3	·9
		3	·92

As 110°·0 : 90°·0 :: 4°·8 :

$\times 48$

72·00

36

11·0) 43200 (3·9 = 3°·54′ if we leave off at the step *b*, but
3300 = *a* if we continue the process one step
farther, viz to *c*, we obtain 3°·92 for
10200 the answer or fourth Term.
9900 = *b*

300·0

220·0 = *c*

80·0

and this is a very short process, but still it gives the answer to the very minute of a degree; for we see instantly by both the Tables A and B, that the decimal ·9 is equal to 54 minutes, and we see by Table B, that 1 minute is equal to ·017 and ·017 if expressed by two figures becomes ·02; therefore it must be evident (to any one accustomed to such calculations) that 3°·92 must be 3° 55′ and about one-fifth of a minute more. I would also observe, that it is best to have the same number of Decimal places at the end of the first, second, and third Terms of the Analogy; then we see at once the number of integers we should have in the resulting fourth Term. Or we perform the same,

S. 332.—By the Sliding Gunter, thus: opposite to 110 on A place 90 on B; then opposite 4·78 on A stands 3·9 on B, very nearly. Observe that according to the usual notation of a Sliding Gunter that has only two sets of numbers, namely 1, 2, 3, 4, 5, 6, 7, 8, 9. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, upon the fixed piece A, and the same corresponding numbers upon the Slide B, we call that 110 on A which should only be taken as 11, if we take the 478, which comes before it on the same line to stand only for 4·78 instead of 47·8 a third set, or another 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, should be added upon each line of numbers, both on the upper fixed piece and also upon the slide. The rule should be three feet long: such an instrument would be of immense utility, and would resolve a vast number of Problems that cannot be answered by sliding rules as now constructed. I hope that some mathematical instrument maker will act upon the hint here given, and manufacture the said article at a reasonable price.

S. 333.—The manner of calculating the Planet's circle of position upon the Equator has just been taught above, and also in page 42 of this Treatise; but it sometimes happens that Planets are by their small declination very near the Equator, in which case it will be easier to place the Planet's Pole correctly by finding its circle of Position upon the parallel of Cancer or Capricorn, as this will enable

us to hold the curve steadily in the proper position upon the chart when we are drawing the Planet's Pole of Elevation thereon.

It is believed that now a single Example will be quite sufficient to make this perfectly easy to the student.

Example of finding a Planet's Circle of Position upon the Parallels of Cancer and Capricorn.

S. 334. *Example.*—In the Nativity of the Emperor Napoleon, the declination of the Planet Mars is 7°·57 N.; his Semi-diurnal Arc is 97° 8′ = 97 and 1-tenth degrees, and his distance from the tenth 50° 49′ = 50° 8-tenths; and the Semi-diurnal Arc of the Parallel of Cancer is 112° 44′ = 112° 7-tenths. These particulars being known, the Circle of Position of Mars upon the Parallel of Cancer may be found by this

S. 335.—*Analogy.*

		P. Logar.
As Semi-diurnal Arc of ♂ 97°·8 .....(co-arc)	97°·8	9.7321
Is to the distance of ♂ à 10th	50·49	.5492
So is the Semi-diurnal Arc of the Par. of ♋ ..	112·44	2032
To the Circle of Position's distance à 10th	58·59	·4845

S. 336.—Or,

As 97°·1 : 50°·8 :: 112°·7
×50·8

9016
56350

97·1) 572516 (58°·96, or 58°·$\frac{96}{100}$ = 58° 58′ by Table B in page 112, being only a single minute less than by the Table of Proportional Logarithms.
4855

8701
7768

9336
8739

597·0
582 6

144

S. 337.—By the Sliding Gunter, Thus: Set 97·8 on A opposite 50·8 on B; then opposite 112·75 on A stands 51°·0 on B. And it is this distance of the Circle of Position of ♂ from the meridional line of the tenth house, viz. 59° 0′, that a fine dot or mark should be made upon the parallel of the tropic of Cancer.

S. 338.—*Note.* If Mars had had south declination instead of north, then it would have been proper to have used 67½°, the semi-

diurnal arc of the parallel of Capricorn, as the third term in the foregoing Analogy; and the fourth number, or answer, would have been the distance from the tenth of the Circle of Position of Mars, to be marked upon the parallel of ♑. Observe, if the declination of a planet be less than 11 degrees either north or south, calculate its Circle of Position's distance from the tenth upon the parallel of Cancer or Capricorn, when above the horizon, in the manner explained by the previous Example. But the distance of the said Circle of Position is from the line of the fourth when the planet is below the horizon. And if the declination of a planet be 11° 44′, or more than 11° 44′, find the distance of the Circle of Position upon the line of the Equator, in the manner taught in pages 42, 112, 113, and in Section 378; and it may be well to remark, the 90 degrees of the Equator should be the third term in the Analogy, and the distance of the planet from the meridian stand in the second place, although the result would be precisely the same in either way of stating the proportion. I shall further on, in Sections 375 to 385, shew the manner of finding the planets' Circles of Position instrumentally, by means of the Sectors and Quadrants that I have invented for these purposes.

S. 339.—To find the Pole of Mars.

The Pole of the twelfth house is 31° 3′, the Pole of the eleventh is 16° 54′, and the difference of the Polar Elevations is 14° 9′; and the one-third of Mars' semi-diurnal arc is 32° 23′; which, taken from the distance of Mars from the tenth, 50° 49′ leaves 18° 26′, the distance of Mars from the eleventh house. These things being known, the Pole of Mars may be found by the following

S. 340.—*Analogy.*

			Prop. Logar. 0·7449
As one-third Semi-diurnal Arc of ♂ .... (co-arc)	32°	23′	9·2551
To the difference of Poles of eleventh and twelfth...	14	9	1·1045
So is the distance of ♂ from the eleventh	18	26	0·9897
To the proportional part	8	3	1·3493
Add the Pole of the eleventh house	16	54	
The sum is the Pole of ♂	24	57	

S. 341.—To find the Circle of Position of ♂ on the Equator.

As Semi-diurnal Arc of ♂ ..... (co-arc)	97°	8′	9·7321
Is to distance of ♂ from tenth	50	49	5492
So are 90° of the Equator.....	90	0	3010
To distance of ♂ Circle of Position from the tenth	47	6	0·5823

This distance of the Circle of Position taken from 50° 49′ Mars's from the meridian leaves 3° 43′, the Ascensional Difference of Mars under his own Pole of Elevation.

S. 342.—By Formula No. 12 the Pole of ♂ is thus found:—

			Logar.
To Tangent Decl. ♂	(co-arc)	7° 57′	0·85496
Add Sine of Ascl. Diff.....		3 43	8·81173
Gives Tangent Pole ♂		24 54	9·66669

The one process proves the correctness of the other; but we might have found the proportional for the Pole of Mars in the first Analogy sufficiently correct for any Planispheric purpose, and with great expedition, by the sliding Gunter, thus:—Opposite 32°·8 on A set 18°·4 on B; then opposlte to 14°·1 on A stands 8° on B, the proportional required to be added to the Pole of the eleventh house to give the Pole of ♂.

S. 343.—We now suppose that all the planets have been properly placed upon the exemplary Planisphere by the student, according to the instruction given in the preceding chapters of this book; and having in this 16th chapter shewn several methods by which their Circles of Position and Polar Elevations can be found, we shall conclude the present chapter by explaining how to draw the Planets' Pole upon the Planisphere. For the reasons already explained, our student has now marked the Circle of Position of ♂ at 59° distance from the line of the tenth, upon the parallel of ♋; the Polar Elevation of ♂ has been found to be 25° very nearly; and therefore from among the Curve Patterns for different latitudes we always select that which is nearest to the Polar Elevation of the planet: therefore take the curve for latitude 25 degrees. Then,

To draw the Pole of Mars on the Celestial Planisphere.

S. 344.—Having taken the curve for latitude 25 degrees, place the Equator of this curve upon the Equator of the Planisphere of Napoleon; bring the edge of the said curve to coincide both with the centre of ♂, and also with the mark for the Circle of Position of ♂ upon the parallel of Cancer, 59° from the tenth, and with your steel drawing-pen draw a line to pass correctly through these two points, and this line will be the Pole of Mars, as was required. By carefully examining the Planisphere of the Nativity of Napoleon which is given with this book, and by laying the pattern curves upon it, and comparing and observing how the different poles are inclined towards and decline from the meridian lines of the projection, will give him a clearer idea how he should use these curves of polar elevations than could be done by adding ten thousand more words of explanation to the ample instruction which I have given for this purpose; for by proceeding in the manner of the foregoing example of the planets ♄ and ♂, the Circles of Position and the Poles of the Planets may be found and drawn upon the Planisphere of any

Nativity with the greatest facility and correctness. Now suppose that we had not found the astronomical requisites of Napoleon's Planisphere Nativity by Spherics, as given in page 35, the two following little Tables shew the results obtained by taking and measuring the distances upon the

S. 345.—Semi-diurnal Arcs, &c., of the Planets.

♅ 103·7	34·6	♃ 104·3 *n*	34·8	☉ 102·8	34·3	☿ 108·0	36·0
♄ 110·7	36·7	♂ 97·1	32·4	♀ 109·0	36·3	☽ 106·3	35·4

S. 346.—Table

Of the Planets' Distances from the Tenth and Fourth Houses, their Equatorial Circles of Position, and their Polar Elevations, in the Nativity of Napoleon.

	Dist. from Angl.	Circle of Position.	Pole of Elevation.	Scale of Pole used.
Uranus.....	73·7 fm. 10th	63·9	32·9	33
Saturn.....	4·8 fm. 10th	3·9	2¼	2°
Jupiter.....	70·0 fm. 4th	60·4	31·0	31
Mars.....	50·8 fm. 10th	47·1	25·0	25
Venus.....	15·5 fm. 10th	12·8	7·4	7
Mercury	16·0 fm. 10th	13·4	7·7	8
Sun.....	32·1 fm. 10th	28·1	15·6	16
Moon.....	7·3 fm. 4th	6·2	3·5	4
P. Fortune ..	78·0 fm. 4th	66·1	33·0	33

S. 347.—The numbers in the two preceding Tables are expressed in degrees and tenths. The Circles of Position and also the Polar Elevations of the other Planets were calculated in the same manner as those were for Saturn and Mars in pages 112, 113, 114, 115, and 116. I need not here insert the said calculations, but would strongly recommend as a praxis for the student, that he should calculate from a Planisphere very carefully projected by himself all the particulars contained in these two little Tables. I strongly recommend both care and attention in his early attempts in Planispherometry, that he may not blame either the author or principles of the Celestial Planispheres when he should blame his own want of care and attention: if he courteously follows this good advice, he will be perfectly satisfied with his progress and success in these Sublime Sciences and Celestial Projections.

CHAPTER 17.

PLANIS. VIII.

HOW TO FIND THE OBLIQUE DISTANCE OF ANY TWO PLANETS UPON THE CELESTIAL PLANISPHERES.

S. 348.—THERE are certain cases in which it is desirable to find the distance in Oblique Ascension between two Planets, or two given points of the Zodiac; but one of the most useful of these is for finding the oblique distance between the Sun and Moon, which distance is found in order to find the true mundane place of the Part of Fortune. To do this, it is necessary to know how to keep the curve or planisphere pattern for the latitude of birth parallel to the horizon of the Planisphere of the given Nativity, which is done in this manner: Fix the curve pattern for the latitude of birth upon the line of the eastern horizon, or first house of the Planisphere of the Nativity, just as you would if you were going to draw the line of the eastern horizon or first house; observe where the parallels of Cancer and Capricorn touch the said curve pattern, and with a fine pointed black lead pencil make a mark very exactly at both these places upon the pattern, it will then be ready for use. You have then only to slide the pattern backward or forward upon the Planisphere, keep the Equator of the pattern true with the Equator of the Planisphere, and the aforesaid two marks to correspond with lines or parallels of Cancer and Capricorn upon the Planisphere, and the pattern is then parallel to the eastern horizon, or first house. A single example will be sufficient to make this quite easy.

S. 349.—EXAMPLE FOR THE LATITUDE OF LONDON.

The curved pattern for the latitude of 51½° being marked in the manner beforementioned, let it be required, upon the Planisphere (of the twelve houses) for London; to find the oblique distance between 10° ♌ and 10° ♍; and let 0° ♋ 0′ be upon the Mid-heaven.

Process.—Having the Planisphere for London laid down smooth and even upon the board, place the Ecliptic Slider upon the same, and bring 0° ♋ 0′ on the tenth, taking care that the Equator of the Slider agrees exactly with the Equator of the Planisphere for London: when thus fixed, make a fine dot upon the Planisphere for London, to correspond exactly to 10° ♌, and another fine dot to 10° ♍; this done, remove the Ecliptic Slider.

S. 350.—Next take the curve pattern for the latitude of London, and slide it along in the parallel manner aforesaid, until it touches the mark or dot for 10° ♌; then by this curve (with a fine pointed black lead pencil) draw a fine line to pass through 10° ♌ right from the parallel of ♋, as far as to the Equator of the Planisphere. In

like manner draw another such curve line to pass through 10° ♍. Through each of the said points at 10° ♌ and 10° ♍, I find the distance in equatorial degrees is 42 degrees and nine-tenths of a degree, which is the true distance in Oblique Ascension between 10° ♌ and 10° ♍ in the latitude of London; and the distance will be found to be the same, whether measured upon the parallel of 10° ♌ or of 10° of ♍, or upon the Equator; which proves that the pattern curve was kept parallel to the curve line of the eastern horizon or first house, as required.

S. 351.—*Remark.* The Oblique Ascension is the corresponding degree of the Equator, which then ascends with any given point of the Zodiac, or ascends with any Planet, reckoned from the beginning of ♈, as far as 360°, or the complete circle. But it may sometimes be convenient, when using the Planispheres, to measure our distances from that point of the Equator corresponding in Right Ascension to 0° ♋ 0′, or 0° ♎ 0′, or 0° ♑ 0′: when this occurs, it will be easily seen from a mere inspection of the Planisphere. In the given example, the curve line drawn through the 10th degree of ♌, by means of the curve pattern for latitude 51½°, will be found to cut the line of the Equator at the distance of 18 and 7-10ths degrees from the point of the Equator, corresponding in Right Ascension with 0° ♋ 0′; therefore 18° 7-10ths added to 90°, gives 108° 7-10ths degrees, which is the Oblique Ascension of 10° ♌. In the same manner may the Oblique Ascension of any other degree of the Zodiac, or of a Planet, be found, if required. But in using these Celestial Planispheres, if the Planets are properly placed, as already taught in the former Chapters of this Work, all the various Directions of any Nativity may be correctly obtained, without even knowing either the Right or Oblique Ascensions of the Planets.

To find the true Mundane Position of the Part of Fortune in any Nativity.

S. 352.—To render the instruction contained in the former part of this Chapter more useful and acceptable to the student, we shall now proceed to shew how the Rule there given is applicable to finding, by the Planispheres, the true mundane position of the Part of Fortune, or, as the celebrated Ptolemy calls it, the Lunar Horoscope, in any Nativity.

S. 353.—*Example.* In the Nativity of the Emperor Napoleon, let it be required to find the mundane position of the Part of Fortune, and thereby to place it correctly upon the Planisphere of the Nativity. Observe, that the latitude of birth is 41° 40′ north; therefore the curve pattern which is nearest to the given latitude is the pattern for 42°, which is sufficiently near; and by placing this pattern upon the curve line of the first house of the Planisphere of the Nativity, and marking this pattern (for 42°) exactly where the parallels of Cancer and Capricorn touch it, the pattern is then ready for use.

S. 354.—*Next Process.* As before taught, fix the said curve, parallel to the Eastern horizon, and draw a line thereby to pass through the centre of the Sun; then slide along the pattern, and in the same manner draw another such line through the centre of the Moon then upon the line or parallel of the Moon's declination take the distance between the Moon's centre to the line marked 41° 40′, which passes through the Sun's centre to the very point where the said line intersects the Moon's parallel of Declination; and with this distance in your compasses, set one foot upon the line of the Eastern horizon, where it is cut by the Moon's parallel of Declination, and with the other foot of your compasses make a mark to the westward upon the Moon's said parallel, and that will be the true mundane place of the Part of Fortune, as is clearly shewn in the Celestial Planispheres, Plate No. 4, where the aforesaid two lines drawn through the centres of the Sun and Moon are each marked 41° 40′, both on the upper and lower side of the Planisphere, so that they cannot be mistaken by any person for the poles of these Planets.

S. 355.—The Part of Fortune's place being marked upon the Planisphere in the manner now described, its distance from the 10th or 4th house may thereby be instantly found in any Nativity; and hence the circle of Position and the pole of Elevation of the Part of Fortune may be found by the Rules already given for finding the Circles of Position and Poles of the Planets in the preceding Chapters of this Book.

Additional Notes and Observations on finding the Mundane Place of the Part of Fortune.

In order to know clearly whether the ⊕ falls above or below the horizon by the Planispheres,

S. 356.—1st. Let the Sun be placed upon the Ascendant or Eastern Horizon, and if (the place of the) Moon be above the Horizon, in this case the ⊕ will fall in some house above the Horizon, and the oblique distance must be set off upon the Planisphere on the Moon's parallel from the line of the 1st towards the 7th house.

S. 357.—2d. The Sun being placed on the 1st as aforesaid, if the Moon be then in the 1st, 2d, or 3d house, the ⊕ will fall in the 1st, 2d, or 3d house, and the oblique distance (of the Sun and Moon) must be set off from the line of the 1st towards the 4th house upon the Moon's parallel.

S. 358.—3d. The Sun being placed as aforesaid upon the line of the 1st house, if the Moon then be in the 4th, 5th, or 6th house: in this case ⊕ will fall in the 4th, 5th, or 6th house, the oblique distance (of the Sun from the Moon) must be set off upon the Planisphere from the line of the 1st towards the 7th upon the Moon's parallel.

4th. So far as the Sun is distant in Oblique Ascension from the line of the 1st house (upon the Sun's own parallel), so far is ⊕ distant from the centre of the Moon in the Nativity: this distance is always taken upon the parallel of the Moon's declination, and is

clearly illustrated by the Example given in the Nativity of Napoleon, in Planisphere No. 4, and in every other Nativity where the ⊕ is calculated according to these principles of Ptolemy.

S. 359.—In the Example before us, as well as in a vast number of other Nativities, the Mundane place of the ⊕ is found by these Celestial Planispheres within one-tenth part of a degree, the same as would be found by Spherical Trigonometry.

S. 360.—The four preceding Notes include all the possible varieties of position, &c. belonging to the ⊕; and, if attentively considered, will enable any student of moderate capacity to place the Part of Fortune, or Lunar Horoscope, correctly upon the Planisphere of any Nativity. But in order to render this useful and important Rule so clear and easy that no person can possibly misunderstand it, we will further observe,

S. 361.—5th. That if the oblique distance (of the Sun and Moon) be greater than the whole diurnal Arc of the Moon, then must the said distance be set off from the line of the 1st house upon the ☽'s parallel towards the 7th, and the ⊕ will fall somewhere in the 6th, 5th, or 4th house.

S. 362. 6th. If the oblique distance (of the Sun from the Moon) be less than the Moon's whole diurnal Arc, and the Moon be to the west of the Sun, then must the said oblique distance be set off upon the ☽'s parallel from the (line of the) 1st towards the 7th, and the ⊕ will take its position in some house above the Horizon.

S. 363.—7th. If the oblique distance (of the Sun from the Moon) be less than the Moon's Semi-nocturnal, the Moon being then east of the Sun, the oblique distance must be set off from the (line of the) 1st towards the 4th house, upon the Moon's parallel, and the place of the ⊕ will fall in the 1st, 2d, or 3d house. What is here said in these notes about the Moon being east or west of the Sun, refers to the Moon's relative position on the Planispheres; which represent the actual position of the Moon if the centre of the Sun was on the eastern Horizon with the Moon in the same zodiacal longitude and latitude as she has in the Nativity.

S. 364.—N.B. This method of placing the Part of Fortune, according to oblique distance, is so different from the common way, that the ⊕ will sometimes fall one or two houses different to what it would by the common method.

CHAPTER 18.

Planis. IX.

S. 365.—The instruction contained in the preceding Chapter is supposed to have enabled the student to fix the ⊕ in its proper position, &c. in the Celestial Planisphere: this was the last thing to be done previous to commencing the working off or calculating the various directions by these Planispheres.

S. 336.—But as there are other modes of finding the circles of position, the line of latitude, and the poles of the Planets, besides those explained in the foregoing Chapters of this Book, I think it right to explain the manner of doing these things before I give any explanation of working the Directions by the Celestial Planispheres. I shall now proceed to shew the student how the Poles of Elevation, the Circles of Position, &c. of the Planets may be found instrumentally, almost without using any numeral figures, by the new calculating instruments that I have invented, and which are represented in Plate No. 3.

Of Improved and New Instruments of great Utility in the Use and Construction of the Celestial Planispheres.

S. 367.—As there are some persons who possess considerable skill in the judicial part of Astrology, but who are nevertheless, through a deficiency of education, incapable of performing arithmetical calculations, and may therefore find it difficult to calculate the circle of position of a Planet even by the easy rules and examples contained in this Treatise, they will, no doubt, be gratified to find, that, by the help of the new Instruments described in this Chapter, they will be enabled to do this correctly, and several other important operations on the Celestial Planispheres, without any calculation whatever.

S. 368.—I shall now inform my readers, that those persons who use Mr. Ranger's Planispheres employ a small brass triangle very nearly in shape of a roman or rather italic capital A, divided at the base into thirty parts or degrees: the legs are about twice the length of the base; *but they have no degrees nor divisions upon them.* A string is stretched from the acute angle, or top of the triangle, to the base, and by moving the string backwards and forwards they measure their distances upon the Planisphere of the Nativity, and work the proportions of the Mundane Aspects, &c. by keeping the base of their triangle as nearly parallel to the Equator as they can judge by their eye, after they had set the string to the centre of the Planet, &c.

S. 369.—After very carefully examining and well considering the Rangerian triangle aforesaid, and many times since the first publication of my Book on the Celestial Planispheres, a number of them has been shewn to me by persons who had purchased my Planispheres, and who tell me that they obtain far more accurate results by mine than they ever did by Ranger's Planispheres. I found all the said Triangles similar to the one just mentioned. I was thoroughly convinced, that, however correct in principle *it may be*, the Rangerian Triangle is extremely deficient in its construction and in the relative size and proportion between the legs and the length of the base; and, having no divisions upon the legs, to guide one in the use of it, it depends entirely on the eye and judgment, or skill of the person using it, keeping the base parallel to the Equator, &c. whether the result be correct or not: I therefore set myself to work, and invented and made myself a new Instrument (see Plate No. 3, and Figure 1), which is called the Planisphere Quadrant, because it is used to determine all the proportions of the Semi-diurnal and Semi-

nocturnal Arcs of the Planets, and all the proportions of the Aspects and Circles of Position of the Planets which can be found in the space of three houses, or one quadrant of the Celestial Planispheres; though otherwise, as the Arch *n*, *m*, *q*, contains one-sixth part of a circle, it might, according to its geometrical proportions, have been styled the Planisphere Sextant; and will, if constructed correctly, and agreeably to the following directions, be found to perform both with ease, certainty, and correctness, a variety of operations on the Celestial Planispheres.

S. 370.—After the Ecliptic Slider has been fitted up by being pasted on pasteboard, &c. and after it has been thoroughly dried, so that it will not contract any more in length, as explained in the first Chapter of the Third Part of this Book, it will then be ready for our use in constructing the Planisphere Quadrant. Take a piece of well polished sheet brass, about the twentieth of an inch in thickness; let it be cut in the shape of Fig. 1, Plate 3, and let the size of it be from the top T to each extremity *n*, *m*, and *q*, equal to 265 degrees; let it be also from the two corners, viz. from *n* to *q*, equal to 265 degrees: the degrees to be taken are the equatorial degrees engraved upon the straight edge of the Ecliptic Slider. [Near T is a large round hole, sufficient for the head of a good-sized nail to pass through, to hang up the Quadrant by when it is not in use.] At an equal distance from either side, *g*, *h*, and at about 38 degrees from the top T, make a fine dot with the point of your compasses or pointrel, and let this be the centre from which you describe the arch *n*, *m*, *q*.

S. 371.—Having a pair of fine pointed compasses sufficiently large (the steel beam spring adjusting compasses, mentioned in page 77, are the best), take exactly 210 degrees in your compasses, and therewith describe an arc the full extent of the brass from *i* to *k*; from the centre C to A draw a perfectly straight line parallel to *g*, *i*; then upon the point where the line C A intersects the arc *i k*, fix one point of your compasses, and with the extent of 210 degrees make a mark at B with the other foot of your compasses to intersect the arc *i k*; then from the point A to B draw the chord line A B: this being done, draw the line C B very fine and faint; and we have then approximately defined the three lines C A, C B, and A B; and at about one-eighth of an inch inside of these three lines draw another line parallel to C A, C B, and A B; then with a fine edged cold chisel or other proper tool carefully cut all along the three inside lines last drawn, until the entire triangular piece drops, or comes out quite easily without straining the three sides of the Quadrant, which should be laid upon a large smooth and level piece of lead or pewter, while you are operating upon it with the cold chisel. After this process of cutting out, the Quadrant must then be carefully flattened upon what the braziers call a flat polished stake, by lightly malletting it with a very smooth box-wood mallet; and when this has been done, set one point of your compasses on the centre C, and try if the points A and B are any way altered, because the cutting out of the inside brass is liable to somewhat extend them; and if any, even the least, alteration

has taken place, with the 210 degrees still in your compass draw the arc *i k* over again; and proceed to draw again the line C A with the utmost straightness and accuracy. Do the same with regard to the straight lines A B and C B, so that all the three sides shall each of them be exactly 210 degrees in length. This being done, the instrument is ready for being divided. Divide the chord line A B into 90 equal parts (which serve for what we call mundane degrees), and divide the lines C A and C B each into 210 degrees, to correspond exactly with the degrees engraved upon the straight edge of the Ecliptic Slider.

S. 372.—After all these divisions have been engraved upon the Quadrant, remembering that every fifth and tenth degree should be marked by having the line a little longer than the other divisions, proceed to file away very carefully the superfluous metal, until you come quite close and true to the lines C A, C B, and A B; only leave about two degrees from the centre C, forming a small arc; as there a small substance of metal must be kept, in order to drill a fine pin-hole at C, where the thread or index line must be fixed.

S. 373.—At the distance of about one-eighth of an inch above the Quadrant, a flat arch of brass *n*, *m*, *q*, should be fixed by three small fine-threaded screws at each corner of the Quadrant, and by a bit of brass between the arch and the Quadrant, each bit of brass having three holes through which screws pass freely; the three holes at each corner *n* and *q* being properly tapped to receive the screws. It would be well that this arch be the tenth or the twelfth of an inch thick, so as to give strength and steadiness to the Quadrant. The breadth of this arch should be 14 degrees for a Quadrant which has 120 degrees as the length of each leg; 18 for a Quadrant which has 180 degrees on each leg; and 22 degrees should be the breadth of this arch when each leg comprehends a space of 210 degrees, which is the largest Planisphere Quadrant that need be made. Between the arch and the Quadrant an adjusting screw S (with a small nut upon it) works backwards and forwards moderately freely from A to B, that is to say, the whole length of the chord line; the end of the screw nearest the line A B must be flat and square, to keep it from turning round under the arch *n*, *m*, *q*; and through this square end a fine pin-hole should be drilled, through which the index thread, or index line (which should be made of very fine wire of steel or brass, or the very finest catgut, about the size of a horse-hair), passes under the square end of the said screw, and so passes under the Quadrant where it goes through the pin-hole at C. The index line (or wire) must be made moderately tight by turning the nut upon the screw S: the Quadrant is then ready for use.

S. 374.—*Note.* The first two Planisphere Quadrants made by the Author were exactly 180 degrees upon each limb; and were of the same extent on the chord line A B; but he has since found that the instrument would be still more useful if extended in size so as to contain 210 degrees upon each leg, and the chord line was divided, as in

the former, into 90 equal parts or mundane degrees. He has also made some which were 120 degrees upon each leg, and the chord line A B, being of the same length, was divided into two houses, or 60 mundane degrees.

How to find the Circle of Position of any Planet by the new Planisphere Quadrant.

S. 375.—To render this instruction on Instrumental Calculation as complete as possible, let it be required, in the Nativity of Napoleon, to find the Circle of Position of ♂ : first, upon the parallel of ♋ ; secondly, upon the Equator; and thirdly, upon the parallel of ♑.

By referring back to Sections 333 to 344, we there see that the semi-diurnal arc of ♂ is $97\frac{1}{10}$ degrees; and the semi-diurnal arc of the parallel of ♋ is $112\frac{3}{4}$ degrees; and that the semi-diurnal arc of the parallel of ♑ is $67\frac{1}{4}$ degrees. If these things had not been stated, they could have been instantly found by measuring the semi-diurnal arcs by the degrees engraved upon the legs of the Quadrant.

S. 376.—1st. To find the Circle of Position of Mars upon the Parallel of ♋, by using the Planisphere Quadrant parallelwise.

Upon the parallel of ♂ place $97\frac{1}{10}$ degrees of one leg of the Quadrant on the line of the tenth; and let the $97\frac{1}{10}$ degrees of the other leg of the Quadrant touch the eastern horizon where it is cut by the parallel of ♂. Keep the Quadrant firm in this position, and slide the index wire until it comes exactly over the centre of ♂, and there let it (the index wire) remain. This moving of the index wire should be done by pushing with your finger and thumb against the screw nut *e*, Fig. 1, Plate No. 3.

S. 377.—Now observe, that to shorten the description of these processes, we shall for the future call this the setting of the Quadrant (to 112 and 3-fourths, or, any other degree required), which will be sufficient to imply that both the legs of the Quadrant are set to the same degree at the same time; and therefore the chord line A B of the Quadrant will be in true parallel to the Equator; for the word parallelwise, when applied to this Quadrant, always implies that it is set to the same division on both legs upon any parallel from which a proportion is to be found. Next set the Quadrant to $112\frac{3}{4}°$ upon the parallel of ♋; one leg upon the tenth, and the other upon the first house, as aforesaid; and observe where the index wire crosses the parallel of ♋, and there make a dot or mark; and this mark will be the Circle of Position of ♂ upon the parallel of ♋, as was required.

S. 378.—2d. For the Circle of Position of ♂ on the Equator.

The index line remaining fixed as aforesaid, you have nothing more to do than to set the Quadrant to 90° parallelwise upon the

Equator, one leg on the 10th and the other on the line of the 1st; and where the index wire intersects the Equator will be the Circle of Position of ♂ upon the Equator, as was required.

S. 379.—3dly. To find the Circle of Position of ♂ upon the Semi-diurnal Parallel of ♑.

The index wire remaining fixed, as aforesaid, with one leg upon the line of the 10th, and the other leg upon the line of the 1st, set the Quadrant parallel, upon the parallel of ♑ (in this case the number on each leg will be 67¼ degrees); and where the index line crosses the parallel of ♋ ♑ will be the circle of position of ♂, as was required.

S. 380.—*Notes and Observations.*

1st. If any planet be above the horizon, or in the 7th, 8th, 9th, 10th, 11th, or 12th house, the chord line A B (see Figure 1, Plate 3) of the Quadrant must be uppermost, or above the parallel of ♋, with one leg, the inside edge thereof always to touch the line of the 10th, and the graduated edge of the other leg to touch the line of the 1st, or 7th when the Quadrant is used parallelwise.

2d. If the planet whose circle of position is required be posited below the horison, viz. in the 1st, 2d, 3d, 4th, 5th, or 6th house, the chord-line of the Quadrant must be below the parallel of ♑, with one leg upon the line of the 4th, and the other leg upon the line of the 1st house, if the planet be posited in the 1st, 2d, or 3d house: or with one leg of the Quadrant on the line of the 4th, and the other leg on the line of the 7th house, if the planet should happen to be in the 4th, 5th, or 6th house, when the Quadrant is used parallelwise.

3d. There is another method of using this Quadrant, which is called using the Quadrant perpendicularly: a single example will be sufficient to render this method quite clear and easy.

S. 381.—How to use the Quadrant perpendicularly in finding the Circle of Position of any Planet.

Rule and Example combined.—Let it be required to find the Circle of Position of ♂ upon the Parallel of ♋, &c.

Place the chord-line of the Quadrant uppermost above the parallel of ♋; bring the graduated edge of one leg close to the line of the 10th, its whole length, and the other leg will then pass beyond the 1st house. Now bring $97\frac{1}{10}$ degrees on the leg that touches all along on the line of the 10th house upon the parallel of ♂, because $97\frac{1}{10}$ degrees is the Semi-diurnal arc of ♂. Let the Quadrant remain firm in this position; then slide the index line until it stands exactly over the centre of ♂; let the index-wire remain thus, and slide the leg of the Quadrant which is close to the line of the 10th, until 112° and 3-4ths upon the same limb be brought upon the parallel of ♋; because 112° and 3-4ths is the Semi-diurnal arc of the

parallel of ♋. Next, observe where the Index-line crosses the parallel of ♋, and that point of intersection will be the place of the Circle of Position of ♂ upon the parallel of ♋ as was required, exactly the same as by the first method. And by bringing 90 degrees upon the leg which is upon the 10th on the line of the Equator, the place where the Index-line intersects the Equator will be the place of the Circle of Position of ♂ upon the Equator; and in the same manner bring 67¼ degrees upon the Quadrant to the parallel of ♑, and the Index-wire, as in the former cases, will shew the place of the Circle of Position of ♂ upon the parallel of ♑.

Previous to explaining the manner of working directions by the Celestial Planispheres, I will finish my description of my new invented instruments, which are found so eminently useful in these instrumental calculations.

S. 382.—The Astronomical Planisphere Sectors, and their Uses, &c.

The Planisphere Quadrant, described in Sects. 370 and 371, possesses many advantages over the Rangerian Triangle, one of which ought not to be forgotten by the Astral student, viz. that when the Quadrant is set with the Chord-line parallel to the Equator upon the parallel of any planet, the space comprehended between the two legs will always be equal to the degrees engraved upon either leg of the Quadrant; and therefore the Semi-diurnal or Semi-nocturnal arc of a Planet is always made known to the operator while using this Quadrant; and the same divisions being engraved on both legs of this instrument makes it very easy to be kept parallel with the Equator, another very essential advantage which the Rangerian Triangle does not possess. Besides the aforesaid, I have invented for the use of Students and Professors of the Astral Sciences, the Quadrant of Latitude, and two other instruments, which are the Single and Compound Planisphere Sectors.

S. 383.—Of the Single Planisphere Sector.

This instrument consists of two Brass Rules, each being about a quarter of an inch in thickness, and an inch broad: the inward edge of each, upon which the divisions are engraved, must be finely bevelled to a very thin edge, not exceeding $\frac{1}{40}$th of an inch in thickness; and the divisions on each leg of this Sector must be very accurately set off from the centre of the pin or pivot-screw of the point upon which they turn about: the length of each Rule is 230 degrees. As upon the Planisphere Quadrant, every degree as far as 210 degrees must be engraved upon each leg of the Planisphere Sector; and the stroke at every 5th and 10th degree should be drawn something longer than the others, for the sake of more easily reading off the divisions; but in the engravings upon the copperplates I did not think it necessary to give myself the trouble of engraving every degree; the principal divisions only being marked upon the figures

in Plate No. 3, was quite sufficient to explain the construction of these instruments.

The joint of the Sector should be very carefully made to turn upon a screw as its centre, so that, by turning the screw a very little, it can always be made moderately tight, in order that the legs of the Sector may remain truly at the distance that the operator finds necessary to set them.

S. 384.—Of the Compound Planisphere Sector.

This instrument is made just in the same manner as the single Sector, only that each leg is about an inch longer, and that it has an additional rule D E, which works upon a pin or pivot D, where the brass is extended, so that the centre of this pivot is exactly in a line with the graduated edge of the leg A C, exactly at 210 degrees from the centre C. The divided side of this chord line is also 210 degrees in length; but must be divided into 90 equal parts, and numbered on every tenth degree, both ways, from right to left, from 0° to 90°; also the 72d degree should be numbered both ways, or distinguished by an asterisk *, the same as on the Planisphere Quadrant, because the quintile Aspect consists of 72 degrees. The leg of the Sector B C has fixed upon it, at the end B, a strap, or flat staple of brass, indicated by the letters *i*, *k*, *x*, and through it the chord line rule passes quite freely. It extends from *x* to the graduated edge at 210°, so that the chord line rule shall always be kept at the distance of 210 degrees from C, the centre of the Sector, but is cut away in a slanting form from *i* to *n*, so that when you close the Sector, or bring the legs nearer towards each other than what is represented in the drawing of Figure 3d, there may still be a free space for the chord line rule to pass or slide freely, and yet so as to be kept at the distance of 210 degrees from the centre C. The inside of the legs A C and B C need not be bevelled farther than 210 degrees from the centre. This instrument is very difficult to make: it is very compact, and when properly made is a most useful instrument for Planispheric purposes, and cannot be surpassed by any thing that has ever yet been invented. However, the single Sector, which is much more easily made, deserves much to be recommended for its excellent utility. We shall therefore now proceed to shew the student

How to find the Circle of Position of any Planet by the Single Planisphere Sector.

S. 385.—*Rule.* If the planet be above the horizon, the inside or graduated edge of one of the legs A C or B C of the Sector must be brought upon the Meridian, perpendicular to the Equator; and the division upon this limb, which answers to the number of degrees of the planet's semi-diurnal arc, must be fixed so as to coincide with the parallel (declination) of the planet whose Circle of Position is to to be found. Keep this limb of the instrument firm in this position;

move the other leg until its graduated edge touch the centre of the planet: the Sector is then *set*. Next slide the other leg up or down upon the Meridian line, until the degree which answers to the semi-diurnal arc of the parallel of ♋ on this (Meridional) leg touches the parallel of ♋; then observe the leg which was set to the centre of the planet, where it cuts the parallel of ♋; there make a mark, and this mark will be the place of the planet's Circle of Position upon the parallel of ♋, as was required. Next bring 90° of the leg on the Meridian to coincide with the Equator of the Planisphere; make a mark where the inward or graduated edge of the other leg touches the Equator, and this mark will be the place of the planet's Circle of Position upon the Equator.

S. 386.—If the planet be under the horizon, fix one leg of the Sector upon the line of the fourth house, instead of the tenth; then proceed in every respect as just before explained for a planet above the horizon. It may be proper to observe, that when you use the Sector for a planet above the horizon, the centre C of the instrument will be towards the south of the projection; but when used to operate for a planet below the horizon, then the centre C must be upwards, or towards the parallel of ♋, and most likely it will extend far beyond that parallel. To those who have carefully attended to the instruction in pages 125 to 127, the application of the single Sector to finding a planet's Circle of Position upon the three different parallels aforesaid needs no example; otherwise we might have given them a very suitable praxis in finding the Circle of Position, and have told them to place $97\frac{1}{10}$ degrees, the semi-diurnal arc of ♂, upon the parallel of ♂, upon the leg placed on the Meridian; and then to have brought the graduated edge of the other limb over the centre of ♂, and then to have brought $112\frac{3}{4}$ degrees upon the Meridional leg of the Sector to coincide with the parallel of ♋; and that where the graduated edge of the other limb intersected the parallel of ♋, there make a mark for the Circle of Position of ♂ on the parallel of ♋, &c., &c. I need not say more than to remark that these operations may be performed both with very great exactness and dispatch by the single Sector.

S. 387.—Scale of Years,

To be used upon the Celestial Planisphere.

In page 40 and SS. 126 and 127 very ample instruction is given how to form or compute a numeral or tabular scale of years; and it is only to transfer the same proportions upon the surface of the lower part of the Planisphere, and we obtain the scale required. But to save the student all this trouble I will here observe, that I have engraved a Solar Scale of Years upon the Zodiacal Planisphere; and the student has only to consider for how many years he would have the said scale; then let him look to the Placidian Scale of Years upon my Planisphere, beginning with the noon-day previous to the hour of birth, and measure off with his compasses one division

after another that he finds on that line, and with the extent in his compasses mark them upon the intended line as aforesaid upon his projected Planisphere, until he has transferred from the engraved scale as many divisions as he would have the scale serve for years in measuring off the Arcs of Direction, as they are found by the Planisphere. For example, in the Nativity of Napoleon begin with the division for the 14th day of August. This is the point to begin with; and with one foot of your compasses upon the division for the 14th of August as a centre, extend the other foot of your compasses to the centre of the line or division for the 15th day of August; this space marked upon the proper line on the Planisphere of the Nativity is the measure for the first year. Next with one foot upon the Placidian Scale on the division for the 14th of August, extend the other foot of the compasses to that division which answers to the 16th of August; transfer this extent to your intended scale, and it will be the measure for two years of the Native's life. Proceed in the same way for 58 more days and 58 more distances; which, transferred to the proper line, will constitute a scale for 60 years, similar to that engraved upon the margin of the Celestial Planisphere of tbe Nativity of the Emperor Napoleon, which is allowed by all competent judges to be the most splendid specimen of Planispheric Projection that ever was published.

The Scale of Years was the last thing to be placed upon the Planisphere previous to working off the Directions. Every thing being now ready, we shall commence our operations in

CHAPTER 19.

Planis. X.

THE CALCULATIONS OF DIRECTIONS IN THE ZODIAC BY THE CELESTIAL PLANISPHERES.

S. 388.—1. By way of Example, let us direct the Sun to the Sextile of Venus in the Zodiac.

It will be remembered that this Aspect (see pages 37 to 40) falls in ♍ 7° 1′. By placing the Planisphere of the Zodiac in its proper position, as before taught, mark the place of the Aspect upon the Planisphere of the Nativity, which may be done in a moment.

S. 389.—For the Arc of Direction.

Draw a line from 7° ♍ parallel to the Equator (by means of your parallel ruler), until it meets the Pole of the Sun; this line, measured by the Equatorial Scale, is equal to 15° 1-6th, the Arc of Direction required. Let the student compare the trouble, or rather, we should say, the expedition and facility, of calculating this Direction by the Planispheres, with the process of finding the same Arc of Direction by Spherical Trigonometry; and remember, at the same time, that that process is full as expeditious as if you worked by Tables of Oblique Ascension, and this comparison will be a stronger

recommendation, if he wishes for expedition, than any thing I can possibly say in favour of the Celestial Planispheres.

S. 390.—*Example* 2.

The Sun to the Sextile of Jupiter in the Zodiac.

From the place of the Aspect ♍ 15° 9′, or ♍ 15° 1-6th, draw a line parallel to the Equator until it touches the Pole of the Sun; this line is equal to 23° 6-10ths, the Arc of Direction required.

S. 391.—*Example* 3.

The Sun to the Trine of (♅) Uranus in the Zodiac.

From the place of the Aspect ♍ 11° 37′, or ♍ 11° 6-10ths, draw a line parallel to the Equator until it touches the Pole of the Sun; the extent of this line, measured upon the Equatorial Scale, will be found to be 19° 56′, or a little more than 19° and 9-10ths, the Arc of Direction of the ☉ △ ♅ in Zodiac.

S. 392.—*Example* 4.

The Sun to the Sesquiquadrate of (♅) Uranus in the Zodiac.

From the place of the Aspect 26° 37′ of ♍ draw a line to the Pole of the Sun; this line, measured by the Equatorial Scale, will be found to be 35° 26′ very nearly, the Arc of Direction required of the ☉ □ ♅ in Zodiac.

S. 393.—*Example* 5.

The Sun to the Body of Saturn in the Zodiac.
Converse Direction.

Upon the Sun's Parallel of Declination from the Centre of the Sun measure the distance where the Sun's parallel intersects the Pole of Saturn, and you will find it a little more than 27° 6-10ths, the Arc of Direction required.

S. 394.—*Example* 6.

The Sun to the Sextile of Saturn in the Zodiac.
Direct Direction.

From the place of Aspect 25° 3-4ths ♍ draw a line parallel to the Equator until this line intersects the Pole of the Sun; this line, measured as aforesaid, will be found equal to 34° 6-10ths, the Arc of Direction required.

S. 395.—*Example* 7.

The Sun to his own Semi-quartile in the Zodiac.

Parallel to the Equator from 7° 3-4ths of Libra, draw a line to intersect the Pole of the Sun; the length of this line will be 46° 5-6ths, the Arc of Direction required.

S. 396.—*Example* 8.

The Sun to the Zodiacal Parallel of Mars.

Observe where the Parallel of Mars intersects the Ecliptic; measure thence unto where the same Parallel intersects the Pole of the Sun; the distance is 17° 5-6ths, the Arc of Direction.

S. 397.—*Example* 9.

The Sun to the Body of Mars in the Zodiac.

From that point where the Pole of Mars intersects the Ecliptic, draw a line parallel to the Equator until it touches the Pole of the Sun; this line will be equal to 20° 4-10ths, the Arc of Direction.

S. 398.—*Example* 10.

The Sun to the Body of Mars in Mundo by Direct Motion.

From the centre of Mars on his Parallel of Declination measure to the point intersected by the Pole of the Sun; this line is equal to 20° 7-10ths, the Arc of Direction.

S. 399.—*Note.* This Direction is also the Direction of the Sun to the Mundane Parallel of Mars, Direct Direction.

S. 400.—*Example* 11.

The Sun to the Trine of Uranus in Mundo.
Direct Direction.

Upon the contra-parallel (of declination) of Uranus set one point of your compasses, where the said parallel is intersected by the Pole of the eleventh house; extend the other foot of the compasses till it reaches where the Pole of the Sun intersects the contra-parallel of Uranus: then with this extent in your compasses rest one foot of your compasses on the parallel (declination) of Uranus, where it is intersected by the line of the seventh house, and with the other foot thereof make a mark towards the sixth house upon the same parallel: this mark is the place where Uranus forms the Mundane Trine to the Sun. Then, with one foot of your compasses on this mark, extend the other foot to the centre of Uranus; this extent is equal to 31° 40′, very nearly, of the Arc of Direction of ☉ △ ♅ in Mundo, Direct Direction.

S. 401.—*Example* 12.

The Sun to the Sesquiquadrate of Uranus in Mundo by Direct Direction.

The Sesquiquadrate always exceeds the Trine Aspect in Mundo by a space equal to one-sixth part of the Planet's semi-arc; therefore in this Direction, as it is completed below the Horizon, place one foot of your compasses upon the line or pole of the Semi-quadrate, where it is intersected by the parallel of Uranus, and extend the other foot thereof either to the pole of the fifth or to the pole of the sixth house, for the result will be the same exactly; then with the space thus found still in your compasses set one foot of the compasses exactly to the mark you made before for the place of the Trine Aspect, and extend the other foot towards the sixth house, and make a dot or mark upon the parallel of Uranus; and this mark will be the place of the Sesqui-quadrate. Then upon this mark rest one foot of your compasses, and extend the other foot thereof to the

centre of Uranus; this extent, if measured upon the Equatorial Scale, will be found equal to 44° 23′ nearly, the Arc of Direction.

S. 402.—*Note.* The 11th, 12th, and 13th Examples, though it was requisite to be minute in describing the process, will, with a little practice, be performed as expeditiously as the preceding Examples.

S. 403.—*Example* 13.

The Sun to the Biquintile of Uranus in Mundo. Direct Direction.

Upon the Parallel of Uranus, where it is intersected by the line of the fourth house, set one foot of the compasses, and extend the other to the Pole or Circle of the Quintiles; then with this extent set one foot exactly on the mark you made for the Trine; turn the compasses twice over; the second mark will be the place of the Biquintile. Lastly, with one foot of the compasses upon this last place extend the other foot to the centre of Uranus, and this last extent will be equal to 52°, being the Arc of Direction of the ☉ B.Q ♅ in Mundo, Direct Direction; or otherwise marked thus, ☉ ☌ ♅, M. d. d.

S. 404.—*Observation.* I believe a set of more suitable Examples than the 11th, 12th, and 13th, could not be found for illustrating the manner of directing a Planet to Aspects, or Directions that are completed in a different hemisphere to that in which the Promittor or Planet was posited at the moment of birth.

S. 405.—*Example* 14.

The Ascendant to the Semi-quartile of Mars.

On the Parallel of Mars measure from his centre to the line marked S □, and you will find the distance 2° 1-3d, the Arc of Direction required.

S. 406.—*Example* 15.

The Ascendant to the Sextile of Mars.

On the Parallel of Mars, from his centre to the pole of the eleventh house, the extent, 18½°, is the Arc of Direction.

S. 407.—*Example* 16.

The Ascendant to the Trine of Venus.

From the centre of Venus (on her Parallel), measured to the pole of the ninth house, is 20° 5-6ths, the Arc of Direction required.

S. 408.—*Example* 17.

The Ascendant to the Sesqui-quadrate of Venus.

On the Parallel of Venus, from her centre to the circle marked S ⚼ □, is 39°, which is the Arc of Direction.

S. 409.—*Example* 18.

The Ascendant to the Biquintile of Venus.

Place one foot of the compasses on the Meridian line, where it is intersected by the Parallel of Venus; extend the other foot upon the same Parallel till it touches the Circle or Pole of the Quintiles: then with this space in your compasses set one foot thereof upon the

Parallel of Venus where it is crossed by the pole of the ninth house; turn your compasses twice over, or take two steps therewith towards the eighth house: at the second step make a mark (this mark is the place where Venus forms the Biquintile Aspect to the Ascendant). With one foot of the compasses on this mark extend the other foot to the centre of Venus; this space, if carefully taken, and measured on the Equatorial Scale, will be found equal to 49° 9-10ths, or 49° 53′, the Arc of Direction required.

S. 410.—*Example* 19.

The Ascendant to the Trine of Saturn.

On the Parallel of Saturn, from his centre unto the pole of the ninth, is 41½°, which is the Arc of Direction.

S. 411.—*Example* 20.

The Sun to the Semi-quartile of Saturn in Mundo.
Direct Direction.

Take in your compasses the distance from the midheaven to where the Pole of the Sun intersects the Parallel of Saturn; apply this distance upon the same Parallel from the circle or pole [the pole here meant is that situated equally between the eighth and ninth houses] marked S □ towards Saturn, where make a mark. Measure from this mark to the centre of Saturn; the distance will be 25½°, the Arc of Direction required.

S. 412.—Or thus:

Set one foot of the compasses upon the Parallel of Saturn, and on the line of the pole marked S □ upon the same Parallel extend the other foot to the line of the tenth (this space is half the semi-diurnal arc of Saturn). With this space in your compasses set one foot thereof upon the Parallel of Saturn, where it is intersected by the Pole of the Sun, and with the other foot mark westwardly on the same Parallel. Lastly, with one foot on this mark, extend the other foot to the centre of Saturn; this distance, measured upon the Equatorial Scale, is equal to 25½ degrees, the Arc of Direction, the same as by the first method.

Note.—All the other Mundane Directions may be found by this second method, of which some additional Examples are given in the next Chapter.

S. 413.—*Example* 21.

The Ascendant to the Opposition of Uranus.

Set one foot of the compasses on the centre of Uranus, and extend the other foot upon the Parallel of Uranus to the line of the seventh house; this extent is equal to 30° 1-20th, or to 30° 3′, the Arc of Direction required.

S. 414.—*Example* 22.

Midheaven to the Body of Saturn.

From the centre of Saturn to the Midheaven, when measured as already taught, is 4° 8-10ths, the Arc of Direction required.

S. 415.—*Example* 23.

The Ascendant to the Quartile of Saturn.

This Example is precisely the same as the 22d Example, and the Arc of Direction is 4° 8-10ths: for in a case when any Planet comes to the Meridian he is then in Mundane Quartile to the Ascendant, as was fully explained in Section 23.

S. 416.—*Example* 24.

Midheaven to the Body of the Sun.

From the centre of the Sun to the Midheaven is 32° 1-10th, the Arc of Direction.

S. 417.—*Example* 25.

The Ascendant to the Quartile of the Sun.

This Example is precisely the same as Example 24. The Arc of Direction is 32° 1-10th.

S. 418.—*Example* 26.

The Sun to the Conjunction of Saturn in Mundo.
Converse Direction.

Set one foot of the compasses on the centre of the Sun, and extend the other foot to the place where the Pole of Saturn intersects the Parallel of the Sun; this distance is equal to 27° 6-10ths, the Arc of Direction.

N.B.—The Sun being in the Ecliptic, or having no latitude, this Mundane Direction gives the same result as found in the 5th Example, namely, 27° 6-10ths, for the Arc of Direction; but if the Sun had been a planet having latitude in the same point of the Zodiac, the Mundane Direction would then have given a different Arc of Direction.

S. 419.—*Example* 27.

The Sun to the Parallel of Saturn in Mundo.
Converse Direction.

Upon the Sun's Parallel, with one foot of your compasses on the Midheaven as a centre, extend the other point of the compasses to where the Pole of Saturn intersects the Sun's Parallel. With this extent make a mark on the west side of the Midheaven upon the Sun's Parallel; then from the Sun's centre to this mark will be about 36° 6-10ths, the Arc of Direction sought.

S. 420.—*Example* 28.

The Sun to the Parallel of Venus in Mundo.
Direct Direction.

On the Parallel of Venus, from where it is intersected by the Pole of the Sun, extend your compasses to the Midheaven as a centre. With this extent make a mark westward upon the aforesaid Parallel; then from the centre of Venus to this mark will be 18½ degrees, the Arc of Direction required.

S. 421.—*Example* 29.

The Sun to the Sextile of Venus in Mundo.
Direct Direction.

With the extent in your compasses found in Example 28, place one foot of the compasses on the Pole of the eighth, on the Parallel of Venus, and with the other point of the compasses mark this extent on the said Parallel; then from the centre of Venus to this mark is 23° 3-10ths, the Arc of Direction required.

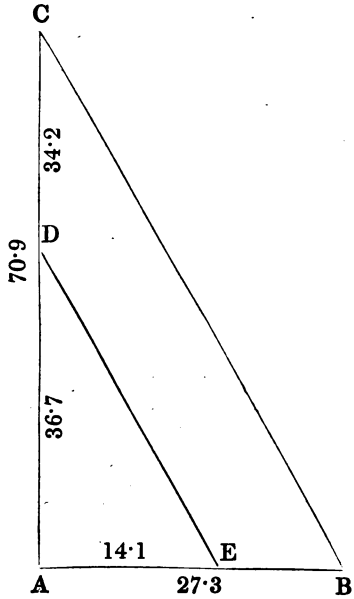
S. 422.—*Example* 30.

The Sun to the Rapt Parallel of Saturn.

We will shew the methods of working this Calculation several ways. 1st, on the Sliding Gunter.

Opposite 70°·9, the sum of both Planets Double Horary times on A, set 27°·3 the right distance on B; then opposite 36°·7, the Double Horary times of Saturn on A, will be 14°·1, Saturn's secondary distance on B. Lay off this 14°·1 from the centre of Saturn on Saturn's parallel to the eastward, and make a mark; the distance from this mark to the meridian (line) will be 18°·9-10ths, the Arc of Direction required.

S. 423.—2d. By the Construction of a Plane Triangle.



Draw A C, a line at pleasure; from A to C mark off 70·9-10ths Equatorial Degrees, the sum of the Double Horary times of the Sun and Saturn; and from A to B draw a line 27°·3-tenths degrees, the distance in Right Ascension between the Sun and Saturn, in an angle taken at random, to the line A C (for it is not needful in this case to draw it at a right angle of 90° to A C); next from A to D set off 36°·7-10ths Saturn's Double Horary times; but first draw a line from C to B: this being done, with your parallel ruler draw the line D E parallel to the line C B; this will give you A E, equal 14°·1-10th, the secondary distance of Saturn from the Midheaven, as before.

S. 424.—If the Student refers to pages 57 and 58 of this Book, he will see this Direction calculated at full length by astronomical numbers,

and the proportional logarithms. I might have shewn some other methods of calculating Rapt Parallels, but having given three different methods of doing this, and also added a number of Examples more than were in the Original Work, and in the Supplement or Key to same Book, I must hasten towards the conclusion, by giving many other Examples besides those contained in the preceding pages.

S. 425.—*Example* 31.

The Ascendant to the Body of Jupiter.

Upon the Parallel of Jupiter, measured from the centre of the Planet to the Horizon, the distance is 34°·1-5th nearly, the Arc of Direction required.

S. 426.—*Example* 32.

The Moon to the Opposition of Mars in Mundo.
Direct Direction.

On the Contra-Parallel of Mars, where intersected by the Pole of the Moon, place one foot of the compasses, and extend to the Imum-Cœli (4th); take this extent and apply it from the Midheaven towards Mars, upon the parallel of Mars, where make a mark; then from this mark to the centre of Mars is 44°·1-5th, the required Arc of Direction.

S. 427.—*Example* 33.

The Moon to the Opposition of Mercury in Mundo.
Direct Direction.

On the Contra-Parallel of Mercury, where intersected by the Pole of the Moon, take its distance in the manner aforesaid from the Imum Cœli, mark this distance from the Midheaven towards Mercury upon the parallel of Mercury; then from this mark to the centre of Mercury will be 8½ degrees, the Arc of Direction.

S. 428.—*Example* 34.

The Ascendant to the Sextile of the Moon.

From the centre of the Moon, measured as aforesaid upon the Moon's parallel, is 42°·7-10ths, the Arc of Direction.

S. 429.—*Example* 35.

The Sun to the Opposition of the Moon in Mundo.
Converse Direction.

On the Contra parallel of the Sun take the distance of the Moon's Pole from the line of the 4th house; apply this distance from the Midheaven towards the Sun, upon the Sun's parallel, and there make a mark; from this mark to the centre of the Sun will be 25°, the Arc of Direction.

S. 430.—*Example* 36.

The Sun to the Parallel of the Moon in Mundo.
Converse Direction.

Apply the distance found in the 35th Example the contrary way, that is, from the 10th towards the west upon the Sun's parallel, where make a mark; then from this mark to the centre of the Sun will be 39° 1-6th, the Arc of Direction required.

S. 431.—*Example* 37.

The Sun to the Parallel of Mercury in Mundo.
Converse Direction.

From the Midheaven upon the parallel of the Sun extend the compasses to the Pole of Mercury; mark off this extent upon the Sun's Parallel from the 10th towards the west; then from this mark to the centre of the Sun is 47¼°, the Arc of Direction.

S. 432.—*Example* 38.

The Sun to the Body of Venus in Mundo.
Converse Direction.

Upon the Sun's Parallel from the Pole of Venus to the centre of the Sun is 46° 7-10th, the Arc of Direction required.

S. 433.—*Example* 39.

The Part of Fortune to the Quartile of Saturn in Mundo.

On the Contra-Parallel of Saturn take the distance of the Pole of the Part of Fortune from the western horizon; mark this distance on the Parallel of Saturn from the Midheaven towards the west; then from this mark to the centre of Saturn is 34°, the Arc of Direction.

S. 434.—*Example* 40.

The Part of Fortune to the Sextile of Venus in Mundo.

Take the distance from the Pole of the Part of Fortune on the contra-Parallel of Venus from the Pole of the 9th towards the 8th house; from this mark to the centre of Venus is 49° 8-10ths, the Arc of Direction required.

CHAPTER 20.

PLANIS. XI.

S. 435.—THAT nothing may be left wanting, but that the instruction contained herein might be full, perfect, and satisfactory to the Student, I have added, in this Twentieth Chapter, not only some very excellent Rules, being a Summary of the Principles of Directional

Motion by the Celestial Planispheres, but also some additional Examples to the numerous list previously given.

The Numeral attached to the Examples in this Chapter will be in sequence to those contained in the 19th chapter.

Special Rules for working Mundane Directions on the Celestial Planispheres.

Case the First.

S. 436.—When the Significators (☉ or ☽) and the Promittors (♅, ♄, ♃, ♂, ♀, or ☿) are both in the same Hemisphere, or when both of them are above the Horizon, or both below the Horizon when the Direction is completed.

For Direct Directions.

S. 437.—*Rule* 1*st*. Observe to the Pole of what house the Significator is nearest; then upon the Parallel of the Promittor, take in your compasses the distance from the Pole of *that* house to where the Pole of the Significator intersects: this will be the proportional distance of the Promittor; and mark this distance upon the Parallel of the said Promittor, from the line of the given angle or house to the place where the aspect is completely formed, and this mark will shew where the aspect is completed. Next place one foot of your compasses upon this mark, and extend the other foot to the centre of the planet or Promittor, and this last extent will be the Arc of Direction required.

S. 438.—*Rule* 2*d*. Upon the Parallel of the Promittor, take in your compasses the full extent or space of the aspect required; set off this extent from the place where the Pole of the Significator intersected this parallel, upon this said Parallel of the Promittor, where make a mark. Place one foot of your compasses upon this mark, and the other upon the centre of the Promittor, and this last extent will be the Arc of Direction required.

S. 438.—*Note*. Those persons who have attentively read the preceding pages of this book, need not be told that the Semi-quartile is the space of one mundane house and a half, or that it is equal to half of the Semi-arc, or the Sextile is the space of two mundane houses; and that the Quintile is one-fifth part of the Sextile more than the aforesaid Sextile; and that the Quartile is the space of three mundane houses, and the Trine of four such houses, &c.

S. 439.—*Example* 41.

In the Nativity of the Emperor Napoleon, let it be required to direct the ☉ to ✶ of ♄ by Direct Motion in Mundo.

By the first Method:—Here we find the nearest cusp to the ☉ is the Pole of the 11th; therefore upon the Parallel of ♄ place one foot of your compasses on the Pole of the 11th, and extend the other to where the Pole of ☉ intersects the Parallel of ♄; and this extent, marked off from the Pole of the 9th towards the west upon the

Parallel of Saturn, will be the place where ♄ will be when in Mundane ✱ to the place of the natal ☉. Set one foot of your compasses on this mark, and extend the other to the centre of ♄; and this last extent will be about 43° 5-6ths, which is the Arc of Direction of ☉ ✱ ♄ M. D. D., and measured upon the scale of years is equal to 48 years of his age.

S. 440.—*Example* 42.

☉ ✱ ♄ M. D. D. By the Second Rule, or Method.

Take in your compasses the extent of two houses upon the Parallel of ♄; set one foot upon the place intersected by the Pole of the ☉, and with the other foot of your compasses on ♄'s Parallel make a mark towards the seventh house; this mark will be the place of the Aspect. Then with one foot of the compasses on this mark extend the other foot to the centre of ♄; and this last found extent is 43° 5-6ths, the Arc of Direction, as was found by the first method.

Case the Second.

Direct Directions in Mundo,

S. 441.—When one Planet is above and another below the Horizon when the Direction is completed.

The method to be pursued is the same as in the first case; only observing, in this second Case, that the proportional distances must be taken upon the contra-parallels of the Planets (Promittors), instead of upon their own parallels. Thus, if the Significators, the ☉ or ☽, be below the Horizon, and the Promittor, (♅ ♄ ♃ ♂ ♀ or ☿), above; or if the Significator be above, and the Promittor below the Horizon: where the Pole of the Significator intersects the contra-parallel of the Promittor, here set one foot of your compasses, and extend the other foot to the pole of the nearest house or angle: this extent will be the proportional distance of the Promittors in the other hemisphere, which extent is to be set off from the (pole of the) house or angle where the Aspect is formed, and marked upon the Promittor's own parallel; then from this mark to the centre of the Promittor will be the Arc of Direction required.

S. 442.—*Example* 43.

In Napoleon's Nativity, let it be required to direct ☽ by Direct Motion to the ☌ of ☿ in Mundo.

Here we find ☽ Significator below the horizon on the 4th, and nearest the cusp of the 4th; and ☿, the Promittor, is in the opposite hemisphere above the horizon, and in the 10th house; therefore upon the place where the Pole of the ☽ intersects the contra-parallel of ☿, there place one foot of your compasses, and extend the other foot to the line of the 4th; this extent, laid off from the line of the 10th towards the east upon ☿'s own Parallel, will mark where the Aspect is completed; then with one foot of your compasses on this

mark, extend the other foot to the centre of ☿ ; which extent will be 8½°, the Arc of Direction of the ☽ ☌ ☿ in Mundo by Direct Motion.

Converse Directions in Mundo.

Case First.

S. 443.—When the Significators and Promittor are both above or both below the Horizon when the Direction is completed.

Observation.—In Converse Directions the Significators (☉ or ☽) are carried forward to the completing of the Aspect by their own proper motion in the world, and thereby form the Aspects to the Promittors (♅ ♄ ♃ ♂ ♀ or ☿).

S. 444.—*Rule First.* Observe to what cusp, pole of house, or angle, the Promittor is nearest; then upon the Parallel of the Significator, where the Pole of the Promittor intersects it, place one foot of your compasses, and extend the other foot to the nearest pole of house or angles; and this extent will be the Significator's proportional distance from the pole of the house or angle where the Aspect is formed, and from which it must be set off and marked upon the Significator's own parallel: then with one foot of your compasses on this mark extend the other foot to the centre of the Significator, and this last extent will be the Arc of Direction required.

Rule Second. Upon the Parallel of the Significator take in your compasses the full extent of the Aspect required. With this extent in your compasses set one foot upon the place where the Pole of the Promittor (♅ ♄ ♃ ♂ ♀ or ☿) intersects the Parallel of the Significator (☉ or ☽), and with the other foot make a mark conversely upon the Significator's own parallel; this mark will be the place where the Aspect is completed. Then with one foot of your compasses on this mark extend the other foot to the centre of the Significator (☉ or ☽); and this last extent will be the Arc of Direction required.

S. 445.—*Example* 44.

In Napoleon's Nativity let it be required to direct the Sun to the ⊏ Semi-quartile of Mars in Mundo by Converse Motion.

Here it is evident both Planets will be in the same hemisphere when the Direction is completed.

By the First Rule:—Here we find the nearest Pole to the Promittor ♂ is the Pole of the Circle of Semi-quartiles. Set one foot of your compasses upon the Pole of ♂, where it intersects the Parallel of the Sun, and extend the other foot to the Circle of Semi-quartile upon the ☉'s Parallel; this extent, set off from the 10th towards the east upon the ☉'s Parallel, will mark the place where the Aspect is completed. Set one foot of your compasses on this mark, and extend the other foot to the centre of the ☉; this extent will be nearly 29° 2-3ds, the Arc of Direction required of ☉ to Semi-quartile of ♂ in Mundo by Converse Motion.

S. 446.—*Example* 45.

☉ Semi-quartile ♂ M. D. C.

By the Second Rule:—Upon the Parallel of the Significator ☉ set one foot of your compasses on the line of the 10th, and extend the other foot to the line or pole marked S □ and S S □. Next, with this extent in your compasses, set one foot upon the place where the Pole of ♂ intersects the Parallel of the ☉, and with the other foot make a mark conversely towards the 10th upon the ☉'s Parallel; and from this mark to the centre of the ☉ will be 29° 2-3ds, the Arc of Direction of ☉ Semi □ ♂ M. D. C., being the same as was found by the first method. By Logarithms the Arc is 29° 38′.

CONVERSE DIRECTIONS IN MUNDO.

S. 447.—*Case Second.*

When the Significator and Promittor are one above and the other below the Horizon when the Direction is finished.

Rule.—Observe to what pole of house or angle the Promittor is nearest; then set one foot of your compasses on the Pole of the Promittor (♅ ♄ ♃ ♂ ♀ or ☿), where it intersects the contra-parallel of the Significator (☉ or ☽), and extend the other foot to the pole of the nearest house or angle upon the said Significator's contra-parallel; and this extent will be the proportional distance of the Significator (in the opposite hemisphere wherein the Direction is finished). Next, set off and mark this distance upon the Parallel of the Significator from the proper house where the Aspect is formed; then set one foot of your compasses on this mark, and extend the other foot to the centre of the Significator; and this last extent will be the Arc of Direction required.

S. 448.—*Example* 46.

In the Nativity of Napoleon, let it be required to direct the ☉ to △ ♃ in Mundo by Converse Motion.

Here we see this Aspect is formed when the ☉ is in proportion to his semi-diurnal arc, as far from the 10th towards the west as ♃ is above the Pole of the 2d house towards the 1st, in proportion to ♃'s semi-nocturnal arc; and therefore as ♃ is there nearest the Pole of the 2d, set one foot of your compasses on the Pole of ♃, where it intersects the contra-parallel of the ☉, and extend the other foot to the Pole of the 2d house, and this extent will be the proportional distance of the ☉ from the 10th upon his own Parallel. Mark off this distance from the 10th conversely upon the Sun's own Parallel towards the west: set one foot of your compasses upon this mark, and extend the other foot to the centre of the Sun; and this last extent will be 32° 3-5ths, the Arc of Direction required of ☉ △ ♃ by Converse Motion. This Direction, when calculated by Logarithms, comes out 32° 35′, being within one single minute of a degree of what was found by these Planispheres.

S. 449.—*Remarks.*

The proportional distance of the Sun might have been found by placing one foot of your compasses on the Pole of ♃, where it intersects the contra-parallel of ☉, and extending the other foot of your compasses to the place where the line of the East Angle intersects the contra-parallel of the Sun; this extent, set off from the Pole of the 9th towards the 10th, would mark the place of the Aspect and where the Direction is completed, exactly the same as by the former method upon the Sun's own Parallel. It may be well to observe, that in working every Mundane Direction we have always the choice of the Poles of two houses, from either of which we can take the proportional distances; but the Arc of Direction will always come out the same by a properly projected Planisphere, provided the distance be correctly taken, and be set off from the pole of such a house or angle as will cause the mark to fall in the proper position where the Aspect is completed. This will all be very plain and easy to those persons who have attentively read and carefully studied the preceding pages of this book.

CHAPTER 21.

PLANIS. XII.

GENERAL RULES FOR WORKING MUNDANE DIRECTIONS, BOTH DIRECT AND CONVERSE, BY THE CELESTIAL PLANISPHERES.

S. 450.—OBSERVE, the ☉ and ☽ are commonly called Significators, or Planets which signify some event; and ♅ ♄ ♃ ♂ ♀ and ☿ are Promittors, or Planets promising the accomplishment of the same. Now remember, once and for ever, that when the ☉ or ☽ is said to remain in its place, and that ♅ ♄ ♃ ♂ ♀ or ☿ moves forward to complete the Aspect, this is called Direct Direction in Mundo: but when the ☉ or ☽ is carried on to complete the Aspect, in this latter case it is called Converse Direction in Mundo. And farther, remember that the ☉ and ☽ are sometimes Promittors, accordingly as they are directed to the Aspects of each other, or, it may be, to the Aspects of the Ascendant, to those of the Midheaven, or of the Part of Fortune.

S. 451.—*Rule* 1. When both Planets are posited in the same hemisphere when the Direction is completed, or when both remain above or both below the Horizon when the Direction is finished.

First, observe which Planet is to be carried forward to complete the Aspect; then place one foot of your compasses on the Pole of the other Planet, exactly where it intersects the Parallel of the Planet that is carried forward, if both remain in the same hemisphere; but let this be done upon the contra-parallel of the Planet

carried forward, if it be in a different hemisphere to the Planet that is carried forward; and extend the other foot of your compasses upon the same Parallel unto the pole of the nearest angle or house in the order in which the Aspect is reckoned; and this extent in your compasses will be the proportional distance of the Planet to be carried forward, which extent must be marked upon the same Parallel from the pole of the house where the Direction is completed; and this mark will be the place of the Aspect. Then set one foot of your compasses on this mark, and extend the other foot to the centre of the Planet carried forward; and this last extent will be the Arc of Direction required.

S. 452.—*Example* 47.

☉ ✶ ♀, M. D. D.

In the Nativity of the Emperor Napoleon, let it be required to direct the Sun to the Sextile of Venus in Mundo by Direct Direction.

Here we observe that the Sun remains in his position near the Pole of the 11th house, and that Venus moves forward by her own converse motion to complete the Aspect, which she does by moving onward upon her Parallel until she is at the same proportional distance from the west side of the Pole of the 9th, that the Sun is distant from the west side of the Pole of the 11th, according to his semi-diurnal arc.

S. 453.—*Process.* Upon the Parallel of Venus set one foot of the compasses on the Pole of the 11th, and extend the other foot to the Pole of the Sun. With this distance in your compasses, set one foot upon the Pole of the 9th and Parallel of Venus, and make a mark towards the 7th with the other foot of the compasses on the same Parallel; and this mark will be the point where the Sextile is completed. With one foot still on this mark, extend the other foot to the centre of ♀; and this last found extent, applied to the scale of degrees, will be found to be 23¼°. This is the Arc of Direction, being only four minutes of a degree more than the result calculated by Logarithms.

Example 48, *by Rule* 1.

☉ ☌ ☽, M. D. D.

In the Nativity of Napoleon, Plate No. 4. Let it be required to direct the Sun to the Opposition of the Moon in Mundo by Converse Motion.

S. 454.—Here we observe that the Moon remains in her position near the line of the 4th house, and the Sun moves onward by his own converse motion until he is at the same proportional distance from the 10th, according to his semi-diurnal arc, that the Moon is distant from the 4th, according to her semi-nocturnal arc.

S. 455.—*Process.* Therefore upon the contra-parallel of the Sun set one foot of the compasses on the (line of the) 4th, and extend the other foot to where the contra-parallel of the Sun is cut by the Pole

of the Moon. With this distance in your compasses set one foot on the 10th upon the Sun's Parallel, and with the other foot make a mark upon the same Parallel towards the Sun (that is, on the east side of the 10th); and this mark will be the place of the Sun's Opposition to the Moon in Mundo. Set one foot of the compasses on this mark, and extend the other to the centre of the Sun; and *this* extent, measured upon the scale of degrees, will be found equal to 25°, which is the Arc of Direction, being only two minutes of a degree different to the result given by Logarithms.

S. 456.—*Second General Rule.*

When the Planets are posited in different hemispheres, or one above and the other below the Horizon when the Direction is finished.

Observe, as before, which Planet is to be carried forward to the place of the Aspect; then place one foot of your compasses on the Pole of the other Planet, exactly where the said Pole intersects the contra-parallel of the Planet that is carried forward, and extend the other foot upon the same contra-parallel unto the pole of the nearest angle or house in the order in which the Aspect is reckoned. Now this extent in your compasses will be the proportional distance in the other hemisphere of the Planet that is carried forward to complete the Aspect, which extent must be marked upon the Planet's own Parallel which is carried forward, and set off this extent from the pole of the house where the Aspect is completed. Set one foot of your compasses on this mark, and extend the other foot to the centre of the Planet that is moved forward; and this last found extent will be the Arc of Direction required.

Example 49.

☽ △ ♃, M. D. D.

Being the Example to the Second General Rule.

S. 457.—In the Nativity of Napoleon, Plate No. 4. Let it be required to direct the Moon to the Trine of Jupiter in Mundo by Direct Direction.

Here the Moon will remain below, and Jupiter will have ascended above the Horizon when this Direction is completed; for Jupiter will then be the same proportional distance above the Ascendant, according to his semi-diurnal arc, that the Moon is distant from the 5th, according to her semi-nocturnal arc. Jupiter is the planet which moves forward to complete this Direction.

S. 458.—*Process.* Therefore set one foot of your compasses on the Pole of the Moon, where it is intersected by the contra-parallel of Jupiter (*c* ♃), and upon the same contra-parallel extend the other foot of your compasses to the (Pole of the) 5th house; and with this distance in your compasses set one foot thereof upon the Parallel of Jupiter, at the point where it is cut by the line of the 1st, or eastern

horizon; then with the other foot make a mark towards the 10th, upon the Parallel of Jupiter; and now extend the compasses from this mark to the centre of Jupiter; and this last extent, measured on the scale of degrees, will be found to be 54° 1-10th, the Arc of Direction of ☽ △ ♃, M. D. D.

S. 459.—N.B. The same result will be obtained by placing one foot of your compasses upon the line of the 4th, upon the contra-parallel of Jupiter, and extending the other foot on the same parallel to where it is intersected by the Pole of the Moon. This extent, laid off from the Pole of the 12th towards the 1st upon Jupiter's own Parallel, will be the mark where Jupiter forms the Mundane Trine to the Moon; because ♃ would then have the same proportional distance from the Pole of the 12th, according to his semi-diurnal arc, that the ☽ is distant on the west side of the 4th, according to her semi-diurnal arc.

Remarks on Directing to the Quintile and Biquintile Aspects.

S. 460.—1st. To direct any Planet to the Quintile.

Having by the former Rules made a mark upon the Planisphere where the Sextile falls, you have only to take in your compasses the proportion of the Quintile from the Circles of the Quintile found upon the same parallel that the Direction falls upon. Add this to the place where the Sextile falls, and that will be the place where the Quintile falls.

S. 461.—*For the Biquintile.*

The aforesaid proportion of the Quintile being marked and set off from the place where the Trine falls upon any parallel, by turning the compasses twice over from that place, the last mark will be the place of the Biquintile. After all the instruction already given in the preceding pages, it is almost needless to add, that the Arcs of Direction will be found by measuring from the marks where the Quintile and Biquintile fall to the centres of the Planets carried forward, as before taught. And that the proportion of the Quintile is always found upon a Planet's parallel, by setting one foot of the compasses upon the line of the 10th or 4th house, and extending the other foot thereof upon the same parallel to where it is cut by the Circle or Pole of the Quintiles.

And the student is requested to bear well in mind what has been stated in pages 83 and 90 to 93, relative to the Quintiles and Biquintiles.

S. 462.—*Example* 50.

The Sun to the Quintile of Venus in M. D. D.

Having found the place of the ☉ * ♀, M. D. D., in the 29th Example, all that now remains to be done, is to set one foot of your compasses on the line of the 10th upon the Parallel of Venus, and extend the other foot to the Pole of the Quintiles; and this ex-

tent mark off from the place of the Sextile to the West thereof upon Venus's Parallel; then, with one foot upon this last mark, extend the other foot of your compasses to the centre of Venus, and the last found extent will be 35° $\frac{2}{3}$, or 35° 41′, Arc of Direction required of ☉ to Quintile of ♀ M. D. D.

How to work Mundane Directions by the New Planisphere Quadrant upon the Celestial Chart of any Nativity.

S. 463.—*Example* 51.

In the Nativity of Napoleon, let it be required to direct the ☉ to the Sextile of ♄, M. D. D.

Rule and Example combined. Set the Quadrant parallelwise upon the parallel of ♄, and the Quadrant will then have about 110$\frac{1}{2}$ degrees, the Semi-diurnal Arc of ♄, shewn on each of the legs. Set the Index-string to two houses, or 60 mundane degrees upon the Chord-line of the Quadrant; keep the same degrees of the Quadrant still upon the Parallel of ♄, and in this way slide the Quadrant along upon the same parallel, until the Index-string stands exactly over where the Pole of the ☉ cuts the parallel of ♄; then make a mark where the most distant leg of the Quadrant intersects the parallel of ♄, and from this mark to the centre of ♄ will be 43$\frac{5}{8}$ degrees, the Arc of Direction required of ☉ * ♄, M. D. D.

S. 464.—*Example* 52.

In the Nativity of Napoleon, let it be required to direct the Sun to the Quintile of Venus by Direct Direction in Mundo, by means of the New Planisphere Quadrant.

S. 465.—☉ Quintile ♀ M. D. D.

Set the Quadrant parallelwise upon the parallel of ♀, and you will find 109° the Semi-diurnal Arc of ♀ upon both legs of the instrument. Set the Index-string to 72° upon the Chord-line of the Quadrant; slide the instrument along the Parallel of ♀, until the Index-string stands exactly over where the pole of the ☉ intersects the Parallel of ♀ (keeping 109° on both legs still on the Parallel of ♀); make a mark where the farthest leg, passing beyond ♀, cuts the parallel of ♀: from this mark to the centre of ♀ will be found to be 37$\frac{4}{5}$ degrees, the Arc of Direction required.

Observe, that, if the Sun had been directed by converse motion, the Quadrant must then have been set parallel upon the parallel of the Sun.

S. 466.—The Examples here given are sufficient to shew the method of working Directions by the Planisphere Quadrant; so that the ingenious student will now be qualified to work these Directions either by the compasses or by the Planisphere Quadrant, accordingly as he may feel disposed to prefer the one or the other method.

How to Direct a Planet having Latitude to the Aspects in the Zodiac.

It was promised in page 111 to give an Example of doing this, and we could not select one more suitable for the student's instruction than

S. 467.—*Example* 53.

☽ △ ♀ in Zodiac with Latitude.

Process. This Aspect falls in 7°·1 ♓, because ♀ is in 7°·1 ♋ in the Nativity. By referring to the Table in page 96, we see that the distance for the centre of the Index of the Quadrant of latitude to be set to is 147° 57′, which taken as 148°, is quite exact enough. Having, by help of the Ecliptic Slider, made a fine dot at 7° ♓ upon the Ecliptic line of the Planisphere of the Nativity of Napoleon, take the Quadrant of Latitude, and fix it upon the Chart of the Nativity, as already taught in page 106; then place the thin edge of the straight-edge ruler to the 148th degree upon the Index-line IL, IL, and let the same edge of the ruler at the same time touch the aforesaid mark at 7° ♓; then draw a fine line through 7° ♓, so as to intersect the Moon's orbit-line. Next, from the point where the line of latitude intersects the orbit of the Moon, draw a line to the Pole of the Moon, parallel to the Equator: this last drawn line, when measured on the scale of equatorial degrees, will be found to be 37½°, very nearly, which is the Arc of Direction required of ☽ △ ♀ in Zodiac with Latitude.

S. 468.—*Note.* By taking very carefully the extent of the above Arc upon the engraved plate of copper by a pair of very fine-pointed compasses, and applying the same to the aforesaid brass scale of equatorial degrees, the Arc of Direction is found to be 37° 27′. If calculated by the Tables, it would be 37° 29′; so we find the difference is 2′, or only one-thirtieth of a degree different by the Planispheres to the result which would be given by tabular calculation.

S. 469.

TABLE of some of the Principal Directions in Napoleon's Nativity, with Mr. Worsdale's Remarks on the same.

		Arc. ° ′	Y.	M.	
1	Asct. to S □ of ♂ Mundo	2 19	2	3	
2	M. Cœli ☌ ♄	4 47	5	0	
3	Asct. □ ♄	4 47	5	0	
4	☽ ✶ ♃ in M. converse.	7 42	8	3	
5	☽ ☍ ☿ M. D. D.	8 30	9	2	
6	☉ ✶ ♀ in Zodiac	15 10	16	5	
7	Asct. △ in Mundo	20 50	22	8	
8	☽ ☍ ♀ M. D. C.	22 23	24	5	
9	☉ ✶ ♀ M. D. D.	23 11	25	5	
10	☉ ✶ ♃ in Zodiac	23 36	25	9	Made General of the Armed Force of France.
11	☉ SSq. □ ☽ M. D. D.	27 14	29	9	Defeated in Egypt, and returned home.
12	☉ ☌ ♄ in M. D. C.	27 37	30	3	
13	Mid-Heaven ☌ ☉	32 5	35	3	Crowned Emp. of France.
14	Asct. ☌ ♃	34 17	37	8	
15	☉ Par. ♄ M. D. C.	36 33	40	2	Great danger.
16	☽ △ ♀ in Zodiac cum lat.	37 29	41	3	
17	☉ △ ☽ in Zodiac	37 41	41	5	
18	☉ Par. ♄ M. D. D.	39 6	43	0	In great danger of Death by Slaughter, either civil or hostile; or by himself, by tumults of the people, or by HANGING or STRANGLING.
19	☉ Par. ☽ M. D. C.	39 8	43	0	
20	☉ Par. ☽ M. D. D.	40 25	44	6	
21	☉ R. Par. ♂	41 41	45	11	
22	☽ ☍ ♂ in Mundo	44 12	48	7	
23	☉ ☌ ♀ in M. D. C.	46 42	51	4	
24	☉ S □ ☉ in Zodiac	46 51	51	7	
25	☉ P. ☿ in M. D. C.	47 14	52	0	
26	☉ P. ☿ in M. D. D.	49 31	54	5	
27	M. Cœli ☌ ♂	50 52	55	10	
28	Asct. □ ♂ Mundo	50 52	55	10	
29	☉ S □ ☉ in Mundo	51 23	56	5	

S. 470.—The foregoing Table contains some of the most eminent Directions in the Nativity of this most wonderful man, with the corresponding years and months of the Native's age, equated according to the Sun's daily motion in right ascension. Those who desire a more numerous Table of Directions may easily calculate them by my Planispheres; or they may refer to the late Mr. Worsdale's publication of this Geniture, containing 106 quarto pages, wherein is given a very long Table of Directions, &c. It will be observed, that

some of the Arcs which I have calculated in the foregoing Table will be found to differ one or two minutes of a degree from those given by Mr. Worsdale; a matter of no very great importance, as this would only make from one to two weeks difference in the time of the event.

S. 471.—And it is highly proper here to remark, particularly for the information of such students as are only new beginners in the Celestial Sciences, that in the Directions, especially those of the Sun and Moon, it must not be supposed that the Direction is wrong because the event may not have happened in the exact month calculated in the Table; for it has been found by repeated observation, that the Sun or Moon, directed to the Aspects of ♅ ♄ ♃ ♂ ♀ or ☿, the *Event* may anticipate the Direction; or, otherwise, it may not happen so soon by the space of from three to six months. But when the Sun and Moon are directed to each other, or to each other's Aspects, this retarding or anticipating the time calculated for may amount to six or even to twelve months, as I have shewn in my Essay on this subject, which forms the 23d Chapter of this Book.

S. 472.—The reason of this seeming anomaly in Directional Motion is, the great apparent diameters of both the Sun and the Moon, each of these luminaries being rather more than half a degree in diameter, while all the Directions are calculated for the centres only, both of the Planets and the Luminaries: but to the mathematical Astronomer it must be evident that one extreme edge or limb of each luminary touches upon the Aspect or Direction before the time calculated; while, on the contrary, the other limb or extreme of the luminary continues in the Direction or Aspect, and prolongs its effects beyond the time calculated.

S. 473.—And I believe that I have discovered that the Arcs of Direction are protracted, or otherwise curtailed, by the effects of Refraction and Parallax; to which may be added the accelerating and retarding effects of the Secondary Directions and Lunar Progressions. The two last named are generally explained in all good books on the judicial part of the Astral Sciences, and therefore it is not necessary for me to do more than to mention this.

S. 474.—These things relating to the anticipation and retarding of the effects of Directions being duly considered, we find the Directions No. 16 and 17 correspond sufficiently near to the time of this Native's marriage with the Archduchess Maria Louisa, and, according to Astrology, are predictive of such an event. While No. 18, the Direction of the Sun to Par. ♄, M. D. D., answers to the Native's defeat in Russia, and to his flight therefrom, &c. And No. 20, of the Sun to Par. Moon, M. D. D., answers to his first abdication of the throne of France, and retiring to Elba. And the Direction No. 21, the Sun to the Rapt Parallel of ♂, answers wonderfully both to the time and manner of his final overthrow at the Battle of Waterloo.

S. 475.—I must here remark, that the first great Aneretic train of Directions, according to Mr. Worsdale, consists of Nos. 15, 18, 19,

20, 21, and 22, in the preceding Table; but Mr. W. placed great reliance on the Sun, Rapt Par. of ☌, at 45 years 11 months, that it would prove mortal to the Native, as being the most dangerous and the most powerful. As before observed, this Direction answers to the Battle of Waterloo, and his subsequent surrender to the English; and although he was not slain in battle, his political existence was then effectually destroyed, and his death accelerated, as was no doubt intended, by his residence in the unhealthy climate of St. Helena. But to speak according to the terms of the Astral Sciences, the rays of a Benefic falling in the train, this was the 23d Direction, viz., of the Sun ☌ ♀, M. D. D., which, beginning to operate near the same time as the last named Direction, saved his life; until the Sun Hyleg, or Apheta, came to the second great Aneretic train of Directions, consisting of Nos. 24, 25, 26, 27, 28, and 29, of the preceding Table, in which, when the Sun came to his own Semi-quartile in the Zodiac (followed by five other malevolent Directions), answers most admirably to the time of his death!!

S. 476.—That sceptics may be confounded, I have placed Mr. Worsdale's own remarks opposite to certain remarkable Directions indicating his overthrow and death, published sixteen years before this latter event transpired! by which they may see that there really exists a Predictive Science founded on the Phenomena of the Universe, and upon regular and methodical Rules and Calculations.

CHAPTER 22.

Planis. XIII.

HOW TO FIND THE DURATION OF TWILIGHT FOR ANY LATITUDE, AND TO DESCRIBE THE CREPUSCULINE PARALLEL UPON THE CELESTIAL PLANISPHERES.

S. 477.—The continuance of a considerable portion of the Sun's light, for a long time after that luminary has descended below the Horizon, is so universal and so interesting a phenomenon, that I have been induced on this consideration alone to add this Chapter, to enable the student to find the Crepusculine Arc with the utmost precision for any time, and for any place of which the Latitude is known; and also to teach him a very easy and accurate mode of delineating the Crepusculine Parallel upon the Celestial Planispheres.

S. 478.—To resolve this problem in Oblique Spherical Triangles, we have three sides of the Triangle given to find the required Angle. These three sides are, first, the Zenith distance, always 108 degrees, the Sun then being 18 degrees below the horizon; therefore, as the Zenith (point) is always 90 degrees above the horizon, $90° + 18° = 108$, the Zenith distance, as before stated. The second side is the co-latitude of the place; and the third side is the Sun's North Polar distance. By these three being given, the Sun's distance from the

Meridian is found, and from that we can determine the Arc of Twilight.

S. 479.—*Note.* To find the North Polar distance of the Sun:—Observe, when the Sun has North declination, subtract the Sun's declination from 90 degrees, and the remainder is the Polar distance; but when the Sun's declination is South, then add his declination, 90 degrees, and the sum is the Polar distance.

Example.

Required the Sun's Meridian Distance at London, when the Zenith Distance is 108°, and the Sun's Declination 23° 28′ South.

S. 480.—*The Formula and Example combined.*

N.B.—Reject 10 *from the Co-secants.*

Zen. Distance..	108°	0′	0″					
Co-lat.....	38	29	0	Co-secant	0·20601	or Sine (co-arith)		
Polar Dist.....	113	28	0	Co-secant +	0·03749	or Sine (co-arith)		
Sum.....	259	57	0					
Half Sum	129	58	30	Sine =	9·88441	= cosine of excess above 90°		
Zen. Dist. subt..	108	0	0					
Difference	21	58	30	Sine	9·57301			
Sum of the Logarithms.....					19·70092			
½ Sum is the Cosine of ½ the Merid. Distance ×	44°	52′	20″		9·85046			
			2			h.	m.	sec.
and the Merid. Distance is from noon	89	44	40	=		5	56	3
Subt. Semi-diurnl. Arc of ⊙	56	54	0			3	47	36 Sunset
Remains Crepusculine Arc	32	50	40			2	8	27

S. 490.—In the preceding calculation for the co-secant of the Polar distance 113° 28′ the secant of the excess above 90° is used; but this must be already familiar to the student, from the instructions given for the use of the Formulæ in the fifth Chapter of this Book. Observe also, when the Sun's declination is South, subtract his ascensional difference from 90°, and the remainder is the semi-diurnal arc of ⊙, which arc, turned into time by Table in page 97, gives the real time of Sunset (not the apparent). When the Sun's declination is North, add his ascensional difference to 90°, and the sum will be the semi-diurnal Arc, which, converted into time, is the actual time of the Sun's setting.

S. 491.—And by subtracting the Sun's semi-diurnal from the Meridian distance found by the preceding Problem, you always obtain the Crepusculine Arc, or duration of twilight, only except when the Sun's declination is north, and that 18 degrees being added to it, shall make a sum of degrees equal to or even less than the co-latitude of the place; then in this case there will be no real darkness, but twilight all through the night.

S. 492.

TABLE of Meridian Distances of the Sun under the Crepusculine Circle for London, Latitude 51° 31′ North.

Declination.	Merid. Dist.	Dist. from 4th.
20 29 N	180 0	0 0
18 0 N	158 34	21 26
15 0 N	148 20	31 40
12 0 N	140 49	39 11
9 0 N	134 35	45 25
6 0 N	128 36	51 24
3 0 N	124 17	55 43
0 0	119 46	60 14
3 0 S	115 33	64 27
6 0 S	111 32	68 28
9 0 S	107 40	72 20
12 0 S	103 54	76 6
15 0 S	98 14	81 46
18 0 S	96 31	83 29
21 0 S	92 49	87 11
23 28 S	89 45	90 15

S. 493.—The distances from the 4th house in the above Table are the supplements of the Meridian distances to 180 degrees, and give the student a choice in setting off his distances either from the upper or lower Meridian. Having calculated and arranged a Table of Meridian Distances for every second or third degree of the Sun's declination, both north and south, he should next set off the same declinations upon the Meridian lines, both above and below the Equator of the Planisphere of the Twelve Houses; then draw in the Parallels with a very fine-pointed black-lead pencil, as he did in setting off the Planets' Parallels and Contra-parallels of Declination. Then with the compasses set off each Meridian distance upon its proper parallel; this having been done, carefully draw a line through all the points, both on the eastern and western side of the Planisphere,

and these two lines will be the Morning and Evening Crepusculine Circles, as was required.—N.B. By carefully transferring this line upon a piece of pasteboard, upon which the Equator and Meridian Line should be accurately drawn, and cutting away all the superfluous pasteboard with great care, you will then have a curve pattern of the Crepusculine Circle for the given latitude always ready in a moment for your future use.

CHAPTER 23.

Planis. XIV.

AN ESSAY ON THE ANTICIPATING AND RETARDING OF THE EFFECTS OF DIRECTIONS IN NATIVITIES;

And an Original Method of determining the Duration of the powerful Effects of Directions.

S. 494.—The celebrated Placidus, in his "Primum Mobile, or Doctrine of Nativities," has very indefinitely given some hints about the great diameters of the luminaries having an effect upon directions; but this is all, for he has not in his work attempted any demonstration, nor given any rules for determining how long the duration may be of the anticipating and retarding of the effects of directions. Indeed, most students and professors of the Astral Sciences who have had experience in the calculation of Nativities are aware that there exists an anticipating and retarding of the effects of Directions; but I have not met with any person, nor any author, who has attempted to investigate and determine the quantity of such retardation and anticipation of the calculated times of Directions. It is generally believed, and with good reason, that the lunar Directions [see Section 496], and also the secondary Directions, if of the same nature as the primary Directions, will hasten the effects of the primaries, and cause the events signified by the primaries to happen earlier than the calculated times thereof; but if the lunars and secondaries are of a contrary nature to the primary Directions, they will retard their effects, and delay the time of an event beyond that calculated. In page 150, this subject is explained in a more ample manner than it has hitherto been; and in addition to what is there stated, I have discovered another important circumstance closely connected with this subject, which may be justly called

A New Astronomical-Astrological Theorem.

S. 495.—All professors of the Astral Sciences admit that the centres [see Section 497] of the Sun and Moon are directed to the Parallels of Declination, or to the other aspects of ♃, ♄, ♅, ♂, ♀, or ☿; that the ☉ and ☽ are then under the powerful influence of the Planet to which the luminary is directed. Since this is the case, it must follow as a natural consequence, that when the north or south limb of either

of these luminaries shall arrive at the parallel declination of any Planet, or to the same declination that their centres will have when directed by the old method to other aspects, that the effect of the Direction will begin to operate; and that the effect of such Direction will continue in force until the entire diameter of the luminary shall have quitted the Parallel Declination of the Promittor; or, until the entire diameter of the luminary shall have passed through the same declination that its centre only would have when directed in the old method to the aspects of the other Planets. To determine how long the entire diameter of the Sun or Moon will continue in the parallel declination which it has when it completes the aspect according to the old method of calculation, as just explained, must be therefore considered a new Astronomical-Astrological Problem, which shall be illustrated by suitable Examples in this Chapter.

It has often been remarked, that certain persons are very delicate and sickly during their infancy, or even until twelve, sixteen, or eighteen years of age, and that afterwards they have become strong and healthy; and this could not be accounted for by the Nativity according to the usual rules of calculation, as there were no evil directions, or, at most, not more than one direction to the Hyleg during the first sixteen or eighteen years of the Native's life. But, when examined by this new rule, I have frequently found the Sun or Moon's diameter has been immersed in the parallel of declination, or was continuing in the same declination in which the Apheta or Hyleg completed by direction an evil aspect to some Planet. When the Moon is the planet directed, her declination, &c. must be determined by a reference to an Ephemeris, for thereby the declination she has both before and after any direction may be easily found.

S. 496.—The Directions or Aspects formed by the lunar Progressions, viz. those formed within one lunar month from the moment of birth, answering to the first year, and those formed within two lunar months to the events of the second year of the Native's age, and so on for the whole of the Native's life.

S. 497.—It is only to the centres of the Sun and Moon that (Primary) Directions have hitherto been calculated; but this Essay proposes also to calculate directions to the east and west, and to the north and south limbs of each luminary.

New Problem, &c.

S. 498.—The ☉ or ☽ being directed either to the parallel declination, or to other aspects of any Planet; to find the arc of duration, and thereby discover how long the effects of such direction will continue in operation.

S. 499.—1st Observe, if the ☉ be in ♋, ♌, ♍, ♎, ♏, ♐, when he completes the parallel declination, or the aspect, the south limb of the luminary will first be upon the parallel declination, or upon the declination of the aspect, and the north limb will be the last in it.

S. 500.—2d. If the ☉ be in ♑, ♒, ♓, ♈, ♉, ♊, when he completes the aspect or parallel of declination, in this case the north limb

of the luminary will first touch upon the declination of the aspect or of the parallel of declination, and the south limb will be the last immersed in it.

S. 501.—3d. To and from the degrees and minutes of declination of the given parallel of declination (or, of the declination that the ☉'s centre will have at the place of the aspect) add or subtract 0° 16′, and the sum or difference will be the declination of the centre of the luminary when the north or south limb first touches upon the parallel declination, or the declination of the place of the aspect of any Planet, according as the direction falls under the 1st or 2d case before mentioned.

S. 502.—This process of adding and subtracting of 0° 16′ is also applicable as regards the ☽, only that the ☽'s declination, &c. must be found by an Ephemeris.

S. 503.—4th. Find the Sun's longitudes answering to the two declinations found by Note 3d, in the Astronomical Tables given in the Second Part of this Book; or otherwise calculate the Sun's longitude by the following Formula; and then find their Right Ascensions, and next find their Oblique Ascensions under the luminary's own polar elevation; and by subtracting from them the Sun's Oblique Ascension under his own Pole of Elevation, will give two other new Arcs of Direction, which will shew the time that any direction continues in force.

S. 504.—*Formula.*

As the Sine of the Sun's greatest declination 23° 28′
Is to the Sine of the given declination
So is Radius Sine of 90°
To the Sine of the longitude from ♈ or ♎,
Or to Cosine of the longitude from ♋ or ♑;
accordingly as you would reckon the longitude of the ☉ from the Equinoctial points ♈ or ♎, or from the Tropical points ♋ or ♑. An Example cannot fail of making this easily understood.

Example.

The diagram to illustrate this is Figure 4, Plate 3, where S represents the south limb and N the north limb of the Sun.

S. 505.—In the Nativity of the Emperor Napoleon, ♂ is in ♍ 12° 2′ with 0° 58′ north latitude, and the Parallel declination of ♂ is 7° 56′ north.

Now, let it be required to find the Arc of duration of the ☉ in the Parallel declination of ♂; thus,

To the declination of ♂	7° 56′
Add the ☉'s apparent mean Semidiameter	0 16
The sum is the declination of the Sun's centre	8 12

when the Sun's south limb S enters the parallel declination of ♂.

S. 506.—Next,

From the declination of ♂ ..... 7° 56′
Subtract the ☉'s Semidiameter 0 16

The remainder 7 40
is the declination of the ☉'s centre when the north limb N quits the parallel declination of ♂. Then say,

S. 507.—As Sine ..... 23° 28′ ..... 9·6001181
Is to Sine of declination .. 8 12 ..... 9·1542076
So is Radius Sine of ..... 90 0 ..... 10·0000000

To Cosine of longitude .... 69 1 ..... 9·5540895

From 0° ♋ 0′, or in 9° 1′ of ♍, being the Sun's longitude when at S. Then say again, by the Analogy,

S. 508.—As Sine of .... 23° 28′ ..... 9·6001181
Is to Radius Sine of ..... 90 0 ..... 10·0000000
So is the Sine of declination 7 40 ..... 9·1251872

To Cosine of longitude .... 70 26 ..... 9.5250691
or in 10° 26′ of ♍, being the Sun's longitude when at N, or when his north limb quits the parallel declination of ♂.

S. 509.—The Oblique Ascension of each of these Zodiacal places is found under the Sun's Pole of Elevations as follows:—

S. 510.—For the Arc of Direction.

From the Oblique Ascension of 10° 26′ ♍ ..... 159° 48′
Subtract the Oblique Ascension of 9 1 ♍ 158 18

There remains the Arc of Duration 1 30

which, when equated according to the methods already taught for other directions, will be found to have operated during a period of one year and eight months; so that the effects of this direction must have operated on the Native from about eighteen and a-half years to twenty years and two or three months of the Native's age.

S. 511.—N.B. These Arcs of Duration will be of various lengths in different signs, but the largest of all in ♊ and ♋; and in ♐ and ♑, if near to the Tropics, so much the larger will the Arcs of Duration be; in which case the same limb of the luminary that first entered upon the parallel of declination *may* be the last to leave it. In the last fifteen degrees of ♓ and ♍, and the first fifteen degrees of ♈ and ♎, the ☉ will have the shortest arcs of duration in the parallel declination of any Planet; and consequently in all parallels of declination, and in all other directions falling near the Equinoctial points, the effects of such directions will be the shortest time in force; but all parallels of declinations, and other directions in the Zodiac near the Tropics, will continue the longest time in operation. The shortest Arc of Duration near the Equinoxes will be about 1° 20′ of

the Zodiac; and the longest near the Tropics will be about 17° 20′ in degrees of the Zodiac.

S. 512.—In regard to mundane directions, in addition to the old method of directing only to the centres of the luminaries, 0° 16′ should be added to and also subtracted from the Right Ascension of each luminary; and then work with the sum, or remainder, in such manner as to direct the East and West limbs to the parallels and to the other aspects in mundo; and by subtracting the least arc from the greatest, the duration or space of time wherein the effects of any mundane direction may be expected to shew themselves, and hence determine the probable limits of anticipation and retardation of the effects of all mundane directions.

Directions to the East and West Limbs of the Luminaries.

S. 513.—See Figure 6, Plate 3. In this diagram the Sun and Moon are purposely drawn on a large scale, in order to render the reason of the anticipating and retarding of the effects of directions visible to the eye. The mean apparent diameter of each luminary is 0° 32′; we have therefore divided the diameter representing the Sun and Moon into thirty-two parts.

S. 514.—To render this demonstration more explicit, let the Moon (posited above the horizon) be directed to the conjunction of the Sun by converse motion. Let B represent the Sun, E his east and W his west limb; then will A represent the Moon with her west limb W coming in contact with E, the Sun's east limb; and C shews the position of the Moon when her east limb E is just leaving W, the Sun's west limb. It will appear evident, upon inspecting this diagram, that the Moon, in completing the conjunction as I have here explained, must pass from the position at A to that at C, and therefore she will move over the spaces A and B, which are equal to sixty-four minutes, or 1° 4′, the sum of the diameters of both the luminaries. It should here be observed, that the same reasoning applies to all other directions of the Sun and Moon to each other, as will be clearly seen by inspecting Figure 5, Plate 3, representing the ☽ ✱ ☉ in Mundo by converse motion. The difference between the Arcs of Direction calculated in the usual manner, and of arcs calculated to the east and west limbs of each luminary, will shew the actual duration of the one luminary continuing in the aspect of the other; which will be greater or less, according to the polar elevation under which the luminaries are directed, if the directions be in the Zodiac; but if in Mundo, the difference will be greater or less, according to the Semi-diurnal or Semi-nocturnal Arcs of each respective luminary.

S. 515.—Observe, if the luminary to be directed to the Aspect be in the 9th, 8th, or 7th house, 0° 16′ added to the primary distance (of its centre) will be the distance of the west limb from the 10th; but 0° 16′ subtracted from the primary distance will be the distance of its east limb from the 10th. If posited in the 10th, 11th, or 12th, subtract 0° 16′ from the primary distance; the remainder is

the distance of the west limb from the 10th: but if the 0° 16′ be added, the sum will be the distance of the east limb from the 10th.

S. 516.—Secondly, if the luminary be in the 6th, 5th, or 4th, add 0° 16′ to the primary distance; the sum is the distance of the west limb: but 0° 16′ subtracted from the primary distance gives the distance of the east limb from the 4th house. If the luminary be in the 3d, 2d, or 1st house, 0° 16′ taken from the primary distance leaves the distance of the west limb; but 0° 16′ added to the primary distance gives the distance of the east limb from the 4th house. Use these distances of the east and west limbs of the luminaries, and work out the stating of the proportions with semi-diurnal or semi-nocturnal arcs, or double horary times, as already taught; and then, by comparing the results thus obtained with the Directions calculated to the centres, or usual method, will shew how long they may be expected to exhibit their effects before or after the times calculated for by the old method.

S. 517.—In the Nativity of Napoleon, the ☉'s Arc of Direction to ☌ ☽ M. Converse is by accurate calculation 25° 1′; but the Arc of Direction of ☉'s east limb to ☌ of ☽'s east limb is 25° 33′, and of the ☉'s west limb to the ☌ ☽'s west limb 24° 30′; which gives 1° 3′ for the limits within which the effects of ☉ to ☌ ☽ might be expected to shew themselves. The ☉'s ☌ to one limb of ☽ comes up about 6 months and 6 days sooner, but the ☉'s ☌ to ☽'s other limb 6 months and 12 days later, than shewn by the old mode of calculation.

S. 518.—The Semi-diurnal Arc of ☉ 102° 47′, and Semi-nocturnal Arc of ☽ 106° 18′, and the distances (primary) of the centres are, of ☉ 32° 5′ from the 10th, of ☽ 7° 18′ from the 4th; from which the distances of the east and west limbs of each luminary may be found by addition and subtraction of 0° 16′, as explained above.

S 519.—The apparent diameters of ♅, ♄, ♃, ♂, ♀, and ☿, being so very small, neither of them being quite 0° 1′, it is not necessary to regard the difference between their centres and their east and west limbs; it will be quite sufficient to do this in reference to the ☉ or ☽'s east and west limbs, when directed to the ☌ or Aspects of the other Planets.

CHAPTER 24.

PLANIS. XV.

AN ESSAY ON THE MATHEMATICAL CONSTRUCTION OF THE PLANISPHERE OF THE ZODIAC,

And of the Quadrant of Latitude, and of the Curves of the Horizon, which serve as the Poles of the Planets, and of the Twelve Houses in the Projections of the Celestial Planispheres.

S. 520.—IN this original Essay, that nothing might be left wanting to render it perfectly clear and intelligible to every class of

students, I have been at the trouble of delineating and engraving a Diagram of the principal Lines in and about the Circle, so often made use of by mathematicians in their various calculations and projections. I shall not attempt to do more in this part of the performance than to explain just so much as will be required in these Planispheric Constructions and Projections; and this not for the information of the learned class of readers, but for the sake of such students as, not being in the possession of Mathematical Books, might find it inconvenient to procure them.

THE PROPERTIES OF THE CIRCLE. *(See Plate No. 1, Figure 9.)*

S. 521.—The properties of the Circle can all be explained by a Figure of half the Circle.

S. 522.—1st. The Radius. Whatever extent you take in your compasses when you would describe a circle, or any part thereof, is called the Radius, no matter how many inches or how many feet that may be. In the given Diagram, let C be the centre; then will C A, or C B, or C D, be each of them equal to the Radius of the given half-circle C B A D.

S. 523.—2d. Every Circle on its circumference is conceived by the mathematicians to be divided into 360 equal parts; and therefore the Quadrant, or fourth part of the Circle, is supposed to be divided into 90 such equal parts, or degrees, as the Quadrant B *v i* A contains 90 degrees, every tenth degree being marked on this drawing.

S. 524.—3d. A line falling from any number of degrees in the circumference perpendicular on the line B C D is called the Sine (or right Sine) of the arc of so many degrees.

S. 525.—4th. The Sine of 90 degrees is always equal the Radius of the Circle, as the line C A in the Diagram is the Sine of 90 degrees.

S. 526.—5th. Any line drawn parallel to C A *within* the Semicircle, or *within* the Quadrant, will be perpendicular to the line B C D, and will be a Sine. For example: the right line *i n*, drawn from the 50th degree parallel to C A until it touches the line B C D, is the Sine of 50 degrees; and the line *v x*, drawn in a similar manner from the 30th degree, is the Sine of 30 degrees, &c. &c.

S. 527.—6th. Any line falling perpendicular to the line C A from any given degree (on the circumference) will be the Cosine of that number of degrees; thus, the line *i m*, from *i*, the 50th degree, is the Cosine of 50 degrees, and is precisely the same in extent as a line drawn from the 40th degree down to the line B C D, and parallel to the line C A.

S. 528.—7th. A Tangent is a line just touching the extremity of the quadrant or semicircle at B, as the line B T is the line of Tangents; and the length of a tangent is found by placing the edge of your straight edge rule on the centre C, and drawing through the degree on the arch B *v i* A, until the line cuts the perpendicular B T. Thus, to find the Tangent of 50 degrees, set your straight edge to

touch the centre C and the 50th degree at one and the same time; keep the rule there, and draw the line to touch B T at *z*, then will B *z* 50 be the Tangent of 50 degrees; and so of finding any other Tangent.

S. 529.—8th. The Secant is the slanting line drawn from the centre C to the line of Tangents, as the line C *z* is the Secant of 50 degrees.

S. 530.—9th. The line of Semi-tangents, one of the most useful in Astronomical Projections, is found by placing the straight edge at the point or extremity D, and at any degree on the arc B *v i* A draw the lines so as to intersect the line C A, and then will C A become a line of Semi-tangents.

S. 531.—10th. For the sake of ease and accuracy in calculations, the mathematicians consider the radius to be divided into 10,000, or 100,000, or 1,000,000 equal parts, no matter how large or how small the real radius of your circle may be; and further observe, that the parts I have been describing are distinguished by the names of Natural Sines, Natural Tangents, and Natural Secants, &c.

S. 532.—*Note.* A Semi-Tangent is always equal to the Tangent of half the given number of degrees; thus, the Natural Semi-tangent of 23° 28′ is the Natural Tangent of 11° 44′. The Natural Sines and Natural Tangents are generally given in books of the best sort of Mathematical Tables.

The Mathematical Construction of the Planisphere of the Zodiac.

See Figure 12 *and Plate No.* 1.

S. 533.—Provide yourself with a sheet of well planished and polished brass, about the thickness of a card-board, or the 36th part of an inch in thickness, represented by the Parallelogram A B, C D; both the edges A B and C D must be perfectly straight, and perfectly parallel to each other, and the two ends A C and B D must also be perfectly straight and perfectly perpendicular to the sides A B and C D. This sheet of brass should be from half to three-quarters of an inch longer than the 360 equatorial degrees, so that the brass may extend beyond each end of the Zodiac line, and preserve it from injury and wearing away at the corners. Besides having room for the Zodiacal curve, the brass must be broad enough to allow, without crowding, all the other lines, viz., a double line of hours, H H, a line of Declinations, a line of the Sun's daily motion in R. A. for every day in the year, a line for the space of two houses for every latitude from 1 to 60 degrees, and also a line of 360 equatorial degrees: this last named line should be on the straight side C D.

S. 534.—2d. With the Semi-tangent of 28 degrees in your screw or spring-divider compasses, from the edge A B set off A E and B E; then set off the same distance from E to *n*, and from E to *m*. Next with your straight edge draw a perfectly straight line from E to E for the Equator, and another straight line *n* to *m*. The line of

hours should contain 360 equatorial degrees, and will then shew every four minutes of time, and by estimation every minute throughout.

S. 535.—3d. Exactly in the middle of the line E E draw a perpendicular *k* ♋ 6.—4th. Set off 180 equatorial degrees to the right and left of *k* ♋ 6 upon the line E E, and next set off 90 degrees exactly, right and left of *k* ♋ 6 on the line E E.

S. 536.—5th. From 0° ♈ 0′ and 0° ♎ 0′, with your compasses as aforesaid, set off the degree and minute of right ascension (to the right and left of these two points) corresponding to every degree throughout the Zodiac upon the line E E.—6th. Draw 360 perpendiculars, namely, a perpendicular through each point of right ascension before named.

S. 537.—7th. From a Table of the Sun's Declination take the declination of each degree of the Zodiac, and in a Table of Natural Semi-tangents find the number corresponding; then upon your Scale of Decimal Parts of Radius take in your compasses the number of parts found in the Table. This extent, set off to the north and south of the line E E, will give the very place or point of each degree of the Zodiac. Thus, for example: 0° ♉ 0′ and 0° ♓ 0′ are each of them 27° 54′ of right ascension distant from 0° ♈ 0′, and the declination of 0° ♉ 0′ is 11° 29′ North, and of 0° ♓ 0′ is 11° 29′ South; and the Natural Semi-tangent of 11° 29′ is 1004; that is to say, 1004 parts of the 10,000 parts, if your Radius was divided into 10,000 equal parts. By proceeding in this manner for all the 360 degrees, the declination points being well marked in by the points of the compasses, this series of points will form a beautiful line of double curvature. Then at about a quarter of an inch above these points draw a line the whole length of the brass.

S. 538.—Then with a cold chisel carefully cut through the substance of the brass, but without touching the points of declination. Then with files of suitable curvature most carefully file away the superfluous metal until you come to the very centre of each and every point of declination, but not the ten-thousandth part of an inch beyond it. Then with a very smooth box mallet very lightly flatten your brass; and in this manner I constructed my Planisphere of the Zodiac from which my Planisphere Copperplates were engraved.

This Diagram being too small to insert all the perpendiculars answering to each and to every one of the 360 degrees of the Zodiac, I have rendered the principle thereof equally clear and evident to the student by laying down on this Projection the ordinate of declination for each fifth degree of Ecliptic longitude, which has the right ascension belonging thereunto. The letters of the alphabet shew these equal distances from the Equinoctial point 0° ♈ 0′, marked *a*, with their equal corresponding declinations: thus, *b* 10° of ♈ is equal to *z*, and *z* answers to the 20th degree of ♓, both being equal in distance from the Equinox, and both having the same quantity of declination, only that the declination of *b* is north, and that of *z* is

south. In a similar manner *c* answers to the 20th degree of ♈; and *y*, which corresponds to the 10th degree of ♓, is the same distance from the Equinox as *c*, and has the same quantity of south declination as *c* has of north declination. The same is to be understood of all the other letters of the alphabet marked upon the curve line of the Ecliptic, for the last three signs and for the first three signs of the Zodiac; the other six signs of the Zodiac are exactly similar in all respects. It is very proper, in concluding these instructions for constructing a Planisphere of the Zodiac, to strongly impress upon the student's mind the mathematical fact, that the fewer the perpendiculars made use of in this construction, the less true and less perfect will be the line of the Ecliptic; and the more numerous are the ordinates of declination, by so much more true and beautiful will the Zodiacal curvature of the Ecliptic be, so as to amply compensate by its superior accuracy for the additional time and labour bestowed upon the fabrication of this curious and valuable Astronomical instrument. All these particulars have been most carefully attended to in the Planisphere of the Zodiac, 26 inches long, which is sold, together with the complete set of curves for sixty degrees of latitude, &c., for the convenience of those persons who may find it by far too laborious to construct these instruments for themselves; which are printed on good strong paper, and may be had of the Author, or through the medium of his Publishers, as a separate Work from this Book, but which forms an excellent sequel to follow it.

The Construction of a Curve Pattern.

S. 539.—(See Plate 1 and Figure 11.) Take a sheet of well polished brass as aforesaid, which call the parallelogram A B, C D: in length it should be at least 190 equatorial degrees. My published Planisphere of the Zodiac is 26 inches long, and therefore the radius of it is 6½ inches. For example: let it be required to construct a Curve Pattern for the same for Edinburgh, or any other place having 56 degrees of latitude, The co-latitude is therefore 34°; the Semi-tangent of 34° is 3057 parts of Radius, or we may take 34 from our Scale of Declinations. With this extent in the compasses we turn it twice over on a Scale of Inches, and find it is equal to 4 inches, that will be so much metal to be cut away to form the curve, and we allow two inches more for S. D., the substance of metal to be left for the south end of the Pattern. At ¼ of an inch from the edge A B draw a line *n* ♋ parallel thereunto. Then from *n* to E, with the Semi-tangent of 34°, set off *n* E, and set off the same extent from ♋ to E; then draw the line E L E, and that is the Equator of the Curve Pattern. Then from the point L, the middle of the line, set off to the right and left 2° 30′, 5° 0′, 7° 30′, 10° 0′, and 12° 30′. Proceed thus till you have set off 90 equatorial degrees each way: these are for so many degrees of ascensional difference. Draw perpendiculars through all these points the whole breadth of your metal; set off the Semi-tangent of declination, which gives the ascensional difference in every point, which declination can be found by For-

mula No. 13, page 26. Cut away the superfluous metal, and file, &c., with great care, as directed for the Zodiac.. Each Pattern, if properly constructed, would employ a clever artist two days, or more, in the fabrication.

This process was observed by me in constructing the curve for each latitude. Then, by means of the sixty Patterns constructed in this manner, I engraved thirty Patterns, or separate slips, each for two degrees of latitude (mentioned in Section 538), viz., one Pattern for the 1st and 2d degrees, one for the 3d and 4th, one for the 5th and 6th degrees of latitude; so that the curves for all the sixty degrees thus engraved upon thirty separate slips or Patterns I find much more convenient for use than finding the required curve among the set of sixty separate Patterns; and to further increase this facility, for my own use I arrange my curves into six sets; namely, first set from 1° to 10° of latitude, second set from 11° to 20°, third set from 21° to 30°, the fourth set from 31° to 40°, the fifth set from 41° to 50°, and the sixth set from 51° to 60° of latitude, and by returning each Pattern to its proper place as soon as done with, I can always in an instant find the curve I desire for use.

S. 539 A.—As a further instruction on the construction of the Curve Patterns, I shall here observe, that in constructing the Patterns for the low latitudes a much greater number of perpendiculars are required; thus, for 1 to 10 degrees of latitude we must erect a perpendicular for each quarter of a degree of ascensional difference, as far as for two degrees of ascensional difference: then for the 3d, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, and 12½th degrees of ascensional difference; then for 15°, for 17½°, 20°, for 22½ degrees, or for each 2½ degrees of ascensional difference as far 90° each way; indeed, it is a very tedious and difficult task to construct the Curves for the first ten degrees of latitude; for the curvature is very peculiar, and approximates nearly to a straight line as far as to fifty degrees of declination nearly; and yet the Curve for 1° of latitude is very different to that for 2° of latitude, and so the Curve for 2° of latitude is a very different curvature to that for 3° of latitude; and in the same manner the Curves of 3° and of 4°, and of the 4th and 5th degrees, &c., of latitude, present different curvatures. And a complete Curve, extending as far as for 90 degrees of ascensional difference each way, viz., for North and South Declinations for 60 degrees of latitude, is so vast an undertaking as, I believe, was never performed, nor ever attempted, by any other person than myself. The late celebrated Raphael (Mr. R. C. Smith), who examined my complete Set of Patterns, and who ordered a set of them and a Planisphere of the Zodiac of brass, to be made by me for his own use, did not hesitate to say that the construction of the original Curves was an Herculean undertaking, and for which the scientific world would feel thankful; as he believed there was not another person who would have had the industry and patience to have completed so elaborate a work, though one so much required to facilitate the labours of the Astral Student.

CHAPTER 25.

Planis. XVI.

PRELIMINARY OBSERVATIONS ON THE RECTIFICATION OF NATIVITIES.

S. 540.—From the uncertainty of clocks and watches being correct, together with the negligence of midwives or accoucheurs in noting down the times of births, it very seldom happens that the times given to the students and professors of the Astral Sciences are the true times of the nativities: it is in consequence of this inaccuracy that the learned students and professors have invented various rules for discovering the true times of Nativities, from the estimated or given times, such as the Animoder of Ptolemy, the Trutine of Hermes, the Rectification of the Angles of the Figure of Birth by the Mundane Parallels of the Planets, &c., and the Rectification by past events or accidents. In regard to the three first-named methods, experience has taught me that very little dependence can be placed on them, as they sometimes bring out the time nearer the correct time; but in many instances they give the time farther from the truth even than the Estimate Time itself is: and as to rectifying the angles of the figure by bringing them to the same degree and minute of the Zodiac as the Sun or the Moon, that is, by placing the Sun or Moon on the cusp of one of the three prime angles, viz. on the cusp of the 1st, of the 10th, or of the 7th house, or by bringing the Sun and Moon to the Mundane Parallel of these angles; or by bringing the two malevolent planets, Saturn or Mars, to the cusps of the Mundane Parallels of the same; this last rule of Rectification involves so great a degree of absurdity, that I have really been surprised it should ever have been invented, or, after it had been invented, that any person could be found so inconsiderate as to make use of it. It is even contrary to Astrology itself; because, according to the principles of Astrology, persons born under similar positions of the Heavens scarcely ever live to years of maturity; and this, by my own observation, I know to be true; for out of a considerable number of nativities that I have seen having similar configurations, I do not recollect that more than two or three lived to full age; for such positions have in them so much of the nature of violence as generally to destroy life in infancy: but should they live to years of maturity (which, as abovementioned, very rarely happens) then would their whole lives be little better than continued scenes of trouble, vexation, and misery, brought on, in a great measure, by the perverseness and obstinacy of their own disposition. So that we must regard it as a great mercy of Divine Providence that such persons do most generally die in their infancy, and are thereby transferred from a life of trouble and misfortune to a world of bliss.

S. 541.—Secondly, agreeably to reason, truth, and observation, persons are born at every moment during the natural day of twenty-

four hours, and consequently under every possible position of the Heavens; but the absurd rule of which I am speaking would not allow of this; for example, if ten persons were born in the same town, and successively within the space of two hours from the first to the last, and, consequently, the Figures of their Nativities very widely different, yet, according to the Rectification by Mundane Parallels, the artist would be constrained to alter the given times of their births, and to assign only one Figure of the Heavens for the whole ten!! And therefore I leave it to every candid and philosophical mind, and to every enlightened student in the Celestial Sciences, to consider how excessively irrational such a mode of Rectification must be. In fact, there is only one method of Rectification which can always be depended on, and that is the Rectification by Accidents; and therefore this is the only method I shall here exemplify.

The Rectification of Nativities by past Accidents.

S. 542.—First note down the times of three, four, or five remarkable past accidents or events which have happened to the Native; and it would be best that these events should not be all of one nature, all bad or all good; but endeavour to learn from the Native the correct dates of some of the most remarkable events that have occurred in their past life, both fortunate and unfortunate, as by this means you have a much better chance of comparing the results of your calculations. Having thus noted down a list of past events, find by the Planispheres, or by the Ephemeris, what the true Solar Arc [see Sect. 544] of Direction will be corresponding to so many years and months, &c. of the Native's age for each and for every accident given, placing the true arc in each case in a line with its corresponding accident or event.

S. 543.—In this mode of Rectification the Ascendant is generally directed for the accidents of the body, such as sickness, broken limbs, &c.; the Midheaven is directed to the conjunction or other good Aspects of the Sun or Moon, or to those of the fortunate planets, Jupiter and Venus, or even to the Aspects of the Lord of the Tenth, for honor, dignities, and promotions in life, and for the setting up in business, &c. Sometimes the Sun or Moon, or whatever planet happens to be the Apheta or Hyleg, is directed to the Conjunction, Semiquartile, the Quartile, the Sesquiquadrate, or to the opposition of other Planets for sicknesses and other accidents of the body; but this last named method of directing the Apheta is generally attended with a great deal of trouble and waste of time, whether the Directions be performed in the Zodiac or in Mundo, except my New Rule of Rectification be employed.

S. 544.—See Sections 124, 125, 126, and 127 of this book, where the method of equating or finding the true Arcs according to the Placidian principles is so amply illustrated, that it is not necessary to give any instruction on that subject in this part of my Work; and that nothing might be wanting to gratify the wishes of every student and

admirer of these sublime Sciences, in addition to the Placidian scale of years upon the Planisphere of the Zodiac, the Author has also engraved another, adapted to Naibod's measure of time, and has extended it to 100 years.

S. 545.—If the Direction be in the Zodiac, the Arcs of Direction will be varied, or increased, or decreased, according as the Polar Elevation of the Planet carried on to the Aspect is increased or decreased by being placed near to or farther from the upper or lower meridian, or whether in signs of long or short ascension. And if the Direction be in Mundo, the Arc of Direction will also be varied accordingly as we take the primary distance of the Planet (which is carried forward to the aspect) nearer to or farther from the cusp of the 10th or 4th, or from the east or west angle.

S. 546.—And if the old tentative methods be used, it will sometimes require the same process to be performed fifteen or twenty times to obtain the rectification of one Nativity only, comparing the Arcs of Direction calculated for each time one with another, still altering the time, and calculating over and over again, until a time be at last found out which will bring out the Arc of Direction for the accident or event which shall be the same as the solar Arc required; and sometimes it is nearly impossible to find the exact arc required by such a tedious method.

S. 547.—But the Rule I am now presenting to the student's notice will, by assuming one time only, either later or earlier than the given time of birth, generally bring out the rectified time with the greatest exactness, seldom differing more than six or eight seconds from the perfectly true time of birth.

S. 548.—It may be here proper to remark, that in the years 1809 and 1810 I tried many experiments on this and other methods of correcting the Polar Elevation of the Apheta, and thereby succeeded in discovering the method which saves so many erections of the figures of birth, and other tedious calculations, and generally finds the Polar Elevation of the Apheta, or of the Planet to be directed to a certain aspect of the Apheta, which is required to give the true Arc of Direction sought, by only erecting one or at most two figures, besides that for the estimate time of birth; but in most cases I have succeeded by erecting one additional figure only besides that for the estimate time. In brief terms the Rule is this:—

S. 549.—Having erected the figure correctly to the estimate time, and having determined the Right Ascension and Polar Elevations, &c. of the Planet that is to be carried forward to complete the aspect, calculate the Arc of Direction of that planet to the Apheta, or of the Apheta to the aspect of any Planet which would give an accident or event of a similar nature with that noted down; and observe, that the Arc of Direction may come out one, two, or three degrees, &c. more or less than the proper solar Arc; next erect another figure for twelve, sixteen, twenty, thirty, or forty minutes sooner or later than the estimate time, and having determined again the Polar Elevation of the Apheta, or of the Planet carried on to the required aspect of

the Apheta, to this second figure of birth calculate the aforesaid Direction over again, and observe the difference between the first and second Arcs of Direction, as also the differences between the first and second Arcs of Direction and of the required solar Arc of Direction, and also the difference between the estimate and the second or assumed time of birth; then, by the process of Algebraic Equations, you may determine immediately the time which will give the true Arc of Direction, which is, therefore, the true time of birth.

S. 550.—Or, instead of the algebraic process, by substituting the more simplified form thereof, the Arithmetical Rule for the Elimination of Errors, commonly known as the Rule of Position. And yet my Rule is quite different to any thing to be found in books of Arithmetic, and was never used or adapted to the purposes of rectifying Nativities until adapted and exemplified by myself. I have had in my possession during nearly forty years past all the best books on the Astral Sciences in the English language, as also some in other languages, and never met with the Rule in any of them. I have also a great variety of the best mathematical books by the most eminent Authors; but in none of them can my Rule for the Rectification of Nativities be found; and I can with the most perfect truth assert, that in vain may the Astral student look for this Rule in any or in all the books, Arithmetical, Mathematical, Astrological, or Astronomical, that have ever been published previous to the first edition of my Celestial Planispheres; and as this Rule cannot be found in any book printed previously to mine, it must be perfectly clear and most demonstrably evident to every candid person, that the Rule here given is *an original in the Astral Science*, equally as much as if the Rule for the Elimination of Errors, or as if the Rule of Position had never been taught and had never existed. It is absurd and useless for men of narrow minds and for plagiarists to tell us that the principle of it was already known, or has long existed: let all such persons remember, that it is the perfect adaptation and the proper application of principles to new and useful purposes that constitute the claim to authorship and to the merits thereof. Many instances of this truth might be cited,—one will suffice: steam was known many thousand years ago; but the application of its power to the purposes of the steam engine is a modern invention or discovery. The only book my Rule has appeared in besides my own work is the "Grammar of Astrology," published a few years after mine, by a highly talented and respected friend, who transcribed it into his work without the acknowledgment where it was got from, leaving his readers, who had not seen my book, naturally to suppose that himself was the author of it.

S. 551.—Let every reader hereof remember that THIS RULE IS MY COPYRIGHT.

S. 552.—This Rule is also equally applicable to obtaining the true time of Birth by various Mundane Directions, Mundane Parallels, &c. when the Accidents correspond in their nature with these Mundane Directions, and the same may easily be performed by the following

Arithmetical and Logarithmetical Rule, which I have divested of all difficulty.

S. 553.—I first wrote the Rule in a manuscript, and intended it for printing in the year 1809; but it was not published till the First Edition of this Work in 1830, and I have for many years past proved its correctness upon a great number of Nativities which have come under my own observation, which in most instances produced a true Rectification by altering the Estimate Time three, four, five, or six minutes only. But if the Rules of Rectification by the Trutine of Hermes, by Mundane Parallels, &c. as hitherto *commonly practised*, had been used, the time would have been altered half an hour in some of them, and in others even an hour or more. My Rule has in some instances altered the Estimate Time fifty minutes or more, but then there have been the strongest proofs that the Rectification was equally correct as in those Nativities where the Rectified Figure only differed four or five minutes from the Estimate Time of Birth, of which I have given a splendid example by way of illustrating the following improved and newly remodelled Rule.

The Rule.

S. 554.—1. When the artist has calculated the Directions in any Nativity for the past events given to him for his guidance, and he finds the Arcs do not correspond with the required Solar Arcs, he may then safely conclude that the Estimate is not the true time of Birth, and therefore the given time requires Rectification. To save the trouble of repeatedly calculating the Longitudes, Latitudes, Declinations, Right Ascensions, Semi-diurnal, and Semi-nocturnal Arcs of the Promittor and Significator, let this be done with exactness for the given time of Birth, and let the same be done for exactly one hour before or one hour after the given time of Birth. I prefer finding these numbers for one hour after the Estimate Time of Birth. The difference of Right Ascensions, Semi-arcs, &c. between which and the Estimate Time is the hourly motion of the same.

S. 555.—Then accordingly as you assume a Position of the Heavens so many minutes sooner or later than the Estimate Time of Birth, the proportional part for so many minutes of Right Ascension, Semi-arc, &c. taken from or added to the Right Ascensions, Semi-arcs, &c. for the Estimate Time, will be the true Right Ascensions, &c. for the New Position.

S. 556.—2d. From the list of Accidents given to correct the Estimate Time by, select one of the principal Directions corresponding to a remarkable event, or accident; calculate the same, and observe whether the Arc of Direction comes out greater or less than the Solar Measure: the difference is the First Error.

S. 557.—3d. Let the Promittor's or Significator's distance from a given House or Angle in the Estimate Figure be called the First Position.

S. 558.—4th. Assume a time, twelve, sixteen, twenty, twenty-four, thirty-two, thirty-six, or forty minutes, sooner or later than the

Estimate Time; that is, make the Right Ascension of the M. Cœli 3, 4, 5, 6, 8, 9, or 10 degrees less or greater than that in the Estimate Figure of Birth. To this assumed time let the Right Ascensions and Semi-arcs of the Promittor and Significator be made correct according to S. 555.

S. 559.—Then to this assumed time find the primary distances of the Promittor and Significator from a certain Angle or House. Then calculate the given Direction or Aspect to this assumed time or second Position of the Heavens, and observe whether the Arc of Direction comes out greater or less than the Solar measure: the difference between the said Arc of Direction last found and the Solar Measure is the Second Error.

S. 560.—N.B. If the Error in the Arc of Direction of the Estimate Figure of Birth should exceed a quarter of a degree, it will in such case generally be best to alter the Right Ascension of the Mid-heaven of the Estimate Time as much as 8 or 10 degrees.

S. 561.—5th. Arrange the results in three lines in the following order :—

a. Positions, Significator's or Promittor's Distance in Degrees, &c.	In Minutes.	Errors.	Products.
b. 1st Position			
c. 2d Position			

S. 562.—Then opposite to the Promittor or Significator's distance, belonging to the First Position, place the Error of the Second Position.

S. 563.—6th. Opposite the Promittor or Significator's Primary distance of the Second Position place the Error which belongs to the First Position.

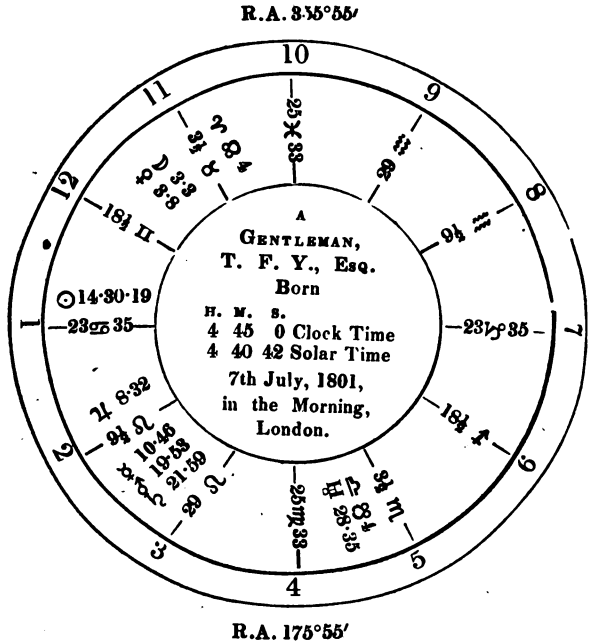
S. 564.—7th. Let the numbers of the distances, and of the Errors in degrees, &c. be all reduced into minutes of a degree, so that all may be integer numbers. Then, for the products, multiply the Positions by the Errors which stand opposite to them.

S. 565.—8th. If the Errors be of the same kind, that is, if both the Arcs of Direction are greater or both of them less than the Solar measure, take the difference of the two Errors for a divisor, and the difference of the Products for a dividend.

S. 566.—9th. But if the Errors are unlike, namely, one Arc of Direction greater and the other Arc of Direction less than the Solar measure, then take the sum of the two Errors for a divisor; and the sum of the Products for a dividend; the quotient will be the Promittor's or Significator's rectified distance (from the given Angle or House) expressed in minutes of a degree. And this rectified distance being known, so likewise is the true Time of Birth known by comparing the distance in the Estimate Time with the rectified distance, or by taking the difference of Right Ascension of the 10th House of the Estimate Time, and of the Rectified Time, allowing 15 degrees for one hour, and for every single degree reckon four minutes of time, &c.

Exemplification of the preceding Rule for the Rectification of Nativities by past Events.

S. 567.—Figure of the Heavens to the Estimate Time of Birth, as stated by the Native himself.



S. 568.—Accidents given by the Native for obtaining a Rectification.

	Y.	Months.	Solar Arc.
1. The Native's father died	10	4½	10° 32′
2. The Native went to sea	14	0	14 12
3. Attacked by severe illness	14	1¾	14 21
4. Set up in his business	18	7	18 46
5. Illness again	21	9	21 53

S. 569.—After having carefully considered the positions of the Planets in the foregoing Figure of the Heavens, and having calculated a number of Directions, but finding none of them to agree with the preceeding Solar Arcs for past events of the Native's life, I therefore concluded that the given time was not the true time of Birth, but was considerably far from it; and recollecting the Rules for selecting the Apheta, and finding that the Moon was in an Aphetical place and that the Sun was not, I considered that it must have been some direction of the Moon to an evil Aspect that caused the remarkable illness that began when the Native was fourteen years and seven weeks old, viz. in the beginning of September, and continued through September, October, and November 1815.

S. 570.—I judged that the Moon to the Mundane Semi-quartile of the Sun was the Direction which occasioned this illness. I calculated this Direction to the Estimate Time of Birth, and the Arc came out 13° 30′, which is 0° 51′ smaller than the required Solar Arc 14° 21′.

S. 571.—In order to facilitate this mode of Rectification, as the ☉ and ☽ are the Planets concerned in this calculation, we have found their Longitudes, the Right Ascensions, &c. of the same for the given time of Birth, and for one hour after.

S. 572.—

	☉'s lon. ♋	☉'s R. A.	S-d. A. ☉	☽'s lon.	☽'s lat.	☽'s dec.	☽'s R. A.	☽'s S-d. A.
	° ′ ″	° ′ ″	° ′	° ′	° ′	° ′	° ′	° ′
At Birth	14 30 19	105 44 59	121 42	3 ♊ 3	4 ♑ 18	25 ♑ 0	60 5	125 53
1 hour later	14 32 42	105 47 34	121 42	3 ♊ 33	4 ♑ 19	25 ♑ 7	60 37	126 8
Hourly motion	2 23	2 35	0 0	0 30	0 1	0 7	0 32	0 15

S. 573.—We shall have occasion to refer to the contents of this little Table after we have directed ☽ to ☌ ☉ M. C. to the Estimate Time of Birth. By referring to the Figure of Birth, the student will see the R. A. of the Tenth House or Meridian is 355° 55′, and, the ☉'s R. A. being 105° 45′, therefore the Sun's distance from the 10th is 109° 50′; which 109° 50′ taken from the Sun's Semi-diurnal Arc 121·42, leaves 11° 52′ for the Sun's distance from the 1st house, and the Moon's distance from the 10th was 64° 10′. With these numbers we shall first direct ☽ to □ of ☉ in Mundo converse, from which we shall derive the Arc of Direction of ☽ ☌ ☉ M. C.

S. 574.—☽ □ ☉ in Mundo Converse Motion,

		P. Logar.
As Semi-diurnal Arc of ☉	121° 42′	1700
Is to the ☉'s distance from the 1st	11 52	1·1809
So is the ☽'s Semi-diurnal Arc	125 53	1553
		1·3362
(Subtract the Proportional Logarithm of the first Term)		1700
To ☽'s Secondary Distance from the 10th	12°·16	= 1·1662
Add ☽'s Primary Distance from the 10th	64·10	
The Sum is the Arc of Direction of ☽ □ ☉ M.C.	76·26	
Half the ☽'s S-d. Arc subtract	62·56	
Leaves Arc of Direction of ☽ ☐ ☉ M. C.	13·30	
The required Solar Arc is	14·21	
Error too small	0·51	

S. 575.—The foregoing Example is worked out at full length properly as an Analogy; but in the following Examples we shall make use of the Complement Arithmetical of the First Term in the proportion. By adding the Complement Arithmetical of the First Term to the proportional Logarithms of the Second and Third Terms, the sum of *these three*, rejecting 10 from the Index, is the proportional Logarithm of the answer or 4th Term required in the Analogy. The Complement Arithmetical of a Logarithm is found by subtracting the given Logarithm from the logarithmic Radius, which Radius is always 10, with as many Zeros annexed as there are decimals in the given Logarithm. The proportional Logarithms having four figures besides the Index, therefore the logarithmic Radius of these Logarithms is 10·0000; from which subtracting 1700, the proportional Logarithm of the First Term, there remains 9·8300, the Complement Arithmetical of the First Term's proportional Logarithm. Now, if we add 9·8300 to 1·1809 and 1553 together, their sum is 11·1662; but rejecting the 10 leaves 1·1662, the proportional Logarithm of 12° 16′, the Moon's secondary distance on the West side of the 10th house, or (Meridian) precisely the same as by the former process, whereby we save two lines in the working of each Example.

S. 576.—Next, let us assume a position 40 minutes later than the Estimate:—

The R. A. to the Estimate Time of the 10th is	355° 55′
For 40 minutes later add	10 0
The sum is	365 55
And rejecting the circle therefrom, the R. A. of the 10th is	5 55

And by adding the part proportional for the increase of Right Ascension, &c., of the ☉ and ☽ for 40 minutes later to the numbers for the Estimate Time of Birth, we shall have,

S. 577.—The Right Ascension of the Sun then is ..... 105° 47′
The Sun's distance from the 10th..... 99 52
The Sun's distance from the 1st 21 50
The Right Ascension of the Moon then will be 60 26
The Moon distance from the 10th then 54 31
The Semi-diurnal Arc of the Moon will then be..... 126 3

With these numbers we again direct the Moon,

S. 578.— ☽ □ ☉ in Mundo Converse.

As Semi-diurnal Arc of ☉..... 121·42 (co-arc) 9·8300
Is to the distance of ☉ from 1st..... 21·50 9161
So is Semi-diurnal Arc of ☽ ..... 126· 3 1547

To ☽ 's Secondary Distance from the 10th 22° 37′ ·9008
To which add the ☽ 's Primary Distance 54 31

Gives the Arc of Direction of ☽ □ ☉ M.C. = 77 8
Half the Moon's Semi-diurnal Arc subtract.. 63 1

Leaves the Moon to the Semi-quartile of the Sun 14 7 in M. C.
The Solar Arc required..... 14 21

The Error too small 0 14

S. 579.—The Correction or Elimination of Errors.

Position.	Distance of ☉	In Minutes.	Errors.	Products.
1st	109·50	6590	14	92260
2d	99·52	5992	51	305592
Differences			37	213332

S. 580.— ☽ □ ☉ in Mundo Converse.

S. 580.—Agreeably to S. 465, as the Errors in the Arcs of Direction are both of the same kind, namely, both too small, we take the difference of the two Errors for a Divisor, and the difference of the products for a Dividend. Thus,

S. 581.—37) 213332 (5765$\frac{27}{37}$; say 5766′, equal 96° 6′, for the Sun's rectified Distance from the 10th, which answers to 6 h. 24 m. 36 sec. Solar Time before noonday; or to 5 h. 35 m. 36 sec. Solar Time in the morning; or 5 h. 39 m. 54 sec. Clock Time.

185
283
259
243
222
212
185
27

S. 582.—To find the R. A. of the Rectified Midheaven.

From the Right Ascension of the Sun	105° 47′
Subtract the Sun's distance from the 10th	96 6
There remains the R. A. of the 10th, or Meridian	9 41

S. 583.—As the Rectified Time just found is 54′ 54″ later than the Estimate Time, or, we may say, 55 minutes later, by adding the part proportional in the increase of the ☉ and ☽'s Right Ascension, &c., due to 55 minutes, to their Right Ascensions for the given Time, we shall have,

S. 584.

☉'s long.	☉'s R. A.	☽'s long.	☽'s R. A.	☽'s S-d. A.
♎ 14° 32′ 30″	105° 47′ 21″	3 ♊ 3	60·34	126·7

S. 585.—From the Sun's Semi-diurnal Arc	121° 42′
Subtract the Sun's distance from the 10th	96 6
Leaves the Sun's distance from the 1st house	25 36
And ☽'s R. A. 60° 34′ — 9° 41′ leaves ☽'s distance à 10th	50 53

Now, to prove the correctness of this mode of Rectification, we will, with these last corrected numbers, direct the Moon again to the Semi-quartile of the Sun in Mundo by Converse Motion.

S. 586.— ☽ □ ☉, M. C., &c.

			P. Logar.
As Semi-diurnal Arc of ☉	121° 42′	(co-arc)	9·8300
Is to ☉'s distance from the 1st	25 36		8470
So is ☽'s Semi-diurnal Arc	126 7		1545
To ☽'s Secondary Distance from the 10th	26° 32′		·8315
Add ☽'s Primary Distance from the 10th	50 53		
Their sum is Arc of Direction of ☽ □ ☉, M. C.	77 25		
Half the Moon's Semi-diurnal Arc subtract	63 3½		
Leaves Arc of Direction of ☽ ☌ ☉, M. C. =	14 21½		
The Solar Arc required	14 21		
The difference being only	0 0½		

S. 587.—This trifling difference of half a minute of a degree is so small a matter as not in the least to affect the correctness of the Calculation; and would not have appeared at all, if I had taken half of the Moon's Semi-diurnal Arc as being 63° 4′, which in practice is usually by reckoning, for every fraction of a minute which is equal to or exceeds 30 seconds, another integral minute.

S. 588.—Those persons who have had much practice in the use of Logarithms are well aware that the very trifling error of 15, 20, or 30 seconds is unavoidable, especially when some of the numbers for the Arcs are so large as 120 or 130 degrees, more particularly in using the Proportional Logarithms, which contain only four figures besides the index: indeed, such exactness of calculation would only

be attainable by the use of Logarithms containing seven figures besides the index, the use of which would be found by far too tedious for the purposes of the Astrologer.

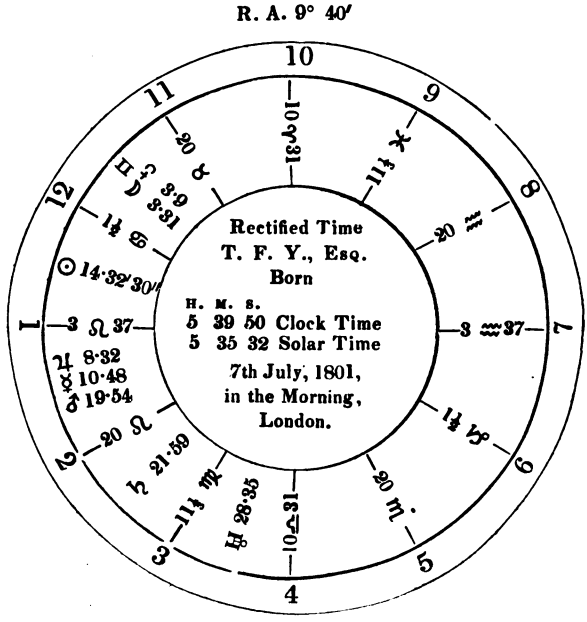
S. 589.—To shew how nearly the Rectification just found approaches to perfection, we will assume a time only four seconds earlier than the one just found; that is, making the R. A. of the 10th = 9° 40′, and the Sun's distance from the 10th 96° 7′, and the Sun's distance from the 1st = 25° 35′, and the ☽'s distance from the 10th = 50° 54′. Then again for,

S. 590.— ☽ □ ☉, M. C., &c.

		P. Logar.
As Semi-diurnal Arc of ☉.....	121·42 (co. ar.)	9·8300
Is to ☉'s distance from 1st	25·35	8473
So is Semi-diurnal Arc of ☽.....	126· 7	1545
To ☽'s secondary distance from the 10th	26·30⅔	·8318
The ☽'s Primary distance, add	50·54	
Arc Direction of ☽ □ ☉, M. C. =	77·24⅔ =	77·24⅔
Half of Moon's S.-d. Arc subtract	63· 3½ =	63· 3⅔
Leaves the Arc of Direction of ☽ ☌ ☉, M. C. =		14·21⅙

Here follows the Rectified Figure of Birth to this precise Position.

S. 591.



S. 592.—This is an extreme of exactness beyond what is ever required in practice. I have repeated this calculation to shew the student he must not always expect the result of his calculations to come out exactly the even minute of a degree, let him take all the pains he can do. I wish further to impress on his mind, that in practice a minute of a degree, which answers to about six days and a half of the native's life, is not worth noticing.

S. 593.—In Primary Directions he must not expect to be able to predict the chief events of human life to the exact day on which they should happen: if he comes within six months, or even a year in some cases, he ought to be satisfied, seeing that there are many secondary causes which will produce an anticipation or retarding of the Primary Direction.

S. 594.—There is a very important Primary Direction answering to one of the principal events given in the foregoing list of accidents, namely, the Ascendant or 1st house to the Conjunction of Mars. Mars in this Geniture is Ruler in the 10th and 5th houses; that is to say, he rules both business and pleasures; at 21 years and 9 months we accordingly find the native had a severe illness, originating in great exertions in business and in pleasures and indulgences, &c. This Direction is thus calculated:—

S. 595.—The Ascendant ☌ ♂.

From the Right Ascension of Mars	142° 42′
The Declination of Mars being north, subtract Ascensional Difference	21 7
The oblique Ascension of Mars is	121 35
From which subtract the oblique Ascension of the Ascendant	99 40
Then the Arc of Direction of the Ascendant to Conjunction of ♂ is	21 55
The required Solar Arc for 21 years 9 months is.....	21 53

S. 596.—These two Arcs may be considered as identical, the difference being no more than two minutes of a degree. To every candid and judicious artist the agreement of this last direction with the event which took place at that time of the Native's life will be a very strong corroboration of the truth and correctness of the Rectification of the Time of Birth found by directing ☽ to ☐ of the ☉ in Mundo by converse motion; but I have still stronger proofs, furnished by the mother and sister of the Native, which I shall give in their own words towards the conclusion of this Chapter.

S. 597.—Table of the Astronomical Requisites.

To the Rectified Time for this Nativity.

	Lat.	Decl.	Tangent.	R. A.	A. X.	S.D.A.	½	S.N.A.	½
☉		22 n 41	9·621142	105 47	31 42	121 42	40 34		
P. l.						1700	6471		
☽	4 n 19	25 n 7	9·670977	60 34	36 7	126 7	42 2⅓		
P. l.						1545	6316		
♅	0 n 44	1 n 14	8·333025	178 17	0 55	90 55	30 18	89 5	29 42
♄	1 n 17	15 n 25	9·440529	144 47	20 18	110 18	36 46	69 42	23 14
♃	0 n 38	18 n 46	9·531023	131 8	25 18	115 18	38 26	64 42	21 34
♂	1 n 11	15 n 59	9·457067	142 42	21 7	111 7	37 2⅓	68 53	22 57⅔
♀	4 S 12	16 n 41	9·476683	61 57	22 9	112 9	37 23		
☿	0 n 7	17 n 42	9·503982	133 10	23 40	113 40	37 53⅓	66 20	22 6⅔

S. 598.—*Note.* The declination of the ☽ is rather less than 25° 7′ N, being about 25° 6′ 59″ N. When a Nativity is calculated by the Astronomical Tables of Right Ascensions, &c. a Table of Requisites should be calculated and arranged agreeably to the Form exhibited in this specimen, leaving a space or line between each of the Planets marked P. l. wherein should be placed the proportional logarithm for the Semi-diurnal and Semi-nocturnal Arcs of all the Planets, and for the third parts thereof also immediately under the same, as is done for the ☉ and ☽ in the above Table: I have here omitted them, by way of not extending my book over much.

S. 599.—And another Table should be drawn out, to contain the Planets' distances from the 1st, 10th, 4th, and 7th houses of the Celestial Figure, accordingly as the Planets are posited on the east side or west side of the Meridian; together with their circles of Position, their own Poles of Elevation, the Tangents of the said Poles, and their oblique Ascensions and oblique Descensions under their own respective Poles of Elevation, accordingly as they may be posited in the Ascending or Descending part of Heaven.

S. 600.—In reference to the Table of Requisites, of which a specimen has just been presented to the student, it may here be well to remark, that if any Planet forms a Direction in Mundo in the contrary sphere to which it is posited at birth, that is to say, if a Planet situated below the Horizon ascends above it to form an Aspect, or if a Planet situated above the Horizon at the time of Birth should descend below it to complete the Direction, in both these cases should the Semi-diurnal and the Semi-nocturnal Arcs and their parts be found and inserted in the Tables of Requisites, as has been done in the foregoing Example.

S. 601.—It may be well to remark, that the Ascendant to the Conjunction, or body of Mars, might have been found thus: subtract the distance of Mars in Rt. Ascension from the 4th house from his Semi-

nocturnal Arc, and the remainder would be the Arc of Direction required. The Semi-nocturnal Arc of Mars is 68° 53′: subtract 46° 58′, there remains 21° 55′, the same Arc of Direction as was found by using the oblique ascensions. In like manner, any Planet located in the 9th, 8th, or 7th houses may be directed to the opposition of the Ascendant by subtracting the Planets' distance in R. A. from the 10th from his Semi-diurnal Arc, the remainder will be the Arc of Direction of that Planet to the opposition of the Ascendant. *Note.*—1700 and 1545 are the proportional logarithms of 121° 42′ and 126° 7′, the S.d. Arcs of the ☉ and ☽.

S. 602.—The Gentleman whose estimate and rectified figures of Birth I have just presented to the notice of my candid readers, according to my recollection, called on me in the month of December 1831, or in January 1832, and then stated that he was born on the 7th July 1801, at a quarter-of-an-hour before 5 o'clock in the morning, in London, and furnished me with the list of accidents before mentioned. As it was to be done in my five-guinea style, he being anxious to have it carefully calculated, I told him that it was seldom the given time of Birth could be depended upon, and that I judged, from the figure I had hastily sketched out of his Horoscope, that it would be necessary to bestow considerable pains in rectifying his Nativity. The Gentleman said his mother had retired independent from business, and was living a day's journey from London, but that he would make it his particular business to pay her a visit the next day, to ask her what time he was born, and would return and inform me exactly in two days from that hour; observing to me, that his sister was nearly sixteen years older than himself, and that she had noted down the time of his birth in the Family Bible on the very morning that he was born.

S. 603.—The Gentleman returned exactly at the time he had promised me, when the following conversation took place between us:—

S. 604.—*Mr. T. F. Y.* "Well, Mr. Oxley, how are you getting on with my Nativity? Have you rectified it, and found out the right time by the accidents I told you of? and what is the time your calculation makes me to have been born?"

S. 605.—*Mr. O.* I find the time considerably different, Sir, to what you said: I find it to have been most part of an hour later than you told me. Instead of being a quarter *before* five o'clock, I find that the birth was nearer to six o'clock than to five in the morning. I make it to have been twenty minutes before six by the clock time, or about twenty-four minutes before six in the morning by solar time.

S. 606.—*Mr. T. F. Y.* Why really, Mr. Oxley, you astonish me: your science must needs be a very exact and true one, and you must yourself be very clever in it. You will, no doubt, be much pleased when I tell you that your calculation has brought out the very time my mother and sister say that I was born, and I think you will be pleased when I tell you all about it. I left town yesterday morning early, as I told you I should, and arrived safely at my mother's house: as soon as the usual compliments were over between me and

my mother and sister, I said, "Mother, I have engaged Mr. Oxley to calculate my Nativity, and I was determined to come and ask you what time I was born. I told him that I was born a quarter before five o'clock in the morning: was not that the right time?"

S. 607.—*Mrs. Y.* No, my dear Thomas, that was not the right time, and I am afraid you will throw the Gentleman very much wrong in his calculations, and give him a great deal of needless trouble. You were born at about half-past five o'clock in the morning.

S. 608.—*Miss Y.* No, mother, I do assure you it was something later. I remember it quite well, as if it were but yesterday, and I recollect it was from five to ten minutes past the half hour. I wrote it down in the Bible, and here it is, "*T. F. Y.* born the 7th of July, 1801, from twenty to about five-and-twenty minutes before six in the morning."

S. 609.—*Mr. T. F. Y.* So you see, Mr. Oxley, how very nicely your calculation agrees with the time noted down by my sister; and I do assure you that nothing in the world could so strongly convince me of the truth of your science, as my having given you the time of my birth nearly an hour wrong, and that you have discovered the very moment I was born by calculating from the events of my past life.

S. 610.—To my candid readers and friends of the Astral science I need not offer an apology for occupying their time a few moments in giving them the full particulars of this very interesting and powerful proof in support of its verity. From the many Nativities that I have calculated it would have been easy for me to have selected a great many more Examples of Rectification performed by my Rule, even as many as would have filled a large volume, in which the difference of time was not more than from three to ten minutes between the Estimate and Rectified Times of Birth; but the one, of which I have given such an ample and clear elucidation will, I trust, be quite satisfactory to the ingenious student, and will enable him easily and successfully to obtain a perfect Rectification of every Nativity on which he may please to apply my Rule, provided suitable events of the Native's past life are given him, and selected as data for his guidance.

S. 611.—Many instances similar to the well known case of the celebrated Poet Dryden's Prediction of the misfortunes and death of his son Charles, both ancient and modern, can be appealed to as historical proofs of the truth of our Science; but this Example of the Rectification of the Nativity of Mr. T. F. Y. must be considered by all candid persons as a strong Mathematical Demonstration of the Truth of Astrology.

S. 611 A.—I shall now, having room here, add one more very strong proof of the Truth of Predictions by the Astral Sciences. In my Book on the Celestial Planispheres which was written in 1828 and 1829, and printed and published in the year 1830, in my Remarks on the Nativity of his late Majesty King William the Fourth, from the calculations I had made when he was Duke of

Clarence, I predicted with great exactness the time of his Coronation to be when the King was 63 years old (see the Book aforesaid at page 199), and also the severe illness of His Majesty in November and December 1830, when he was about 65¼ years old (see page 200, as aforesaid). The Book was printed full one year and three months before the date of the Coronation. There can be no doubt whatever that the learned lords about His Majesty could not tell this; for in June, or early in July, 1830, it was asserted that the King would be crowned in October or November of that year. The foregoing Predictions were not written in Hieroglyphics, but expressed in words of plain and positive English, which could not have been retracted if the Predictions had happened to fail. A number of my scientific friends, to whom I shewed the proof-sheets of my Book as it was passing through the press in the summer of 1830, advised me by all means to alter my Prediction of the time of the King's Coronation; for they said the King would certainly be crowned in the autumn of the same year, and they said I should be wrong a whole year in regard to that important event in the King's life. I told them that, as the time of a Royal Prince's birth must be correctly noted down and well known, I would not venture on altering the given time of King William the Fourth's birth, for I had carefully made my calculations, and would abide by them. A year after giving me the advice to alter the time, &c. when the Royal Proclamation appeared, stating the time of the grand ceremony, the same parties most warmly congratulated me on the wonderful correctness of my Predictions!!!

THE GEM OF THE ASTRAL SCIENCES,

CHAPTER 26,

BRING THE

FOURTH PART OF THIS BOOK;

AND

AN ORIGINAL TREATISE ON PERFORMING THE VARIOUS CALCULATIONS REQUIRED IN THE CELESTIAL SCIENCES FOR NEW ZEALAND, VAN DIEMAN'S LAND, AUSTRALIA, AND FOR ALL OTHER PLACES IN THE SOUTHERN HEMISPHERE.

S. 612.—This New Branch of Instruction has long been wanting, and very much desired by many students and professors of Genethliacal Astronomy. I had many years ago made a beginning in this department of Astronomical Calculations, but from pressure of business laid it aside, until one of my very worthy friends (who had, during the years 1831, 1832, 1833, and 1834, taken a regular course of instruction in Spherical Trigonometry and the Projection of the

Celestial Planispheres) called on me about three years ago, requesting instruction how to erect the Figure of the Heavens, &c., for the Geniture of his grandson, J. A. J., who was born at Launceston, in Van Dieman's Land, in Latitude 41° South, and in 147° of East Longitude. This circumstance caused me to write the substance of the present Treatise for the purpose of his instruction.

Observations on the Phenomena of the Twelve Houses of the Heavens, &c.

S. 613.—To have a clear idea of Directional Motion in the Genitures of persons who are born in the Southern Hemisphere, it is very necessary to observe, first, that in the northern parts of the earth we are, when contemplating the Celestial Figure, supposed to stand with our face to the South, and then the 1st house, or East Angle, will be to our left hand, and the Sun and Planets all rise to our left hand: and secondly, that the 7th house, or West Angle, is to the right hand; then the 10th house is the South, and the 4th house is the North, or Midnight Meridian, or lower Meridian.

S. 614.—Thirdly. But in the Southern Hemisphere of our globe, every thing beforementioned is not only reversed, but even more than reversed, as the ingenious student will see by the Examples I shall immediately lay before him. For instance, if we were at Launceston, in Van Dieman's Land, the latitude of which is about 41° south, in order to see the noonday Sun, we there face to the north; and the cusp of the 10th house will be the north point of the Compass, and the 1st house or east angle will be on our right hand, and the 7th house or west angle will then be on our left hand side, and therefore the Sun and Planets would all set on our left side.

S. 615.—Or more comprehensively, we may say, that in the Southern Hemisphere the Sun and Planets rise in the east on our right side, and ascend up to the Meridian, and then from the Meridian or north point they descend to the west, and the 4th house or lower Meridian is the south point of the compass in the Celestial figure of the southern Hemisphere.

S. 616.—The father of the boy, who knew quite well the difference between the common way of reckoning time and the astronomical method, says in his letter that "his son was born on the 7th of September, 1844, at 20 minutes past 12 in the morning, before daybreak." This phraseology is singular, but it is wonderfully correct, so much so, that there is no mistaking that he really was born, according to astronomical reckoning, at Launceston as aforesaid, on the 6th of September, 1844, at 12h. 20m. post meridian, and it is to this time that I make my calculations. The student must recollect that 1 o'clock in the morning of the 7th of September by the civil account is equal to the 6th day of September at 13h. 0m. post meridian, and so would 6 o'clock in the morning of the 7th of September be the same thing as the 6th day of September at 18 hours post meridian, the calculation of the planets' places from the Ephemeris being always taken according to the distance in time from the preceding day at noon: and further, the time of birth by the clock

must always be converted into solar time, as was explained in Sections 288 and 289.

S. 617.—Our first operation will be to find the time at London (or Greenwich) corresponding to 6th September 1844, at 12h. 20m. P. M.

By S. 297. From the given time at Launceston .. 12h. 20m. P.M.
Subtract for 147° east longitude..... 9 48

Leaves for the mean time at London..... 2 32 P.M.

and we must, therefore, calculate the Planet's places to 2h. 32m. P.M., or the 6th September, 1844, at London, and these places so found will be their positions in the Heavens at 12h. 20m. P.M., at Launceston. They are as follow,

S. 618.

☉'s lon.	☽'s lon.	☽'s lat.	♄ R	♅ R	♂	♀	☿	♉ in ♐ 9·0
14 ♍ 2	2 ♋ 39	2 S 1	1♒19	0♈56	3♍16	1♌13	10♎35	♅ 5♈ 4 R.

In this case the R. A. of ☉ is 165° 18'..... lat. ♅ 0° S 46

S. 619.—The next step is to find the R. A. of the 10th house, thus:

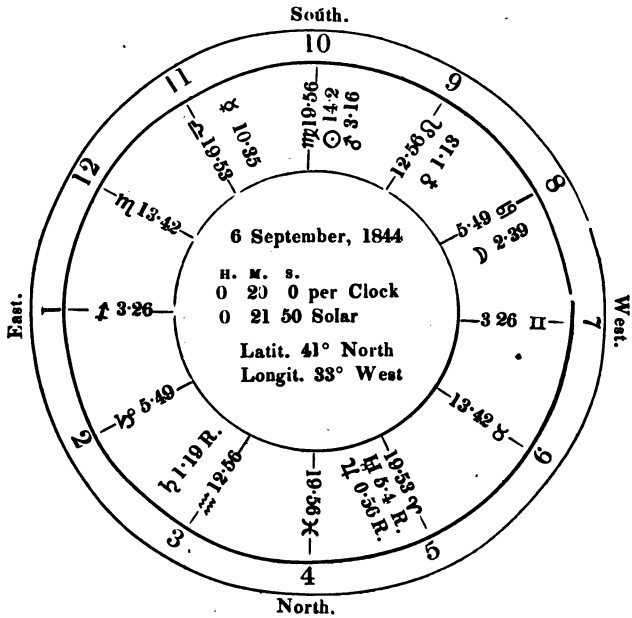
	H.	M.	S.
To the Time at Launceston	12	20	0
Add for the Equation of Time	0	1	50
The Sum is the Solar Time at Launceston.....	12	21	50

To the R. A. in Time of 12h. 21m. 50s. in degrees.....	185°	27′
Add the R. A. of ☉ in 14 ♍ 2	165	18
The R. A. of the 10th house is.....	350	45
Subtract half the circle.....	180	0
Remains the R. A. of 10th in latitude 41° north, and in the opposite longitude to Launceston.....	170	45
Add	30	0
The obl. Ascension of the 11th is.....	200	45
Add	30	0
The obl. Ascension of the 12th is.....	230	45
Add	30	0
The obl. Ascension of the 1st is	260	45
Add	30	0
The obl. Ascension of the 2d is.....	290	45
Add	30	0
The obl. Ascension of the 3d is.....	320	45

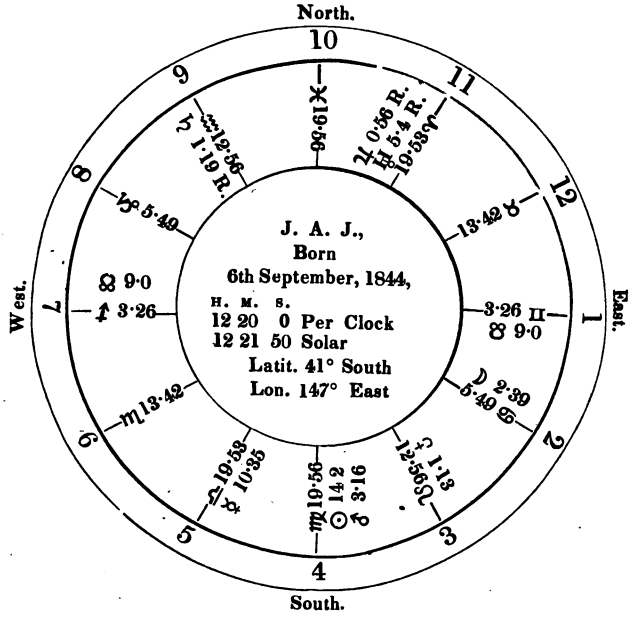
For the Latitude of Birth 41°, the nearest Pole for the 11th and 3d houses is 17°, and for the 12th and 2d houses we use the Polar Elevation of 30°, and the following is the result of the calculations:

S. 620.—The R. A. of the 10th house 170° 45′ gives 19° 56′ ♍.
Then will O. A. 200° 45′ in 17° north lat. give 19 °53′ ♎ the 11th.
O. A. 230 45 in 30 north lat. give 13 42 ♏ 12th.
O. A. 260 45 in 41 north lat. give 3 26 ♐ 1st.
O. A. 290 45 in 30 north lat. give 5 49 ♑ 2d.
O. A. 320 45 in 17 north lat. give 12 56 ♒ 3d.

Figure No. 1.—S. 621.



By reversing No. 1 we obtain Figure No. 2.
S. 623.



S. 623 A.—Having herein explained to the Student how to obtain by easy methods very correctly the Celestial Figure of Birth for a person born in the southern hemisphere, it only remains for me to observe, that if he there finds ♈ or ♎ ascends on the cusp of the 1st house, judge the person under ♂. If ♉ or ♏ ascends, then say under ♀; and if ♐ or ♓ ascends, the person is under ♃, and apply the aphorisms for a person born under ♃, &c. &c.

S. 624.—The method here set forth of obtaining Figure No. 1 must be used by the Student, of erecting a Figure of the Heavens in the same north latitude as the place of Birth had south latitude, and, moreover, for a place on our globe, which is the very Antipodes of the place of Birth; because, according to the best of my information, no Tables of Oblique Ascensions have ever yet been published; neither have I ever heard of any person, except myself, being in possession of Tables of Oblique Ascensions for the Southern Hemisphere: and therefore the Student must either apply the Tables of Oblique Ascensions for the northern Hemisphere in the manner which I have just taught him, or have recourse to the Celestial Planispheres in the manner which I shall now immediately explain to him.

S. 625.—See Figure 13, Plate No. 1.—Construct the Planisphere of the 12 houses of the Heavens in the manner already explained in this Book for any given latitude that may be required. Now let the ingenious Student remember that it has been shewn him (S. 614) that the noonday meridian Sun, in the southern parts of this Globe, is to the north of the spectator there, and that the Sun and the Planets rise in the east on the right hand side, and set or descend into the nocturnal spaces on his left side: the apparent motion of the Celestial Orbs being from B towards A in this Diagram of the Southern Hemisphere, and just the reverse of what is shewn in Figure 12 of Plate No. 1, which shews the position of the Zodiac in the Northern Hemisphere, where the apparent movement of the Zodiac is from A, the East on the left side to B, the West on the right hand side.

S. 626.—This being the case, we reverse the Planisphere of the Zodiac, and turn 0 ♋ 0 towards S, as in Figure 13, Plate No. 1, taking good care that the Equator of the Planisphere of the Zodiac coincides exactly with the Equator of the Planisphere of the 12 Houses; then, by sliding the Zodiacal Planisphere from B towards A, bring any required degree of the Zodiac upon the line of the 10th House (or noonday Meridian) or upper Meridian, and there let it rest; you will thus have presented to your view the positions of the Planets, and the degrees of the Zodiac occupying the cusps of the 12 Houses for any given moment required in the Southern Hemisphere.

S. 627.—*Note:* Figure 13 of Plate No. 1 represents the position of the Heavens at the moment the Sun enters ♋, with 0 ♋ 0 then upon the Meridian, being the longest day to us in the Northern Hemisphere and the shortest day to the inhabitants of the Southern Hemisphere. This Diagram most truly represents all this.

S. 628.—Rules and Observations for making Astronomical Calculations in the Southern Hemisphere,

Applicable to all Places in Australia, New Holland, New Zealand, Van Dieman's Land, &c. &c. &c.

S. 629.—*Rule the First:* To find the Oblique Ascension of the Sun, of any Planet, or of any degree of the Zodiac.

If the Declination be North, the sum of the Right Ascension and of the Ascensional Difference will be the Oblique Ascension required; but if the Declination be South, the difference between the Right Ascension and the Ascensional Difference will be the Oblique Ascension required.

S. 630.—*Rule the Second:* To find the Oblique Descension of the Sun, Planets, or of any required degrees of the Zodiac.

If the Declination be { North, the Difference / South, the sum } of the Right Ascension and Ascensional Difference will be the Oblique Descension required.

S. 631.—*Rule the Third:* To find the Semi-diurnal and Semi-nocturnal Arcs in the Southern Hemisphere.

When the declination of the Sun or planet is South, add the ascensional difference to 90°, and the sum will be the Semi-diurnal Arc required; and the Semi-diurnal taken from 180° leaves the Semi-nocturnal Arc. But when the declination of the Sun or of a Planet be North, subtract the ascensional difference from 90°, and the remainder is the Semi-diurnal Arc required; which Semi-diurnal Arc as aforesaid, if taken from 180°, leaves the Semi-nocturnal Arc.

S. 632.—Directions of the Planets to the various Aspects.

Having found the Semi-diurnal and Semi-nocturnal Arcs of the Planets, &c. by the Rules just given for the Southern Hemisphere, the Ascendant and Midheaven can be directed to the Aspects of the Planets in the same manner as taught herein for Northern latitudes.

S. 633.—The Polar Elevations of the Planets are found by taking their distances from the 10th and 4th Houses, precisely in the same manner as they are found for places in the Northern Hemisphere; observing, however, always to apply the ascensional difference as here taught for the Southern Hemisphere in obtaining the Oblique Ascensions and Oblique Descensions of the Planets, or of any given Aspect or Degree of the Zodiac to which you wish to direct any Planet.

S. 634.—The Student will observe that, in reference to the Quadrant of Latitude, Figure 10, Plate No. 1, the entire Arch of it extends from the 15°th ♓ to the 15°th ♋: the part cut away, shewn by the dotted line, extends from 0 ♈ 0 to 0 ♋ 0.

Observations on the Proper Mode of constructing the Celestial Planispheres on true Mathematical Principles.

S. 635.—I shall begin my remarks on this part of the subject by observing, that the Natural Semi-tangents possess the very desirable property of producing the ascensional difference of any star or planet according to the quantity of its declination, and therefore are capable of resolving all Problems relating to the rising and setting of the heavenly bodies, and of exhibiting in the plainest manner the Semi-diurnal and Semi-nocturnal Arcs of the Planets within the Radius of the circle upon which the Planisphere of the Zodiac was constructed, to the North or South of the Equator of the said Planisphere. Now, I beg leave to observe, that if the Radius of a Planisphere was 10 inches, the Natural Tangent of the Sun's greatest declination 23° 28′ is $4\cdot\frac{3411}{10000}$ inches; but the Natural Semi-tangent of the same would be 2·077 inches. Now, in regard to my published Planispheres, the actual length of the Zodiacal Planisphere is 26 inches, and the generating Radius of Construction is therefore 6·5 inches, and the Natural Tangent to this Radius for 23° 28′ is $2\cdot\frac{8211}{10000}$ inches, and the Natural Semi-tangent of 23° 28′ is $1\cdot\frac{3455}{10000}$ inches.

S. 636.—Now, let the Student remember, that if we construct the Planisphere of the Zodiac by a scale of Natural Tangents, we must use the same scale of Tangents in the construction of the Planisphere Curves of Polar Elevations, and also for the construction of the Planisphere of the 12 houses; and he will see, by Section 644, that if we

suppose that we gain any advantage in the greater breadth of Declinations, it is more than counter-balanced by disadvantages of another kind.

S. 637.—If we use the Scale of Semi-tangents, or if we take in our compasses the decimal parts of Radius from a very correct Diagonal Scale, most accurately made to any given Radius, for the construction of our Zodiacal Planisphere, then must all the Curve Patterns be constructed by the Scale of Natural Semi-tangents, and all other things dependent thereon must be taken from the same Scale, or from a Scale of Radius divided into 10,000 or 100,000 decimal parts, as before-mentioned.

S. 638.—I have taken so much pains in these experiments, as not only to have constructed the Planispheres to the Natural Tangents and Natural Semi-tangents to once the Radius, but I have done much more to investigate both the Theory and Practice of Planispherometry; for I have constructed Planispheres to double the curvature, to two and a half times, and to three times the extent of curvature of the Planispheres that I have published, and from 6½ inches to 7 feet long and more: but should fear, if I had published Planispheres of such extraordinary curvature, that our talented Mathematicians would have found fault with them, and would have called them distorted representations of the Celestial Spheres.

S. 639.—I am most happy to say, that the Planispheres I have published have been patronised by many purchasers highly distinguished for their attainments in the Mathematical Sciences; the late celebrated Dr. Olinthus Gregory, LL.D., and many other eminent Members of the Universities of Oxford and Cambridge, have spoken in the highest terms of commendation of my Celestial Planispheres, being constructed upon the strictest mathematical principles.

S. 640.—After expending upwards of Five Hundred Pounds in Planispheric Experiments, and in the construction of Mathematical Dividing Engines whereby to divide and engrave the divisions upon the copper plates, and after having studied these subjects for thirty-eight or thirty-nine years, I believe the candid reader will allow that I must have obtained some valuable knowledge both in the Theory and Practice of Planispheric Projections.

S. 641.—While engaged in making remarks upon Planispheric constructions, it is proper to observe that, in such constructions as require the use of the Tangents or Secants, very great practical difficulties are found to occur: this was acknowledged by Mr. Benjamin Donne, who published two Circular Planispheres, I believe 30 inches in diameter, and some of the lines of his projection required a substitute for a pair of compasses from 36 to upwards of 40 feet in length. I believe that information of this kind will be useful to the Student, and may keep him from incurring much trouble and expense in the pursuit of such experiments.

S. 642.—There has been some cavilling among persons who know little or nothing of the true principles of Planispherometry, in reference to the Curvature of the Planisphere; but some of those persons,

to my certain knowledge, did not know the Sine from the Tangent, nor the Tangent from the Semi-tangent: a few of these would-be Critics have said, that both the Planisphere of the Zodiac and the Curve Patterns for the Polar Elevations should all be constructed by means of a Scale of Tangents.

S. 643.—But if these gentlemen had ever studied Keith's "Plane and Spherical Trigonometry," or Dr. Kelly's excellent work, entitled "An Introduction to Spherics and Nautical Astronomy," or Le Gendre's "Plane and Spherical Trigonometry," they would have come to a very different conclusion, and would have acknowledged that I was right in making use of the Natural Semi-tangents for these purposes.

S. 644.—I shall now proceed to prove that, if we used the Tangents, we could not make the Planispheres universal for all latitudes; in fact, we could not construct a whole or perfect Planisphere for the low latitudes: for Example, if it were required to construct the Planisphere Curve or Horizon for 10° of latitude. Its greatest extent above and below the Equator of the Planisphere of the 12 houses is equal to the co.-latitude, or 80°, set off both ways. Now, if we suppose the Radius of the Planisphere to be 10 inches, then the Natural Tangent of 80° would be = 56·712 inches, and 6·5 tenths of this 56·712 is = 36·863 inches, which is Natural Tangent of 80° for my published Planispheres, the Radius of which is 6 inches and 5-tenths. We double 56·712, and also 36·863, we then have 113·424 inches and 73·726 inches, or 9 feet 5 inches and 424 thousandths, and 6 feet 1 inch and 726 thousandths for the breadth of paper required to contain the Planisphere to each Radius as aforesaid, even without allowing any thing for a margin. But, according to my plan of using the Natural Semi-tangents, we must take the double of 8·396 inches and of 5·456 inches, and we shall have 16 inches 792 thousandths and 10 inches and 912 thousandths, only for the breadth of the paper required for each respective Planisphere.

S. 645.—What I have said on this subject will be sufficiently convincing to the mind of every reasonable person who is a mathematician, and none but a mathematician should venture an opinion on an important subject so purely mathematical as the construction of the Celestial Planispheres. I could have made a volume five times as large as the present one, if I had written all that I know upon these subjects. I boast not of superior abilities; if I were to boast of any thing, it would be of patient industry, close investigation, practical experience both in the Mathematical and Mechanical performance of my undertaking, with an ardent desire to communicate, within as small a compass as possible, a very large amount of useful and original information, which will be held in esteem for its utility both by the present and by future generations.

THOMAS OXLEY, Civil Engineer, &c.

FINIS.

NOTICE TO ASTRAL STUDENTS.

THE PLATES

That are sold separately from the Book, when mounted on pasteboard, form a complete set of Patterns for the Use and Projection of the Celestial Planispheres.

PLATE I.—The Planisphere of the Zodiac, or Ecliptic Slider (5).

II.—The Planisphere of the 12 Houses for London, with the Circles of the Mundane Aspects upon it (6).

III.—This Plate contains 20 slips or pieces, each piece for two different latitudes, or 40 Curve Patterns, beginning at 1 degree and ending at the 40th degree of latitude (7).

IV.—This Plate contains 12 pieces, or 24 Curve Patterns; viz. for 41° and 42°, for 43° and 44°, 45° and 46°, 47° and 48°, 49° and 50°, 51° and 52°, 53° and 54°, 55° and 56°, 57° and 58°, 59° and 60°, and four Supernumerary Patterns; namely, one for 51° 31′, for the latitude of London; one for the Poles of the 11th and 3d, the 5th and 9th; and one for the 2d and 12th, the 6th and 8th Houses, for projecting the Planisphere for London; and one Curve Pattern for latitude 53½°, because there are many populous towns in the north of this kingdom which fall very nearly under this parallel of latitude. Thus will the Student be furnished with Curve Patterns for every even degree from the Equator to 60 degrees of north and south latitude, and four more, being in all Sixty-four Patterns; a thing perfectly unprecedented by any person except by the Author of this Work (8).

V.—The Quadrant of Latitude, for placing the Planets correctly on the Celestial Planisphere of any Nativity when the Planets have latitude north or south from the line of the Ecliptic (9).

VI.—This Plate has the Curves of the odd degrees, viz. 1°, 3°, 5°, 7°, 9°, and 11°, from 1° to 59° of latitude, and the Parallels of each degree of declination as far as 50 degrees. This Plate is useful for finding the Semi-diurnal and Semi-nocturnal Arcs, and Risings and Settings of the Planets, and other Celestial Bodies, as also for finding the Pole of a Planet instrumentally by the method given in Section 284 of the "Gem of the Astral Sciences (10)."

Note.—The numbers marked thus, (5), (6), (7), (8), (9), (10), would be the number of each Plate as referred to in Sections 220, 221, 222, 223, if the Series had been continued from the four Plates

that belong to and accompany this book. No. (6) and No. (10), after being pasted on pasteboard, are not to be cut out, but should be kept quite flat between boards, as also should the Ecliptic Slider.

The Author is now engaged in engraving New Plates for the Curve Patterns, which he expects to have finished in November of this year (1848).

The complete set of the Six valuable Copperplates aforesaid will be printed on good strong paper, stitched in a wrapper, price Eight Shillings. The same mounted on pasteboard, and the Planisphere of the Zodiac, the Curve Patterns, and the Quadrant of Latitude cut out and prepared as Instruments ready for the Student's use, price One Pound. These Copperplates are large, being thirty inches long by ten inches broad, and consequently expensive in printing and mounting, &c.; therefore the Author will only have them printed as he receives orders for them, otherwise he might involve himself in the outlay of a vast amount of capital, which will be avoided by supplying them as they are wanted: the money to be remitted to him by a Post-Office Order at the same time the order is sent, payable to him at the Lambeth Post and Money-Order Office, in Mount-street, Westminster-road, London; and the articles will always be prepared and forwarded to their destination within eight or ten days after receiving the remittance.

Steel Beam Spring-Adjusting Compasses, at Fifteen Shillings and upwards, made at his Manufactory, No. 3, Elizabeth-place, Westminster-road, London; where the Planisphere of the Zodiac, the Curve Patterns, of brass, and all the other Instruments mentioned in this Book, are to be procured by those persons who are desirous of possessing them, and willing to pay for Articles of so superior a Quality.

ERRATA.

As very great care has been taken both by the Author and the Printers of this Book in correcting the proof sheets, it is confidently hoped that few errors will be found, the Firm by whom this Work has been executed having acquired a high reputation, of many years' standing, for the elegance and correctness of the vast number of Scientific Publications which have issued from their press; and the Author trusts this will be a sufficient guarantee to the lovers of science that it has been rendered in every respect worthy of their approbation.

Page 27, Formula No 14, for "preferred," *read* "prepared."

In Section 131, for "Saturn's distance from the 10th," *read* "4° 47'."

In Section 193, for "six new Astronomical," *read* "six new Astronomical Tables."

Section 202 to Section 207, for "see Plate No. 3, Figure 6," *read* "Plate No. 3, Figure 7;" and in these Examples, instead of "seconds in the numbers taken from the Abridged Tables," *read* "tenths of a minute." The same remark applies to Section 309, as Table 2, Section 187, does not shew seconds, but tenths of a minute, in Right Ascension.

COMPTON AND RITCHIE, PRINTERS, MIDDLE STREET, CLOTH FAIR.